

HTA HT4000L

Clarity Control Module

ENG

Code/Rev.: M187/100A Date: 2025-05-12

Phone: +420 251 013 400 clarity@dataapex.com www.dataapex.com DataApex Ltd. Petrzilkova 2583/13 158 00 Prague 5 Czech Republic

Clarity[®], DataApex[®] and $\blacktriangle^{\mathbb{R}}$ are trademarks of DataApex Ltd. Microsoft[®] and WindowsTM are trademarks of Microsoft Corporation.

DataApex reserves the right to make changes to manuals without prior notice. Updated manuals can be downloaded from www.dataapex.com.

Author: MP

Contents

1 HT4000L Control module	1
2 Requirements	2
3 Installation Procedure	
3.1 HT4000L setup - communication	
3.1.1 Additional connections	4
3.2 Clarity Configuration	5
4 Using the control module	7
4.1 Method Setup - AS	7
4.1.1 General	8
4.1.2 Solvent Wash	9
4.1.3 Move Sample	
4.1.4 Add Reagent	
4.1.5 Injection	
4.1.6 Solvents	
4.2 Hardware Configuration	
4.3 Device Monitor	15
4.4 HT4000L Setup	
5 Report Setup	
6 Troubleshooting	

To facilitate the orientation in the **HTA HT4000L** 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 HT4000L Control module

This manual describes the setting of **HT4000L** autosampler. The control module enables direct control of the instrument over LAN. 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: HT4000L 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.

3 Installation Procedure

3.1 HT4000L setup - communication

The **HT4000L** 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 Additional connections

The **HT4000L** 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, **HT4000L** sampler has a Mini DIN 8 pins 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 **HT4000L** autosamplers can be found in the following table:

PIN	Function	Note
1	FREEOUT-NO	Output = Relay contact (open by default)
2	FREEOUT-COM	Relay common contact
3	SAMPINS-NO	Output = Relay contact (open by default)
4	+5 Volts	Output = max. 20 mA
5	SAMPINS-COM	Relay common contact
6	RDY	Signal input (true low); Low-Level = 0÷0.5 V Hi-level = 4÷12 V
7	GND	Ground
8	FREE-IN	Signal input (true low); Low-Level = 0÷0.5 V Hi-level = 4÷12 V

Tab. 1: HT4000L - Analyzer connector

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

Relay specification - V_{max} = 24V; I_{max} =1A

See the HT4000L User Manual provided by HTA to see more details on connections.

3.2 Clarity Configuration

System Configuration											×
Setup Con	trol Modules				15	ber of Inst	ruments: 1	•			
Name	Used	S/N	-	6	3 Instrument 1	Instrum	ment 2 🔘 Ins	trument 3	O Instru	ment 4	
AS AS Sangler 1 LC GC Detector Balance Thermostat Valve Fraction Collector Capillary Electrophoresis Auxiliary	Instrument 1		<	0	Name Instrument 1 Instrument Type GC Name Sample GC Sample Assumption	er 1 tat ut: :: ings etup	Fro HT 4000L	m •4000L	6)		
Available Control Modules									- П	×	
		Installed Only	Filter:	All	~	ht4000L	2			0	
Name	Statu	s Vendor		Commer	t		Module Info				
HT4000L	insta	led HTA									
GC C Detector Balance Thermostat Valve II Fraction Collector Capillary Electropl Musilary Add Can Can Can	roresis								Help		

Fig. 2: System Configuration

- Start the **Clarity** station by clicking on the A 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 **HT4000L** sampler and press the *Add* 3 button.

The Setup dialog for HTA 4000L will appear.

Setup		×
IP address	192 . 168 . 0 . 254	As Status
Sampler name	HT4000L	
Synchronization	Normal ~	
Temperature [°C]	Off 🔺	
Single Injection Tray	Return To Standby	
Standby Position Ou	tside	Update
ОК	Cancel Help	

Fig. 3: HTA HT4000L Setup

• Fill in the appropriate *IP Address* field and press the *As Status…* button. If the communication is correct, the <u>Hardware Configuration</u> dialog displaying the autosampler configuration appears.

Note: The <u>Setup</u> dialog for HTA 4000L is more closely described in the chapter **"HT4000L Setup"** on pg. **16**.

The **HT4000L** autosampler item will appear in the *Setup Control Modules* list of the *System Configuration* dialog.

