

AGILENT 7890

Clarity Control Module

ENG

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To facilitate the orientation in the **Agilent 7890** 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 Agilent 7890 Control module

This manual describes the setting of the **Agilent 7890** chromatograph control module. Supported versions of the chromatograph are **7890A** and **7890B**. The control module enables direct control of the instrument over Local Area Network (LAN).



Fig. 1: Agilent 7890A Gas Chromatograph (with 7683 autosampler)

1.1 General Conditions of Agilent Autosampler Control

Clarity allows controlling all Agilent GC autosamplers and for their control is always required to purchase **AS Control Module (p/n A26)** license. Not all combinations of autosamplers and 7890 GCs are possible. To find out if desired combination of autosampler and 7890 GC is available refer to following table.

Tab. 1: Possible combinations of Agilent autosamplers and Agilent gas chromatographs:

		Autosa	mplers		
		7673 (A, B, II)	7683	7693	6850
Chromatograph	7890	×	\checkmark	\checkmark	×

The autosampler 7683 (or 7693) is connected to GC via Agilent proprietary connection and its hardware configuration is described in the section **Sampler tab on pg. 29**because the autosampler control is implemented through DataApex 7980 Control Module.

There is a Dual Injection mode support implemented for 7890 GCs. In case of 7890 CGs Dual Injection hardware configuration is described in the section **Sampler tab on pg. 29** because the autosampler control is implemented through DataApex 7890 Control Module.

2 Requirements

• Clarity installation with GC Control module (p/n A23).

Caution: Minimal firmware version required for **7890A** and **7890B** is **A.01.10.0**.

- LAN card in the PC.
- Cross LAN cable (p/n SK08).

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 Agilent 7890 Setup - Communication

The GC must be fully configured prior to connecting to **Clarity**. No special settings have to be made on the **Agilent 7890** chromatograph, only the correct IP address of the instrument (set on the OPTIONS key screen by using COMMUNICATION - IP item). A default IP address of most Agilent GC's is 10.1.1.101 which is suitable only in case the GC is connected directly to computer using separate network.

Caution: Do not use the Agilent 7890 DHCP server feature.

When using the LAN communication it is recommended to attach the GC chromatograph directly to the PC avoiding hubs, switches etc. Contact your local LAN administrator who can make the appropriate settings.

In case your network uses firewall for protection, make sure that connection is not blocked in **both** directions. (chromatograph uses separate connection for control communication and for data sending).

Caution: **Cross LAN** cable is primarily used for the direct connection of the chromatograph and the PC. This cable can also be used for the connection of the device to the switch or network socket, but with older switches, the **straight LAN** cable might be necessary.

3.2 Clarity Configuration

System Configuration						×
Setup Contro	l Modules	(5 Number of Instrument	ts: 4 🔹		
Name Ut	ed S/N DemoSN nstrument 1 nstrument 1 nstrument 1 nstrument 1	Nam Inst GC Nam	strument 1) instrument 2 e ument 1 trument Type	Instrument 3 Instrument 3 From 7890 7890 6 7890 7890 7890 7890	ent 4	
1 Add Remove Abb	st Setup	Ext. Read	I Inputs & Outputs Start Dig. Input: Iy Dig. Output: ellaneous Settings Units Setup	Device	Number	
Available Control Modules	Installed Only	Filter: All	~ 7890 2	- 0	×	
Name	Status Vendor	Hiter: All	Comment	Module Info	•	
 → S → HP 7683 → HP 7693 → LC → GC 	installed Agilent installed Agilent		Part of 7890. Part of 7890.			
C 2399 C Agient GC system by Detector Balance Valve Thermostat Capillary Electrophon Capillary Electrophon Capillary Sector Auxiliary			Aglent GC system compone	ents su		
Add Cancel				Help		

Fig. 2: System Configuration

- In the System Configuration dialog press the Add button ① to invoke the Available Control Modules dialog.
- Type "7890" into the searching field on the top of the dialog ② for quick filtering out the desired instrument.
 - Select the Agilent 7890 in the GC section and press the Add button. 3
 - The Agilent 7890 Setup dialog will appear.

gilent 7890 Setup	
IP Address of 7890	10 . 1 . 1 . 101
IP Address of This Compu	uter 0.0.0.0 ~
AutoDetect Press Au	utoDetect to Test Connection and Download Settings from GC
Keyboard Lock	
Connection GC Signals	Sampler Valves Aux PCM

Fig. 3: Agilent 7890 Setup

- Fill in the *IP address of the 7890* and *IP address for receiving data* (i.e. IP address of computer with installed **Clarity** datastation). Ask your company's IT person if you don't know them. A default IP address of most Agilent GC's is 10.1.1.101 which is suitable only in case the GC is connected directly to computer using separate network.
- Press the *Autodetect* button to read all settings from the instrument. Upon successful detection the serial number of the GC will be displayed.

Note: In most cases it is recommended not to change the settings obtained through the *Autodetect* function. However some modules (e.g. PCM, valves or Aux Pressure modules) are not autodetected correctly and in certain systems it is necessary to set them manually.

