

SHIMADZU GC17A/GC14C

Clarity Control Module

ENG

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To facilitate the orientation in the **Shimadzu GC17A/GC14C** manual and **Clarity** chromatography station, different fonts are used throughout the manual. Meanings of these fonts are:

Instrument (blue text) marks the name of the window to which the text refers.

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 (when you already are in the topic describing the window).

WORK1 (capitals) indicates the name of the file and/or directory.

ACTIVE (capital italics) marks the state of the station or its part.

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 Shimadzu GC17A/GC14C

This manual describes the setting of the Shimadzu **GC17A** and **GC14C** GC chromatographs. The control module enables direct control of the instrument over serial line.



Fig 1: Shimadzu GC 17A series III

Caution: Do not confuse GC14C (model derived from GC17A) with GC14A (older Shimadzu product).

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

The GC14C model is based on the GC17A, with limited functionality (only manual gas flow control). The model type should be selected in the GC setup dialog window in System configuration. In this manual, the options to be selected will be described for the GC17A, with marked differences for GC14C.

Note: Analysis conditions are all the options from the Method Setup - GC dialogs.

2 Requirements

- Clarity Installation CD ROM with GC Control module (p/n A23).
- 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.

• Serial cross DB9F-DB25M cable (p/n SK03).

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

- A/D card (e.g. INT7, NetPAD, Colibrick etc.)
- The chromatograph must have the RS-232 Interface board installed (this may be ordered from Shimadzu (Shimadzu P/N 221-44370-91) + cable (Shimadzu P/N 630-06420-06)). Alternatively the Opt-USB Adapter from DataApex (p/n OPT01) can be used.

3 Installation Procedure

3.1 Shimadzu GC 17A/14C setup - communication

The RS232 **"Interface board"** from Shimadzu or Opt-USB Adapter from **DataApex** must be installed.

The Communication setting is in Function 15

Most of the parameters must correspond with the setting from the Shimadzu GC-17A/14C Setup dialog.

Current loop protocol must be set to EXTEND.

Baud rate must correspond with the setting in the Shimadzu GC-17A/14C Setup dialog. Recommended value is *4800*.

Communication protocol must be set to *OPTICAL LINK*, not to RS-232C (mistake of Shimadzu).

File format must be set 14CH MODE.

Parity must correspond with the setting in the Shimadzu GC-17A/14C Setup dialog.

Note:

There is a Shimadzu mistake causing that EVEN = NONE and NONE = EVEN, but we have amended it by swapping the meanings too to provide corresponding settings.

3.2 Hardware - Wiring

Start and *Ready* signals are communicated with **Clarity** through the Serial cross DB9F-DB25M cable , so it is not necessary to connect additional starting cables.

The signal cable has to be connected according to the following scheme:



Fig 2: Signal cable wiring

In a set with the Autosampler synchronization cables will be required.

Note:

Typical connections of a GC set with Autosampler can be found in the **Getting Started** manual (chapter **Device Setup and Wiring**).

Typical serial cable wiring is described in the picture.



Fig 3: Serial cross cable DB9F - DB25M

3.3 Clarity Configuration

System Configuration	— 🗆 X
Setup Control Modules	Number of Instruments:
Name Used	Instrument 2 Instrument 3 Instrument 4 Name Instrument 1 Instrument Type GC Name From GC GC GC GC GC GC GC GC GC GC GC GC GC
Add Remove About Setup	Data Inputs & Outputs Device Ext. Start Dig. Input: Colibrick Colibrick Miscellaneous Settings Units Setup OK Cancel Help
Installed Only Filter: All	v shimadzu 2
Name Status Vendor Shimadou AOC-2 installed If Shimadou C-10/ installed Shimadou G-2.7 installed	Comment Module Info
Add Cancel	> Нер "1

Fig 4: System Configuration

- Start the **Clarity** station by clicking on the Part 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 **3.3** 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 Shimadzu GC17A/GC14C device and press the Add 3 button.

The Shimadzu GC-17A/14C Setup dialog will appear.