- Drag and drop the HT4000L 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 (3) 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 **HT4000L** in the *Ext. Start Dig. Input* drop-down menu, using the *1* as a 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 <u>Method Setup - AS</u> tab appears in the *Method Setup* dialog, enabling the setting of the **HT4000L** 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 multiple sub-tabs assigned for the various parts of the **HT4000L** autosampler method. Additional buttons allow to display the<u>Hardware Configuration</u> dialog of the **HT4000L** autosampler or to read the instrument method from the **HT4000L** 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 **HT4000L** 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 **HT4000L** 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 General

Main tab defining the basics of AS control method.

Method Setup default3 (MODIFIED)			×
New Open Save Save as * Report setup Audit trail Send method by e-mail			
Select Sampler 1 Sampler 1			
HT4000L Sampler Method			
General Solvent Wash Move Sample Add Reagent Injection Solvents			
General			
Syringe Size 100 µl V			
Loop Size full bo			
Fill Speed [µl/s]			
Viscosity Delay [s] 5			
AC Chables Domo Madoi Net Roady (Mathad has not hoon cont)	45		
AS status being model not ready (method has not been sent)	AD .		
Event Table AS Measurement Integration Calculation Advanced			
R OK Cancel	2 :	end Meth	bod

Fig. 4: Method Setup - AS - General

Syringe Size

Volume of the syringe. The syringe volume affects the limits of other parameters such as speed and volume.

Loop Size [µl]

Volume of the loop. The loop volume affects the limits of other parameters such as volume.

Analysis Time [min]

Time of the sample analysis (time from the injection to the moment in which the analyzer will be ready again). This parameter is taken into consideration by the autosampler only if *Synchronization* option is set to *Normal w/o Rdy*.. For more details see the chapter **HT4000L Setup** on pg. **16**.

Fill Speed [µl/s]

Sets the syringe aspiration speed.

Viscosity Delay [s]

Sets the time the syringe remains in the sample vial after the plunger has been raised. It allows viscous samples time to fill the syringe.

4.1.2 Solvent Wash

The *Method Setup - AS - Solvent Wash* tab allows to set the parameters for washing of the solvent.

lethod Setup de	efault3 - #19	; 27.04.2023 12:	30:07					>
New Open	Save	Save as R	eport setup Audit trail	Send method by e-mail	? Help			
elect Sampler		Sampler 1	Enabled	I				
		н	F4000L Sampler Method					
General S	olvent Wash	Move Sample A	dd Reagent Injection S	olvents				
Solvent Wa	ish							
Pre Wash (Cycles	1	Stator Wash Cycles	0 *				
Pre Wash V	/olume [µl]	100 🔹	Stator Wash Volume [µl]	0				
Pre Wash M	Mode	inject \vee						
Post Wash	Cycles	3 🔺						
Post Wash	Volume [µl]	100 +						
Post Wash	Mode	inject \checkmark						
AS Status	Demo M	ode: Not Ready (Met	hod has not been sent)		From AS			
Event Table	AS Measu	rement Integration	Calculation Advanced					
	Cancel					-	and Math	hor
	Concel						gnumeu	no-Cl

Fig. 5: Method Setup - AS - Solvent Wash

For more details on the setting of the Solvent Wash please see the **User Manual** of the autosampler provided by **HTA**.

4.1.3 Move Sample

The *Method Setup - AS - Move Sample* tab allows to set details on moving the samples.

Method Setup default3 - #19; 27.04.2023 12:30:07			\times
New Open Save Save as Report setup Audt trail Send method by Help			
Select Sampler Sampler 1			
HT4000L Sampler Method			
General Solvent Wash Move Sample Add Reagent Injection Solvents			
Move Sample Cycles d + Move Sample Volume [µ] 0 + Intermediate Cycles 0 +			
AS Status Demo Mode: Not Ready (Method has not been sent) From AS Event Table AS Measurement Integration Calculation Advanced			
R OK Cancel	51	Send Meth	od

Fig. 6: Method Setup - AS - Move Sample

For more details on the setting of the *Move Sample* please see the **User Manual** of the autosampler provided by **HTA**.

4.1.4 Add Reagent

The *Method Setup - AS - Add Reagent* tab allows to set the behavior when adding a reagent.

Method Setup default3 (MC	DIFIED)			\times
New Open Save	Save as Report setup Audit trail Send method by e-mail			
Select Sampler	Sampler 1 💛 🖾 Enabled			
	HT4000L Sampler Method			
General Solvent Wash	Move Sample Add Reagent Injection Solvents			
Add Reagent				
Reagent #1 Cycles:	d Reagent #3 Cydes: 0			
Volume Reagent #1 [µ]	0 🔺 Volume Reagent #3 [µl] 0 🛓			
Reagent #2 Cycles:	0 A Mix Cycles: 0 A			
Volume Reagent #2 [µ]	0 A Mix Volume [µ] 0 A			
	Wait Time [min]: 0,0			
AS Status Demo M	lode: Not Ready (Method has not been sent) From A	AS		
Event Table AS Meas	urement Integration Calculation Advanced			
R OK Cancel		3 -	Send Meth	hod

Fig. 7: Method Setup - AS - Add Reagent

For more details on the setting of the *Add Reagent* please see the **User Manual** of the autosampler provided by **HTA**.