- Check the Keyboard Lock checkbox for ensuring the exclusive access to the chromatograph. Apart from locking the keyboard of the device, this will also prevent other users connected to the same network from connecting to the chromatograph.
- Switch to the *GC* tab to verify the correct detection of injectors, inlets, detectors and columns. Do not change the autodetected values.
 - Switch to the *Signals* tab (for more details see the <u>Agilent 7890 Setup</u> dialog section later in the manual), select the correct number of signals you want to

acquire, name them and possibly check *This Device Starts the Run in Clarity* / *Clarity Starts This Device* radiobutton. The *Clarity Starts This Device* option should be checked only when the GC will not start the acquisition (that means it will not be triggered by the GC Start button, external start contact or autosampler). Press the *OK* button.

- On the *Sampler* tab verify the auto detected sampler version and components, set the *Syringe Size* and *Solvent Wash Mode*.
- On *Valves* tab verify the identified valves, on the *Aux* tab verify the detected auxiliaries.
- Press *OK*. The **Agilent 7890** item ④ will appear in the *Setup Control Modules* list of the *System Configuration* dialog.
- Drag the GC item from the Setup Control Modules list on the left side to the desired Instrument tab (5) on the right side (6), or use the -> button (7) to do so.
- *Note:* In case there is no detector used with 7890 it is necessary to add other detector to the same Instrument (e.g. DEMO detector available on each station), otherwise it would be not possible to send the method and start the GC by **Clarity**.

4 Using the control module

New *GC* tab appears in the *Method Setup* dialog, enabling the setting of the GC control method. With an automatic sampler configured, *AS* tab also appears, allowing the setting of the autosampler method.

4.1 Hardware Configuration

Hardware Configuration					
Type of Machine:	Agilent 7890A	~			
Connection:	http://192.168.0.123:9110				
SN:	CN10939118				
_					
	OK <u>C</u> ancel				

Fig. 4: Hardware Configuration

This dialog is invoked by pressing the *GC Status* button in the *Method Setup - GC* dialog. *Hardware Configuration* dialog displays the type of the chromatograph, it's serial number and the IP address and port to which it is connected.

4.2 Method Setup - Autosampler

	_						-		
			7	~	-	= 2	•		
New C	Open	Save	Save as	Report setup	Audit trail	Send method by e-mail	Help		
elect Sampl	ler		Sampler 1		- Enabled	I			
				Curre	nt		AS Status		
Injection	Mode	Front Inje	tor Back Inje	ctor Tray					
Use I	njector			Use Tray					
OF	ront								
0	Back			Vial No. Shift al Injection and T	(av)				
0	Both		(101 00	1	(uy)				
AS Status		Not Rea	dy (Method has	s not been sent)			From AS		
AS Status		Not Rea	dy (Method has	s not been sent)			From AS		
AS Status Event Tabl					ntegration Calcu	lation Advanced	From AS		
	_				ntegration Calcu	lation Advanced	From AS		

Fig. 5: Method Setup - AS - Mode

Use Injector

Selects the injector which will be used.

Use Tray

Checks if Tray will have to be used.

Vial No. Shift

Sets the shift between numbers of vials injected by both injectors. Active with both injectors and tray used.

Method Setup 789	0 - #1; 19.02.	2024 15:29:5	51							×
New Open		ve as	Report setup	Audit trail	Send meth e-mail	od by	? Help			
Select Sampler	Sa	mpler 1		Enabled						
			Curren	nt			AS Status			
Injection Mode	Front Injector	Back Injector	Tray							
Number of Inje	ections	1	Pre Injection	n Dwell Time [s]	0					
Multiple Inject	ion Delay [s]	0	Post Injectio	on Dwell Time [s]	0					
Washes and Pu Solvent A Solvent B Sample Wash Sample Pumps	Pre Washes	Post Washes	Volume [%] 80 80	Draw Speed [µ Dispense Spee Disp. Speed W Viscosity Delay Depth Offset [d (µL/min) ash (µL/min) [s]	300 6000 6000 0 0				
AS Status	Ready						From AS			
Event Table As	GC Me	easurement A	Acquisition Int	tegration Calcul	ation Adva	nced		3 s	end Meth	od

Fig. 6: Method Setup - AS - Injector

Number of Injections

Sets the number of injections performed with every sample.

Multiple Injection Delay

Sets the delay between individual injections in case of multiple injections.

Pre Injection Dwell Time

Sets the time the needle remains in the inlet before the injection.

Post Injection Dwell Time

Sets the time the needle remains in the inlet after the injection.

Pre Washes

Sets how many times the syringe will be washed by a particular solvent or sample before the injection.

Post Washes

Sets how many times the syringe will be washed by a particular solvent after the injection.

Volume

Sets the percentage of the syringe volume washed.

Sample Pumps

Sets how many times the syringe plunger is moved up and down with the needle in the sample.

Draw Speed

Sets the speed of drawing the sample.

Dispense Speed

Sets the speed of injecting the sample.

Viscosity Delay

Sets how many seconds the plunger pauses at the top of the pump and injection strokes.