Con	nection				
CC Pari	DM COM1	 Stop bits 1 	✓ Rat	e 4800 v Model GC 1	∕ bps 7A ∨
Shim	adzu GC setting Injector Type	Heat Zone		Detector Type	Heat Zone
Inj	Split/Splitless $$	INJ ~	Det 1	FID ~	DET V
Inj	None ~	None ~	Det 2	None ~	None 🗸
			Det 3	None ~	None 🗸
			Det 4	None ~	None 🗸
Aux	Names:				
	Aux 1	AUX1		Au	x 4 AUX4
	Aux 2	AUX2		Au	x 5 AUX5
	Aux 3	AUX3			

Fig 5: Shimadzu GC-17A/14C Setup

- Select the COM Port, Rate, Parity and Stop bits according to the settings in the GC (see the chapter **3.1**) and press the OK button.
- Select the corresponding GC model.
- Set up the configuration options to match the connected GC. Press the *OK* button.

Note: Other fields from this dialog are described later in the manual ("Shimadzu GC-17A/14C Setup" on page 16).

The Shimadzu GC-17A/14C item ④ will appear in the *Setup Control Modules* list of the System Configuration dialog.

Drag the GC icon 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.

Set the *Start* and *Ready* input and output numbers for Colibrick, U-PAD2 or your acquisition card (8) according to the wires used for synchronization.

4 Using the control module

New GC tab appears in the Method Setup dialog, enabling the setting of the GC control method.

Caution: If the module does not get the method file, for example after the Instrument window opening or method file change, the Single Run measurement will run with the old method loaded to the Shimadzu GC17A/GC14C control module.

4.1 Method Setup - GC

4.1.1 Method Setup - GC - Oven/Zones

Method Setup Default1	-		×
New Open Save Save as Report setup Audt trail Send method by email			
Select GC GCs \checkmark Enabled			
Shimadzu Method			
Oven/Zones Inlet 1 Press/Flow 1 Det 1 Time Events Shutdown Gradients Oven Parameters Temperature Zones Temperature Zones Inj [°C] 25 Max 470 I eact Rate Final Temp Hold Time Total Time 3 Det [°C] 25 Max 470 I end 25,00 1,00 1,00 Det [°C] 25 Max 470	C		
Description Demo Mode: Ready			
Event Table GC Measurement Integration Calculation Advanced			
R OK Cancel	3	Send Met	hod

Fig 6: Method Setup - GC - Oven/Zones

Oven Parameters

Sets the Max Oven Temperature, Equilibry Time and the Oven Temperature program.

Oven Max.

Possible values [0 - 470].

Equilibry Time

Time that the GC needs to reach the temperature equilibrium.

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.

Note: Maximum of 5 rows is available. Delete the value in *Heat Rate* column to clear the selected row.

Temperature Zones

Sets the temperature of the zones that have been set in the Shimadzu GC-17A/14C Setup dialog.

Description

Description of the method (this description is not sent to or read from GC, it serves only for the information in **Clarity**).

4.1.2 Method Setup - GC - Inlet 1 (2)

Parameters of the Inlet may differ according to the inlet type. In some cases (when the options selected are not supported by the connected GC), the values will not be sent to the GC and null values will be get from the GC.

Method Setup Default1	-		×
New Open Save Save as Report setup Audit trail Send method by e-mail			
Select GC GCs 🗸 Enabled			
Shimadzu Method			
Oven/Zones Inlet 1 Press/Flow 1 Det 1 Time Events Shutdown Gradents Inlet Split/Splitess Column Parameters Split Gas He Image: Split Split Split Gas He Image: Split Ratio O Split Ratio O Split Ratio O Split Ratio			
Demo Mode: Ready Event Table GC Measurement Integration Calculation Advanced C Cancel	3 s	end Meth	od

Fig 7: Method Setup - GC Control - Inlet

Column parameters: Length, Diameter Purge parameters: Press, Flow SPL mode: is the same for both inlets

Pressure, Velocity, Col Flow:

Caution: Only one value will be sent to GC, select which one, the other values will be calculated by the CG. When reading a method from the GC, all values will be read.

Total Flow, Split Ratio:

Caution:	Only one value will be sent to GC, select which one, the other values will be
	calculated by CG. When reading a method from GC, all values will by read.

4.1.3 Method Setup - GC - Press/Flow 1 (2)

Caution: This tab is not available for the GC14C.