4.1.5 Injection

The *Method Setup - AS - Injection* tab allows to set the injection mode of the **HT4000L** autosampler.

thod Setup default3 - #19	; 27.04.2023 12:30:07	-		
New Open Save	Save as Report setup Audit trail Send method by e-mail			
ect Sampler	Sampler 1 🗸 🗸 Enabled			
	HT4000L Sampler Method			
General Solvent Wash	Move Sample Add Reagent Injection Solvents			
Injection				
Injection Mode	Full Loop V Sample Wash Cycles 0			
	Pull up Strokes 3			
Injection Speed [ul/e]				
Injection Speed [Ja/s]				
Air Volume [µl]				
Flush Volume [µl]	30 🛓			
Fill Volume [µl]	100			
S Status Demo M	ode: Not Ready (Method has not been sent) From AS	;		
vent Table AS Measu	rement Integration Calculation Advanced			
1 OK Cancel			Send Meth	100

Fig. 8: Method Setup - AS - Injection

For more details on the setting of the *Injection* please see the **User Manual** of the autosampler provided by **HTA**.

Note: As of firmware version 2.24, the lower flow rate limit for the 10 ml syringe is 10 µl/s.

4.1.6 Solvents

The *Method Setup - AS - Solvents* tab allows to set particular position of regencies and solvents.

lethod Setup default3 - #1	9; 27.04.2023 12:30:07			
New Open Save	Save as Report setup Audt trail Send method by email			
elect Sampler	Sampler 1 Sampler 1			
	HT4000L Sampler Method			
General Solvent Wash	Move Sample Add Reagent Injection Solvents			
Positions				
Reagent #1	V Post Wash Solvent #1 V			
Reagent #2	Post Wash Solvent #2			
reagant # 2				
Reagent #3	v			
Pre Wash Solvent #1	v			
Pre Wash Solvent #2				
AS Status Demo I	Iode: Not Ready (Method has not been sent) From AS	s		
Event Table AS Meas	urement Integration Calculation Advanced			
Cancel		12	Send Meth	hod

Fig. 9: Method Setup - AS - Solvents

For more details on the setting of the *Solvents* please see the **User Manual** of the autosampler provided by **HTA**.

4.2 Hardware Configuration

The AS Status button in the <u>Device Monitor</u> dialog displays the Hardware Configuration dialog. It displays autosampler serial number, settings and configuration of module which is used in the autosampler.

Hardware Configura	tion							×
Sampler SN	Demo							
Syringe Volume	100 µl							
Sound	Level 0							
Light	Off							
Module 100 Module	≘ 200 Modi	ule 210	Module 220	Module 230	Module 240	Module 300	Module 400	
Installed		No	Active	signals				
Enabled			Valve t	ime [s]				
Insertion depth [mn	1							
Insertion								
Dispensation speed	[ul/s]							
Valve position stand	l-by							
Delay to stand-by p	osition [s]							
Loop size [ul]								
Valve feedback								
				ж	Cancel			

Fig. 10: HTA HT4000L Hardware Configuration

Sampler SN

Detected serial number of the device.

Syringe Volume

Size of the syringe used in the autosampler.

Sound

Detected sound level.

Light

Detected light set on the autosampler.

Depending on the module type installed in the autosampler, the proper settings of *Module 100, 200, 210, 220, 230, 240, 330* or *400* are displayed.

4.3 Device Monitor

@ Instrumen	it 1 - De	vice Moni	tor			—		×
<u>F</u> ile Co <u>n</u> trol	<u>V</u> iew	<u>W</u> indow	<u>H</u> elp		▶ 🖾 🛛 🗏 🤅	b 🖀 II 🔟		
HT4000L S	Sampler	1 (SN De	moSN)	Demo Mo	ode: Not Ready (Met	hod has not been	sent) 🧲	
Sample Quantized S Reagent 1 Reagent 2 Reagent 3 Pre Wash St Pre Wash St	ample olvent 1 olvent 2			Post Wash Solve Post Wash Solve Reagent Wait Tin Analysis Time	nt 1	AS Sta	<u>tus</u>	
Set Tempera Status Devic	ture e			Actual Temperati	ure			
Solvent Vial Wash Volume Wash Cycles	2	1		Wash Position	Waste ~ Start Wash Abort Wash			
For help press F	1.							