Depth offset

Sets the depth offset of the syringe needle.

Note: Autoinjector turret without external tray does not support identification of missing vials. In case there will be requested to inject from position where vial is not placed the injection will take place as usual. This injection will result in chromatogram with unexpected signal pattern (for example).

4.3 Method Setup - GC

4.3.1 Oven/Zones

New Open Save	Save as Report setup	. Audit trail Send me e-ma	thod by Help	
lect GC	GC 1	 Enabled 		
	Curre	nt	GC Status.	
	t Column 1 Front Detector Tim			
Oven Parameters		Temperature Zones		
On Oven: Max [°C	80 Equilibration [min]	Inj. Front [°C]	50	
Heat Rate Final Tem [°C/min] [°C]	p Hold Time Total Time [min] [min]	Inj. Back [°C]	50	
	50 1.00 1.00	Det. Front [°C]	50	
15.00	30 3.00 6.00	Det. Back [°C]	50	
		Det. Third [°C]	50	
On Cryo: Temp [°C	50 Timeout [min] 1	Det. Fourth [°C]	50	
Quick Cool	Fault	Aux #1 [°C]	50	
Post Run: Time [min] Temp [°C]	0 Aux #2 [°C]	50	
GC Status Not F	eady (Method has not been sent)		From GC	
ac status - Not P	and a for the sent		Homec	
vent Table AS G	Measurement Acquisition In	ntegration Calculation Adv	anced	

Fig. 7: Method Setup - GC - Oven/Zones

This tab allows to set the parameters for oven and temperature zones. Particular fields may vary, according to the configuration.

Oven : Max

Sets the maximal allowed temperature for the column oven.

Note: Please note that the maximum value may differ for certain GC models.

Equilibration

Sets the time of oven temperature equilibration.

Gradient Table

Sets the *Heat Rate*, desired temperature (*Final Temp*) and time to hold this temperature (*Hold Time*). The *Total Time* column will be calculated automatically. In other words, for isothermal part of the temperature gradient, the temperature set in *Final Temp* will be kept for the interval set in *Hold Time*. To delete a row, simply delete the value in the *Heat Rate* column on that row.

Temperature Zones

Sets the temperature of particular zones.

Cryo Temp

Sets the temperature setpoint for the cryogenic cooling.

Quick Cool

Turns on/off the Quick Cool feature.

Fault

When checked, GC shuts the oven down if it does not reach setpoint temperature after 16 minutes of continuous Cryo operation.

Timeout

Turns on/off and setting the setpoint for Cryo Timeout.

Post Run (Time and Temp)

Sets the time and temperature of the Post Run period.

4.3.2 Front (Back) Inlet

Method Setup 7890 - #2; 1	9.02.2024 15:55:29			×
New Open Save	Save as · Report setup Audt trail Send method by Help			
Select GC	GC 1 CEnabled			
	Current GC Status			
Oven/Zones Front Inlet Split/Splitless	Column 1 Front Detector Time Table PCM #1 Gradients			
Pneumatic Mode Split	Carrier Gas He Carrier Gas He Carrier Gas Carrier Gas He Carrier Gas Carrier Gas He Carrier Gas	w		
GC Status Not Rea	ady (Method has not been sent) From GC			
Event Table AS GC	Measurement Acquisition Integration Calculation Advanced		Send Met	nod

Fig. 8: Method Setup - GC - Inlet

This tab governs the settings concerning the inlets of the **Agilent 7890** chromatograph. According to configuration of particular chromatograph, there can be *Front Inlet* or *Back Inlet* tabs, both with the same appearance. Particular fields may vary, according to the type of the inlet set.

Temperature Mode

Defines the temperature mode for the inlet. Available for COC and PTV inlets.

Carrier Gas

Sets the type of carrier gas used on this GC.

Temperature Gradient Table

Allows to edit temperature ramp for the inlet (up to three rates and plateaus). Available for COC and PTV inlets.

Injection Pulse (Press + Time)

Sets the pressure and duration of pressure pulse during injection of the sample. Available for PTV and Split/Splitless inlets.

Pneumatic Mode

Defines the operation mode for the injector port. Available for PTV and Split/Splitless inlets.

Total Flow

Turns on/off and sets the flow rate for carrier gas. The value entered here is used only when there are no columns defined on the GC, however the checkbox have to be checked in order to the inlet work properly. Available for PTV, Purged Packed and Split/Splitless inlets.

Split Ratio

The ratio of split vent flow to column flow. This line appears only if the columns in the flow path are defined. Available for PTV and Split/Splitless inlets.

Purge Flow

Sets the flow rate from the purge vent. Available for PTV and Split/Splitless inlets.

Purge Time

Sets the time, after the beginning of the run, when you want the purge valve to open. Available for PTV and Split/Splitless inlets.

Saver (Flow +Time)

Turns on/off and setting the flow and time for the Gas Saver. Available for PTV and Split/Splitless inlets.

Cryo Temp

Sets the temperature setpoint for the cryogenic cooling.

Quick Cool

Turns on/off the Quick Cool feature.