L New	Open	Save	Save as	Report	setup Au	dit trail	Send method by e-mail	? Help		
ect G	GC		GC	5		✓ ✓ Er	abled			
				Shim	adzu Method					
0	Oven/Zones	Inlet 1 Splitless	Press/Flow 1	Det 1 T	ime Events	Shutdown	Gradients	From G	2	
	P/F mode			Press Rate [MPa/min]	Final Press [MPa]	Hold Time [min]	Total Time [min]			
	Pressure		\sim	Initial	0,050	1,00	1,00			
	Pressure			0,005	0,080	120,00	127,00			
	FIOW		_	0,005	0,050	0,00	133,00			
De	emo Mode: R	eady								
vent	Table G	C Mea	surement Ir	ntegration (Calculation	Advanced				

Fig 8: Method Setup - GC Control - Press/Flow

P/F mode

Select whether the gradient will be set in the pressure or flow mode.

Gradient table

Pressure or flow program depends on the P/F mode

4.1.4 Method Setup - GC - Det 1 (2-X)

These tabs define the settings of detectors defined in the Shimadzu GC-17A/14C Setup dialog.

Metho	d Setup Def	ault1						_		×
New	Open	Save	Save as	Report setup.	. Audit trail	Send method by e-mail	? Help			
Select (GC		GCs		~ 2	Enabled				
				Shimadzu N	1ethod					
C	Dven/Zones	Inlet 1	Press/Flow 1	Det 1 Time Ev	ents Shutdown	Gradients	From G	C		
	Range Polarity		0]						
	H2 Flow [Air Flow [imL/min] imL/min] [ml./min]	0]]						
De	emo Mode: R	leady	U]						
Event	t Table	° Mea	surement Int	egration Calcula	tion Advanced					
R	ок с	ancel		Guicale				3	Send Met	nod

Fig 9: Method Setup - GC Control - Detector

The items of this dialog will be different for various types of detectors set in the Shimadzu GC-17A/14C Setup dialog and in the device.

Note: In some cases (options not supported by the connected GC) the values will not be sent to GC and null values will be get from GC.

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4.1.5 Method Setup - GC - Time events

Meth	nod S	etup Def	ault1									-		×
Ne	ew	Open	Sav	ve S	ave as	Repo	nt setup	To Audit trail	Send method by e-mail	? Help				
Selec	t GC				GCs			~ 🗹	Enabled					
						s	nimadzu Meth	od						
	Ove	n/Zones	Inlet	1 Pre	ss/Flow 1	Det 1	Time Events	Shutdown	Gradients					
	1	îme Even	ts							_ [From GC			
									1					
		[m	ne in]		E	vent		Value						
			1,00	Detect	or 1 range			5,00						
			2,00	Detect	or 1 polarit	у		0,00						
			3,00	Detect	or 1 curren	t value		1,00						
		_	4											
	Demo	o Mode: F	Ready											
			_											
Eve	ent Ta	ible G	C N	leasure	ment Inte	egration	Calculation	Advanced						
												-		_
H	OK	C	ancel									2 :	iend Meth	bod

Fig 10: Method Setup - GC Control - Time Events

A table of time events:

Set time, type and value for every event. Values must correspond to the setting in the GC. Incorrect values will be ignored.

Caution: Table is only sent to GC. It cannot be read from the GC to **Clarity**.

Caution: The parameters are not checked for validity. Invalid values will be ignored.

4.1.6 Method Setup - GC - Shutdown

Metho	od Setup Def	ault1						-		×
Ner	w Open	Save	Save as	Report setup	Audit trail	Send method by e-mail	? Help			
Select	GC		GCs		~ 2	Enabled				
				Shimadzu Met	thod					
	Oven/Zones	Inlet 1	Press/Flow 1	Det 1 Time Even	ts Shutdown	Gradients				
	€Keep	State	nalysis				From SU			
Ever	Demo Mode: F	teady	surement Int	egration Calculatio	n Advanced					
R	ок с	ancel]					3 :	Send Meth	nodi

Fig 11: Method Setup - GC Control - Shutdown

The **Shutdown** tab of the GC control enables to switch off the oven heater after the analysis is finished.

