



HITACHI L6200/L6210

Clarity Control Module

ENG

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To facilitate the orientation in the **Hitachi L6200/L6210** 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 Hitachi L6200/L6210 Control Module

This manual describes the setting of the **Hitachi L6200** and **L6210** pumps. The control module enables direct control of the instrument over serial line.



Fig. 1: Hitachi L6200 pump

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

2 Requirements

- **Clarity** Installation with LC Control module (p/n A24).
- Free serial COM port in the PC.

Note: Modern computers usually have only 1 (if any) serial (COM) port installed. To use more devices requiring the RS232 port, the **MultiCOM** adapter (p/n MC01) is available.

- Serial straight 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.

3 Installation procedure

3.1 Hardware - Wiring

The **Hitachi L6200** and **L6210** pumps are controlled by serial (RS232) communication. It uses serial cross DB9F-DB25M wiring described in the picture. The cable can be ordered as p/n SK03.

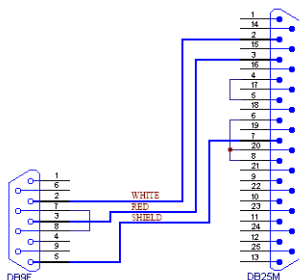


Fig. 2: Serial cross cable DB9F-DB25M

3.2 Setting of the communication

For the proper communication with the **Clarity** station over the serial line it is necessary to set up the **DIP Switch S1** on the Computer Board located in the **Hitachi L6200**. Set the DIPs 1..6 according to the table below.

Tab. 1: Setting of the DIPs of Switch S1:

DIP	On/Off	Comment
6	OFF	RS232 mode
5	ON	8 databits + 2 stop bits
4	OFF	CR
3	ON	
2	ON	Baud rate 4800
1	OFF	

3.3 Clarity Configuration

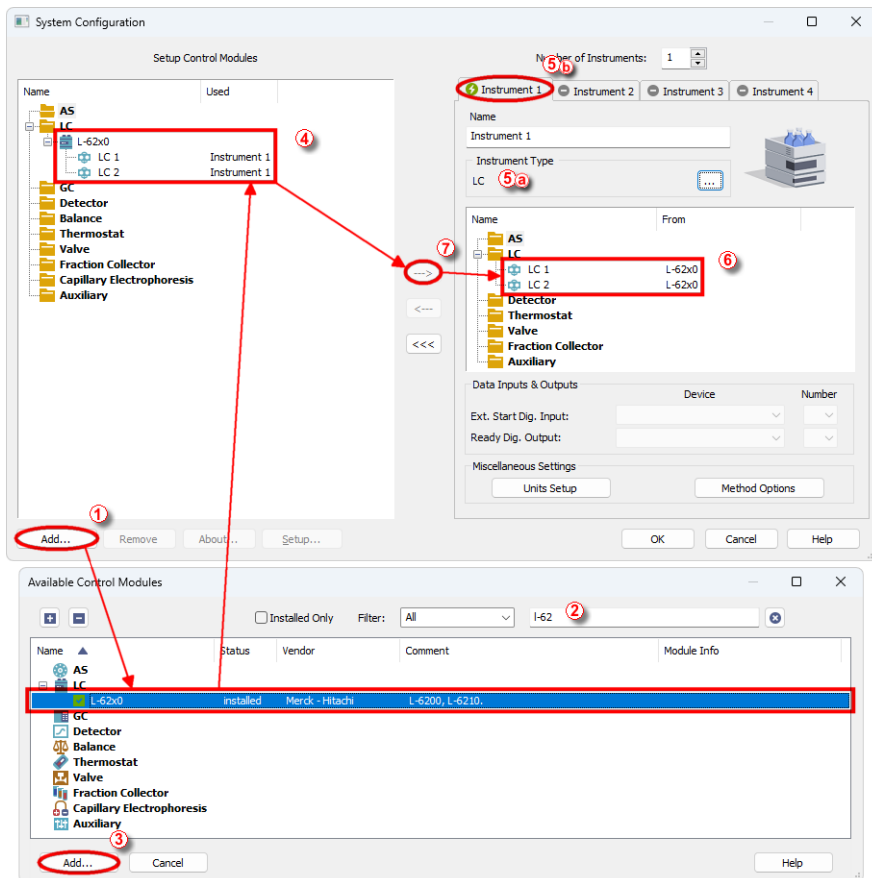



Fig. 3: System Configuration

- 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. 3 on pg. 4.) to invoke the **Available Control Modules** dialog.
- You can specify the searching filter ② to simplify the finding of the driver.
- Select the **L-62x0** and press the **Add** ③ button.

The [Hitachi L-6200 Setup](#) dialog will appear (see **Fig. 4** on pg. 5.).