Fault

When checked, GC shuts the oven down if it does not reach the setpoint temperature after 16 minutes of continuous Cryo operation.

Timeout

Turns on/off and setting the setpoint for Cryo Timeout.

Vent Flow

Sets the flow rate for venting. Available for PTV inlet.

Vent Press

Sets the pressure of gas used for venting. Available for PTV inlet.

Vent Time

Sets the time of venting. Available for PTV inlet.

Septum Purge

Turns on/off the Septum Purge function.

Septum Purge Flow

Sets the flow rate for Septum Purge.

Septum Purge Switching

Turns on/off the Septum Purge Switching function. Available for splitless pneumatic mode.

Switch Time [min]

Sets the time of Septum Purge Switching function.

4.3.3 Column

Method Setup 7890 - #3; 1	9.02.2024 16:01:00						\times
New Open Save	Save as Report se		nd method by e-mail	Help			
Select GC	GC 1	 Enabled 					
Oven/Zones Front Inlet	Column 1 Front Detector	Current Time Table PCM #1 Grad	dients	GC Status			
Length [m] Ins. Diameter [µm] Film [µm]	25 Inlet 320 Detect 0 Mode	Unknown Unknown Constant Pressure	~				
Pressure [psi]	10						
GC Status Ready				From GC			
Event Table AS GC	Measurement Acquisition	Integration Calculation	Advanced				
GK Cancel					🔰 S <u>e</u> n	d Metho	1

Fig. 9: Method Setup - GC - Column

This tab allows to set the parameters for a column configured in the <u>Agilent 7890</u> Setup dialog. Particular fields may vary, according to the column mode selected.

Length

Sets the length of the column.

Ins.Diameter

Sets the internal diameter of the column.

Film

Sets the thickness of coating of the column.

Inlet

Sets to which inlet is the particular column connected.

Detector

Sets to which detector is the particular column connected.

Mode

Sets the temperature mode of the column.

Pressure/Flow Gradient Table

Allows to edit the pressure or flow ramp for the column (up to three rates and plateaus). Active in *Pressure Ramp* or *Flow Ramp* mode only.

Pressure

Sets the pressure of a carrier gas in the column. Active in *Constant Pressure* mode only.

Flow

Sets the flow rate of a carrier gas in the column. Active in *Constant Flow* mode only.

Post Run (Flow or Pressure)

Sets the flow or pressure rate of a carrier gas after finishing the gradient. Active in *Pressure Ramp* or *Flow Ramp* mode only.

4.3.4 Front (Back) Detector

Method Setup 7890 -	#3; 19.02.2024 16:0	1:00					\times
	Save Save as	Report setup Audit trail	Send method by e-mail	? Help			
Select GC	GC 1	🗸 🖉 Enable	:d				
		Current		GC Status			
Oven/Zones From	t Inlet Column 1 From	t Detector Time Table PCM #	1 Gradients				
110		Ilame					
Makeup Gas	He	~					
Makeup Flow	[mL/min]	25 H2 Flow [mL/min]	30				
O Constant Mak	keup Flow	Air Flow [mL/min]	40				
 Constant Col 	umn + Makeup Flow						
	Lit Offset	2					
GC Status	Ready			From GC			
Event Table AS	GC Measurement	Acquisition Integration Calc	ulation Advanced				
GK Canc	-				3 s		
GK Canc	e				1	end Metho	JU .

Fig. 10: Method Setup - GC - Detector

This tab allows to set the parameters for the detector configured in the <u>Agilent 7890</u> Setup dialog. Particular fields may vary, according to the type of the detector set.

Makeup Flow

Turns the makeup gas flow on and off, eventually sets the flow. Available for most detectors.

Makeup Gas

Sets the type of makeup gas used for detector. Available for most detectors.

Constant Makeup Flow

Sets the constant makeup flow into the detector. In this mode, GC will keep the actual makeup flow regardless of changes in the total flow during the GC run. Available for most detectors.

Constant Column + Makeup Flow

Sets the constant combined flow into the detector. In this mode, GC will be adjusting the actual makeup flow in order to keep the total flow constant. Available for most detectors.

Flame

Turns the detector flame on and off. After turning on turns on the air and hydrogen and initiates the ignition sequence. The temperature of the detector must be greater than 150 $^{\circ}$ C for the flame to light. Available for FID and FPD detectors.

H2 Flow

Sets the hydrogen flow into the detector. The flow of hydrogen will be turned off automatically after turning off the flame. Available for FID, FPD and NPD detectors.

Air Flow

Sets the air flow into the detector. The flow of air will be turned off automatically after turning off the flame. Available for FID, FPD and NPD detectors.

Negative Polarity

Reverses the polarity of detector signal. Available for TCD detector.

Reference Flow

Sets the flow of reference gas for the detector. Available for TCD detector.

Dual

Turns on/off the Dual mode. Available for FPD detector.

Electronics

Turns on/off the detector electronics. Available for ECD detector.

Auto Adjust

Turns on/off the automatic bead voltage adjusting. When checked, *Offset* field becomes active, allowing to set the desired current offset value. When unchecked, *Bead Voltage* field becomes active, allowing to set the voltage manually. Available for NPD detector.