Fig. 11: HT4000L Device Monitor

The Device Monitor window for the **HT4000L** autosampler enables to monitor the status of the **HT4000L** autosampler and display its configuration.

AS Status...

Opens the <u>Hardware Configuration</u> dialog described in the chapter **"Hardware Configuration"** on pg. **14**.

4.4 HT4000L Setup

HTA HT4000L Setup dialog (accessible through the *System Configuration* dialog) allows to manually set the parameters needed for the communication with the **HT4000L** autosampler.

Setup		×
IP address	192 . 168 . 0 . 254	As Status
Sampler name	HT4000L	
Synchronization	Normal	
Temperature [°C]	Off	
Standby Position Ou	ıtside	Update
ОК	Cancel Help	

Fig. 12: HTA HT4000L Setup

IP Address

In case of LAN communication sets the IP address of the **HT4000L** autosampler connected to the computer via network.

AS Status...

When pressed, checks whether there is the **HT4000L** 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 <u>Hardware Configuration</u> dialog or an error message, depending on the success of the detection.

Synchronization

Allows to set the synchronization of the injection.

Option	AS starts the sample preparation (pre wash, pull up strokes)	AS injects the sample in the injector	AS gives the <i>Start</i> signal to the analyzer
Normal	At the reception of the <i>Ready</i> signal from the analyzer	After ending the sample preparation the AS again checks the presence of the <i>Ready</i> signal from the analyzer and then starts the injection	At the beginning of the syringe plunger movement
Normal w/o Ready	At the end of the analysis time set in AS method	After ending the sample preparation	At the beginning of the syringe plunger movement
Normal Sng Ready	At the reception of the <i>Ready</i> signal from the analyzer	After ending the sample preparation	At the beginning of the syringe plunger movement

Temperature [°C]

Set the tray temperature. This value can be between $4^{\circ}C$ and $40^{\circ}C$ (active conditioning) or *Off* (inactive conditioning). Other values changes the value to *Off*.

Single Injection Tray Return To Standby

If checked, the tray return to standby position after the single injection finishes.

Standby Position Outside

If checked, the tray Standby position remains open.

5 Report Setup

C Print Preview						×
Print	📸 Print to PDF 🛛 🐴 Send PDF 🔌	▶ 📕 🔍 🗨 <u>C</u> lose				
			General Properties			
	Syringe Size [µl]:	100		10		
	Loop Size [µl]:	20	Viscosity Delay [min]:	0		
	Analysis Time [min]:	0				
			Solvent Wash			
	Pre wash cycle(s):	1	Stator wash cycle(s):	0		
	Pre Wash Volume [µl]:	100	Stator Wash Volume [µl]:	0		
	Pre wash mode:	Inject				
	Post wash cycle(s):	3				
	Post Wash Volume [µl]:	100				
	Post wash mode:	Inject				
			Move Sample			
	Move sample cycle(s):	0				
	Move Sample Volume [µl]:	0				
	Move sample intermediate cycle	(s): 0				
			Add Reagent			
	Reagent #1 cycle(s)	0	Mix cycle(s)	0		
	Volume Reagent #1 [µl]:	0	Mix Volume [µl]:	0		
	Reagent #2 cycle(s):	0	Wait time [min]:	0,0		
	Volume Reagent #2 [µl]:	0				
	Reagent #3 cycle(s)	0				
	Volume Reagent #3 [µl]:	0				
			Injection			
	Injection mode:	Full Loop	Fill volume [µl]:	100		
	Injection speed [µl/s]:	10	Sample Washes cycle(s):	0		
	Air volume [µl]:	0	Pull up strokes:	3		
	Flush volume [µl]:	30				
Page 2						

Fig. 13: HT4000L report preview

All autosampler-specific settings (that means the data from all sub-tabs of the <u>Method</u> <u>Setup - AS</u> 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=HT4000L_%D.txt
reset=off
```

- *Note:* Instead of x.x.x.x type the correct IP address used to communicate with the **HTA HT4000L** autosampler. This information is displayed when the *AS Status* button in the <u>Method Setup AS</u> 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**).

FAILED to send the method to sub-device.

Possible cause:	The selected flow	rate is lowe	er than the mi	nimum support	ed by the d	levice
	firmware (e.g., set	tting <10 µl/s	with firmware	e version below	2.24 for a	10 ml
	syringe).					
o:						

Solution: Adjust the injection speed to match the limits of your current firmware version, or contact HTA to request a firmware update if the lower speed is required.