- Keep state the heater remains on
- Set off after Analysis the heater will be switched off after the end of gradient program.
- *Note:* When any method is sent to GC, the heater will be always switched On. Typically, the method with shutdown On will be used as the last one in a sequence. The automatic sending of the method to the instrument should then be disabled.

4.1.7 Method Setup - GC - Gradients

Method Setup Defa	ault1							×
New Open	Save Save as	Report setup	Audit trail	Send method by e-mail	(2) Help			
Select GC	GCs		~ 🗹	Enabled				
		Shimadzu M	ethod					
Press/Flow 1	Inlet 2 Press/Flow 2	Det 1 Time Ev	ents Shutdown	Gradients				
Gradients of	○ Temperature	Pressure	OFlow		From GC			
[MPa] 0.4 9 0.2- 9 0.0- -0.2- -0.4- 0	20 40	60 Time	80 100		0			
Demo Mode: R Event Table GC	eady Measurement In	tegration Calculat	ion Advanced			5	ignd Meth	od

Fig 12: Method Setup - GC Control - Gradients

Displays the gradients selected by the *Gradients of* radiobuttons (Oven temperature, Pressure or Flow).

4.2 Device Monitor

Device Monitor - Shimadzu GC-17A/14C dialog displays current values from the GC and **expected values** (= values sent to the GC). It also allow a direct control of the GC oven heater.

Note: For the **GC-14C** model, some of the fields in the Device Monitor window might be missing.

Eile	Contro	ol <u>V</u> iew	Wind	low	<u>H</u> elp	<u>1</u> 7		I iii iii		- 6 8	× II 0
٥	GC-17A	/14C GC	s							Demo Mo	ode: Ready
100											
12		- "		100000					1.0	-	6 - I
10	Heate	r Off		Syste	m On		Syster	m Off		M N N	
	Injecto	or [°C]		Oven	[°C]		Detect	or [°C]			
10			1999						1.12	0000	
	Eloy	w 1					Flor	w 2			
13	PRSS						1101				
	FLOW										
	CFLW								1.00		
53	VEL										
	SPL-R										
			Run Ti	me 0,00	D/0,00 [r	nin]					
	CONTRACT OF LAST					ALC: NO	1000		STORES,	0100000000	
	,										

Fig 14: Device Monitor - Shimadzu GC-17A/14C

The GC Heater can be set *On* or *Off* using the corresponding buttons *System ON* and *System Off* in the Device Monitor window.

Note: When the *System Off* is pressed during run, the heater will be switched Off only after the analysis has been finished.

Temperature fields

Fig

Left field contains the values set in the method. Right field contains real values read from the chromatograph. If there is a difference between required value and the real value the actual value is marked in by color.

- Green value means that the actual temperature is lower than the required.
- Red value means that the actual temperature is higher than the required.

Note: The set *Oven* temperature is not updated during a gradient run, the initial set temperature will be displayed.

Any additional informative fields displayed will depend on the current GC configuration.

4.3 Shimadzu GC-17A/14C Setup

Con	nectio	n								
COM		COM1 ~				Rate 4800 V bps				
Pari	ity	No	 Stop 	bits 1		\sim	Model	GC 17A	\sim	
Shim	nadzu	GC setting								
	Injector Type		Heat Zone			Detector Type		ctor De	Heat Zone	
Inj	Split	/Splitless \checkmark	INJ	\sim		Det 1	FID	\sim	DET	~
Inj	None ~		None	\sim		Det 2	None	\sim	None	~
						Det 3	None	\sim	None	~
						Det 4	None	\sim	None	~
Aux	Name	s:								
Aux 1 AUX1								Aux 4	AUX4	_
		Aux 2	AUX2					Aux 5	AUX5	
		Aux 3	AUX3							

Fig 15: Shimadzu GC-17A/14C Setup

СОМ

Selection of the communication port.

Rate

The speed of the communication port. Possible values [1200; 2400; 4800]

Parity

The Parity of the communication port. Possible values [*None*, *Even*]

Stop bits

The Stop bits of the communication port. Possible values [1; 2]

Model

Select model GC17A or GC14C.

Injector and Detector Types

Sets the types of **Injectors** and **Detectors** that have been installed on the GC and attach corresponding Heat zones to them.