Lit Offset

Sets the lit offset value. Available for FID, NPD and FPD detectors.

Bead Voltage

Sets the bead voltage. Field is active only with *Auto Adjust* checkbox unchecked. Available for NPD detector. It is important to set the proper voltage for actually installed bead because setting the voltage too high can destroy the bead irreversibly.

Dry Bead during Warm-up

Turns on/off the Dry Bead function. This causes the detector to wait 5 minutes at 150°C during warming up. Available for NPD detector.

Bead Type

Sets the type of bead installed. It is important to set the proper type of bead because improper setting can destroy the bead irreversibly. Available for NPD detector.

4.3.5 Time Table

New	Open	Save	Save as	. •	Report set		Audit trail	Send m	iethod by nail	? Help		
ect GC			GC 1			~	Enabl	ed				
					C	urrent				GC Status		
Oven	Zones	Front Inlet	Column 1	Front D	Detector	Time Ta	able PCM ;	≠1 Gradien	ts			
		Event			Position		Time [min]	State				
1												
GC Stat	tus	Ready								From GC		
C Stat	tus	Ready								From GC		
GC Stat		Ready S GC	Measure	ment 4	Acquisition	Integ	gration Cal	culation Ac	dvanced	From GC		

Fig. 11: Method Setup - GC - Time Table

This tab allows to set the events that will be triggered during the run based on the analysis time. This includes events like switching the detector polarity, range or signal source (where applicable), setting temperatures to detector / injector / auxiliary zones, controlling the valves etc. To delete a row, simply delete the value in the *Time* column on that row.

4.3.6 PCM

	Save	Save as	Report	setup Au	dit trail	Send method by e-mail	(2) Help		
lect GC		GC 1		\sim	Enabled				
				Current			GC Status		
Oven/Zones From	t Inlet	Column 1	Front Detector	Time Table	PCM #1	Gradients			
Channel A Pneumatics Mode	Pressure	~	Press. Rate [psi/min]	Final Press. [psi]	Hold Time [min]	Total Time [min]	-		
Pressure [psi]		0	Initial	0.00	1.00	1.00			
PostRun Pressure	[psi]	0	Heat Rate [°C/min]	Final Temp [°C]	Hold Time [min]	Total Time [min]	_		
PostRun Temp [%	-]	0	Initial	50	1.00	1.00			
Channel B			Dress Date	Final Press.	Hold Time	Total Time	_		
Pneumatics			[psi/min]	[psi]	[min]	[min]			
PostRun Pressure	[psi]	0	Initial	0.00	1.00	1.00			
GC Status	Ready						From GC		
vent Table AS	GC	Measure	ment Acquisiti	on Integrat	ion Calcula	tion Advanced			

Fig. 12: Method Setup - GC - Inlet

This tab governs the settings concerning the Pressure Control Modules installed in the **Agilent 7890** chromatograph. According to configuration of particular chromatograph, there can be several tabs, both with the similar appearance.

Pneumatics

Turns on/off the pneumatic control of a particular channel.

Mode

Sets the working mode of PCM Channel A.

Pressure

Sets the initial pressure (available only in Pressure mode).

Total Flow

Sets the initial Flow (available only in Flow mode).

Postrun Pressure

Sets the postrun pressure (available only in Pressure mode).

Postrun Flow

Sets the postrun Flow (available only in Flow mode).

Gradient Table

Sets the Pressure/Flow/Temperature rate, desired value and time to hold this value (*Hold Time*). To delete a row, simply delete the value in the *Rate* column on that row.

Heater

Turns on/off the heater.

Postrun Temperature

Sets the postrun temperature.

4.3.7 Gradients

0 - #4; 20.02.2024 11:	03:22					<
Save Save as	Report setup Audit trail	Send method by e-mail	? Help			
GC 1	Enabled	ł				
	Current		GC Status			
1 2						
Ready GC Measurement	Anniellen Tahanakin Cale		From GC			
	Ready	Ready	Save Save as Report setup Audit trail Send method by and trail Current Current ont Inlet Column 1 Front Detector Time Table PCM #1 Gradients 	Report setup Audit trail Send method by email Pepot setup GC 1 Image: Sended setup GC Status Out Intel Courrent GC Status ont Intel Courrent GC Status Ont Intel Courrent GC Status Ont Intel Courrent GC Status Out Intel Courrent GC Status Time Time Time	Save Save ss Report setup Audit trail Sand method by email GC 1 Current GC Status ont Inlet Column 1 Front Detector Time Table PCM #1 GC 1 Oven Temp Time Time Time Time Time Time From GC	Save Save ss Report setup Audt trail Send method by email Heb GC 1 Current GC Status ont Inlet Cournent GC Status OC Town 1 Front Detector Time Table PCM #1 Oven Temp Time Time Time Time Time Time Time

Fig. 13: Method Setup - GC - Gradients

This tab displays the temperature gradient as set on the <u>Method Setup - GC -</u> <u>Oven/Zones</u> tab.

4.4 Method Setup - Acquisition

Method Setup 7890 - #4;	20.02.2024 11:03:22			- 0	×
New Open Save	Save as Report se	tup Audit trail Send	method by Help		
Select Detector	Detector 1	Enabled			
7890 Digital Signal Setting		urrent	Det Status		
Signal Source	Signals	~			
Signal Type	Front 1	~			
Sample Rate	20 Hz 🗸				
Signal Range	10000 ~				
Det Status Ready	1		From Det		
Event Table AS GC	Measurement Acquisition	Integration Calculation	Advanced		
R Cancel				Send Metho	bd

Fig. 14: Method Setup - Acquisition

Each detector allows to set the source of signal on the appropriate tab. To switch to another detector, use the *Select Detector* field in the upper left corner of the *Method Setup - Acquisition* dialog.

Signal Source

Selects the source of the signal (signal from a particular detector or various internal and auxiliary signals, used for monitoring the state of the device).

Signal Type

Selects the type of signal from the particular Signal Source.

Note: In case your GC has some non-standard detector installed (so called Channel Partner detectors), it would be not possible to configure it in <u>Agilent 7890 Setup</u> window, however its signal would be available for acquisition. In such a case you have to select the signal according to position of the detector.

Specific Signal

Selects the specific signal available for selected Signal Type.

Channel

Selects the channel of the signal. Available for some signals only.

Sample Rate

Sets the frequency of the data sent from the **Agilent 7890** detector to **Clarity**, it has nothing to do with the frequency of the actual data acquisition in the instrument. The sample rate is common to all signals of the same instrument.

Note: Only for detector signal it is possible to change the sample rate, all auxiliary signals are collected at 50 Hz sample rate. In case some of the collected signals are auxiliary (e.g. oven temperature or column gas flow), all signals will be sampled at 50 Hz.

Signal Range

Sets the range for the output signal. As the range is increasing, sensitivity is decreasing, so the overall resolution is still the same (24 bit).

Method Setup 7890 - #6; 20.02.2024 11:33:24 × 7 1 Po SĮ, 0 New Open Save as Report setup Audit trail Send method by Help e-mail Select Valve Enabled Valve 3 Current Val Status Valve Initially On Val Status From Val GC Measurement Acquisition Valves Integration Calculation Advanced Event Table AS н ок Send Method Cancel

4.5 Method Setup - Valves

Fig. 15: Method Setup - Valves

Each valve allows to set its parameters on the appropriate tab. To switch to another valve, use the *Select Valve* field in the upper left corner of the *Method Setup - Valves* dialog. Each type of valve has different parameters available, thus the appearance of *Valves* panel depends on the type of selected valve.

Initially On

Selects the initial state of the valve. Available for Switch and Other valves only.

BCD Inverted

Available for *Multiposition* valves only.

Step Time [s]

Sets the Step Time. Available for *Multiposition* valves only.

Position

Sets the position. Available for *Multiposition* valves only.

Loop Volume [cm3]

Sets the Loop Volume. Available for Gas Sampling valves only.

Load Time [min]

Sets the Load Time. Available for Gas Sampling valves only.

Inject Time [min] Sets the Inject Time. Available for *Gas Sampling* valves only.

4.6 Using Dual Injector

In case your GC is equipped with two injectors, it is possible to use them simultaneously. For this purpose it is necessary to have two unused Instrument available.

- At first, ensure the GC has two injectors and tray correctly detected. See also 7890 Setup Sampler.
- Configure the GC, Sampler and Detector 1 on the first Instrument. See also **Clarity** Configuration.
- Configure the Detector 2 on the second Instrument.
- First instrument serves as a master, all GC and AS method parameters will be set here. In the method setup, <u>AS</u> tab, select the option *Use Both Injector* and fill in the *Vial No. Shift*.
- On the second instrument, the AS and GC tabs are not available in method setup. Only the <u>Acquisition</u> tab is available to set the configured detector *Range* and *Sample rate*.

The sequence on first Instrument defines the vial numbers for first injector and injection volume for both. The injection vial and injection volume in the second instrument sequence are just informative, injection volume is equal to that on first instrument, the vial number is equal to the vial number in first instrument and the specified vial shift. To run the system, prepare methods and sequences for both instruments, start the sequence on second instrument and then the sequence on first instrument. Sequence on the master Instrument (controlling the GC) needs to have *Active Sequence* checkbox checked, the sequence on the second Instrument needs to have it unchecked (passive sequence). Checkbox is available on the *Sequence Options* dialog.

4.7 Device Monitor

0	Instrument		evice	Monit											
ile	Co <u>n</u> trol	<u>V</u> iew	<u>W</u> ir	ndow	<u>H</u> elp	A 1			ii () =	61		0		
0	7890 GC 1	(SN D	emo	SN)									Runr	ning	
	Temperatur Front Inlet Back Inlet Oven		Set [°C] 	Actua [°C] 			Front Inle		Pres [P H: [mL/r	si] 2	Flow [mL/mi Air [mL/min]	Make			
							Column :	[n	Flow L/min])[0]	olumn 2	[mL	ow (min] 		
٥	7890 Detec	tor 1	(SN E	Demos	SN)								Runr	ning	
Rat	nal Name: :e: nelp press F1	-	-	al <mark>(</mark> Send	l method	to get s Value									

Fig. 16: Agilent 7890 Device Monitor

The Monitor window for the Agilent 7890 chromatograph displays all set and actual temperatures in each temperature zone and the column oven. It also displays gas flows and pressures for all important parts of the GC. An unequilibrated values are displayed in red letters. Besides that, there are sections for each detector and autosampler present. Detector section shows names of the signals, its sampling rates and the actual value of a particular signal.

4.8 Agilent 7890 Setup

Agilent 7890 Setup dialog (accessible through the *System Configuration* dialog) allows to view and manually set the hardware configuration of the chromatograph. Most fields (with the exception of IP addresses) can be read from the chromatograph by using the *Autodetect* button, however it is recommended to check the settings after autodetection. In case some part of the GC cannot be autodetected, user has to set it manually.

4.8.1 Connection tab

Agilent 7890 Setup		>
IP Address of 7890	10 . 1 . 1 . 101	
IP Address of This Computer	0.0.0.0 ~	
AutoDetect Press AutoD	Netect to Test Connection and Download Settings from GC	
Connection GC Signals Sa	mpler Valves Aux PCM	
OK Car	ncel Help	

Fig. 17: Agilent 7890 Setup - Connection

IP address of 7890

Fill in the IP address of the Agilent 7890 chromatograph.

IP Address of This Computer

The IP address of the computer with installed **Clarity** datastation. In case the computer is connected to more than one network, select the IP address corresponding to the network with **Agilent 7890** connected.

Autodetect

Read all settings from the instrument. Upon successful detection the serial number of the GC will be displayed.

Please note that some modules (e.g. PCM, valves or Aux Pressure modules) are not autodetected correctly and in certain systems it is necessary to set them manually.

Keyboard Lock

Use this checkbox to ensure the exclusive access to the chromatograph. Apart from locking the keyboard of the device, this will also prevent other users connected to the same network from connecting to the chromatograph.

4.8.2 GC tab

Front	Split/Splitless	\sim	Column 1	
Back Inlet	None	~	Column 2	
Front	FID	~	Column 3	
Back Detector	None	~	Column 4	
Third Detector	None	~	Column 5	
Fourth	None	~	Column 6	
Pressure Units	psi	~		

Fig. 18: Agilent 7890 Setup - GC

After successful autodetection of GC parameters it is advisable to verify them manually.

Front (Back) Inlet

Sets the type of inlet installed in the GC.

Front (Back, etc.) Detector

Sets the type of detector installed in the GC.

Column

Check the presence of the columns installed in the GC.

Pressure Units

Sets the pressure units used for setting the pressure of a carrier gas. After changing the units the values in the methods will be converted automatically.

4.8.3 Signals tab

-	Detector 1					
Signal 2						
	Detector 2					
Signal 3	Detector 3					
Signal 4	Detector 4					
Clarity S	vice Starts the Run in Starts This Device GC Signals San	n Clarity npler Valves	Aux	PCM		

Fig. 19: Agilent 7890 Setup - Signals

This tab defines the number of signals that will be processed by Clarity.

Count

Defines the number of signals received by **Clarity**. These signals correspond to **Clarity** detectors and will have their own sub-tabs in the <u>Method Setup - Acquisition</u> dialog, if configured on the given **Clarity** Instrument.

Signal 1 (..4)

Sets the name of the particular signal.

This Device Starts the Run in Clarity / Clarity Starts This Device

This radiobutton enables to start the analysis run from the **Clarity**. With *This Device Starts the Run in Clarity* checked, the device is started prior to **Clarity** by its front button or autosampler connected to this device and passes the start to **Clarity**. When *Clarity Starts This Device* is checked, **Clarity** is started prior to this device by separately wired autosampler, Start button in Single Run or different device and then starts this device.

Note: The *This Device Starts the Run in Clarity* option is checked by default.

4.8.4 Sampler tab

Agilent 7890 Setup				×
Use Sampler Name Sampler 1	Туре 7683 ~			
Front Injector Syringe Size [µL]	Solvent Wash Mode A, B A-A2, B-B2 A-A3, B-B3	Back Injector Syringe Size [µL]	Solvent Wash Mode A, B A-A2, B-B2 A-A3, B-B3	
Connection GC	Signals Sampler Valves	s Aux PCM		
ОК	Cancel	Help		

Fig. 20: Agilent 7890 Setup - Sampler

This tab displays the settings of the automatic liquid sampler (autosampler) connected directly to GC. Settings on this tab may be read from the chromatograph using the *Autodetect* button, however it is advisable to verify them manually.

Use Sampler

Enables the autosampler for use with **Agilent 7890** chromatograph. Needs to be unchecked if you want to start the acquisition from the **Clarity**.

Name

Allows to set the arbitrary name for the autosampler.

Туре

Sets the type of the autosampler installed.

Front (Back) Injector

Enables the use of the particular injector.

Syringe Size

Sets the size of the syringe installed.

Solvent Wash Mode

Sets the solvent wash mode for the autosampler.

Tray

Sets the presence of an autosampler tray.

4.8.5 Valves tab

	Name	Type	
Valve 1	Valve 1	Multiposition	~
Valve 2	Valve 2	Gas Sampling	~
🔽 Valve 3	Valve 3	Switch	\sim
Valve 4	Valve 4	Remote Start	\checkmark
Valve 5	Valve 5	Other	~
Valve 6	Valve 6	None	~
Valve 7	Valve 7	None	
Valve 8	Valve 8	None	
nnection G	C Signals S	ampler Valves Au	ux PCM

Fig. 21: Agilent 7890 Setup - Valves

This tab displays the settings of valves in the GC. Settings on this tab may be read from the chromatograph using the *Autodetect* button, however it is advisable to verify them manually.

4.8.6 Aux tab

gilent 7890 Setup			
Aux Temp 1	Aux Pressure 1	Aux Pressure 6	
Aux Temp 2	Aux Pressure 2	Aux Pressure 7	
	Aux Pressure 3	Aux Pressure 8	
	Aux Pressure 4	Aux Pressure 9	
	Aux Pressure 5		
Connection GC	Signals Sampler Valves	Aux PCM	
ОК	Cancel H	lelp	

Fig. 22: Agilent 7890 Setup - Aux

This tab displays the settings of auxiliary devices in the GC. Settings on this tab may be read from the chromatograph using the *Autodetect* button, however it is advisable to verify them manually.

4.8.7 PCM tab

	- Channe Gas		Channel Gas	В	Control Mode	
PCM 1	H2	\sim	02	~	Forward Pressure	~
PCM 2	N2	\sim	Ar	\sim	Back Pressure	~
PCM 3	He	~	N2	\sim	Forward Pressure	~

Fig. 23: Agilent 7890 Setup - PCM

This tab displays the settings of Pneumatic Control Modules in the GC. Settings on this tab may be read from the chromatograph using the *Autodetect* button, however it is advisable to verify them manually.

5 Report Setup

		7890 Me	thad: Oven/Zanes			- 1
Oven On	: Yes	Post Run	: 0.00 min	Det. Back Temperature	: 50.00 °C	
Max Oven Temperature	: 210.00 °C	Post Run Temperature	: 0.00 °C	Det. Third Heater On	: Yes	
Equilibration Time	: 1.00 min	Inj. Front Heater On	: Yes	Det. Third Temperature	: 50.00 °C	
Cryo On	: Yes	Inj. Front Temperature	: 50.00 °C	Det. Fourth Heater On	: Yes	
Cryo Temperature	: 50.00 °C	Inj. Back Heater On	: Yes	Det. Fourth Temperature	: 50.00 °C	
Quick Cool	: No	Inj. Back Temperature	: 50.00 °C	Aux #1 Heater On	: Yes	
Timeout On	: No	Det. Front Heater On	: Yes	Aux #1 Temperature	: 50.00 °C	
Timeout	: 10.00 min	Det. Front Temperature	: 50.00 °C	Aux #2 Heater On	: Yes	
Fault	: No	Det. Back Heater On	: Yes	Aux #2 Temperature	: 50.00 °C	
		Oven Ten	perature Ramp			
	Heat Rate [°C/min]	Final Temp [°C]	Hold Time [min]	Total Time [min]		
	Initial	50	1.00	1.00		
	10.00	150	12.00	23.00		

Fig. 24: Agilent 7890 - report preview

All chromatograph-specific settings (e.g. temperatures set to particular temperature zones) are reported as a part of the data displayed by the use of *Instrument 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 chromatograph 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 192.168.0.100:9110]

echo=on

textmode=on

filename=Agilent7890_%D.txt

reset=off

- *Note:* Instead of 192.168.0.100:9110 type correct IP address and port used to communicate with the **Agilent 7890** chromatograph. This port number is displayed when the *GC Status* button in the <u>Method Setup GC</u> dialog is invoked or in the <u>Agilent 7890 Setup</u> 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 unrecognised errors and problems in communication.

6.1 Specific Problems

Communication error occurs shortly after opening the instrument window with the GC properly connected

Description: The reason is most probably wrong Firewall setting.

Solution: In Windows Defender Firewall with Advanced Security, Inbound rules must be Enabled for *Chromatography Station for Windows*. The default setting is Disabled in case the used network was set as Public.

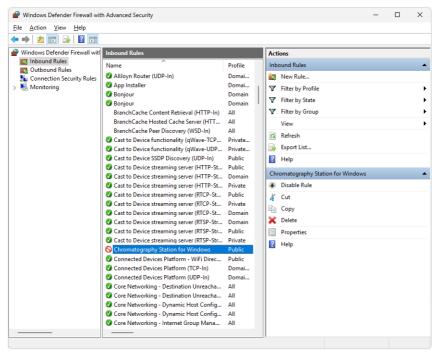


Fig. 25: Windows Defender Firewall