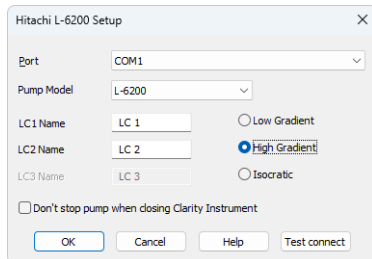


Fig. 4: Hitachi L-6200 Setup

- Select the correct *Port* and *Pump Model*. You can click the *Test connect* to ensure the pump communicates correctly.
- Fill in the gradient names.

Note: Other fields from this dialog are described later in the description of the [Hitachi L-6200 Setup](#) dialog.

- Press the *OK* button.

The **L-62x0** will appear in the *Setup Control Modules* list ④ of the *System Configuration* dialog.

- Change the *Instrument Type* ⑤ ⑥ on the desired *Instrument* tab ⑤ ⑥ to LC.
- Drag and drop the **L-62x0** item from the *Setup Control Modules* list ④ on the left to the *Instrument* tab on the right ⑥, or use the ⇨ button ⑦.

Note: The configuration dialog of the **L-62x0** detector ([Hitachi L-6200 Setup](#)) can be displayed any time by double-clicking on its icon or using the *Setup* button.

4 Using the control module

If the **L-6200** or **L6210** pump is set as a part of the gradient in the *System Configuration* dialog, a new [LC Gradient](#) tab appears in the *Method Setup* dialog, enabling the setting of the LC gradient program.

4.1 Method Setup - LC Gradient

The *Method Setup - LC Gradient* dialog serves for setting up the LC instrument method.

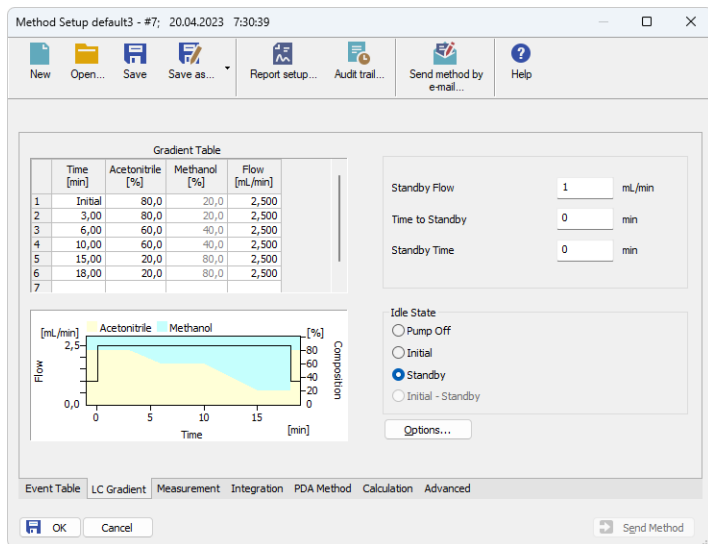


Fig. 5: Method Setup - LC Gradient

Gradient Table

A table for setting the composition of the mobile phase and the overall flow rate as a function of time. Operation is analogous to that of spreadsheets (Excel, Quatro Pro, etc.). To prepare the cell to receive values, click it by the left mouse button; the cell will highlight by dots. A cell that fails to highlight is not available for editing.

Time [min.]

Sets the time at which the ratio of flow rates and the overall flow rate correspond to the values entered in the corresponding row. (These values vary continuously from one time to the next in a manner ensuring that the conditions specified in the next row are satisfied).

XXX1(..4) [%]

Represents the percentage of a component. The designation **XXX1-4** is in fact replaced by the name of the component (items *Solvent 1 - 4* in the [Gradient Options](#) dialog). Should you enter a component value such

that the sum of all values exceeds 100 %, the percentage in the last column is automatically adjusted; if the percentage of the last compound is already zero, the value of the currently entered component is adjusted instead. The flow rate of a compound is calculated by multiplying the overall flow rate (indicated in the *Flow* column) by the corresponding percentage divided by 100.

Flow [ml/min]

Indicates the overall flow rate through the column. The entered value applies to the time specified in the corresponding row.

The possible ranges of the *Flow* for the **Hitachi L6200/L6210** pump is 1-9999 µl/min.

Graph

The graph depicts the percentage of components as a function of time together with the overall flow rate. Data are taken over from the **Gradient Table**. Changes effected in this table are immediately reflected in the graph. Legend in the header of the graph indicates the assignment of colors to individual components. The assignment is fixed and individual components are displayed in the graph from bottom to top. The flow rate is displayed as a black line.

The graph has two vertical axes: the axis on the left refers to the mixing ratio, the one on the right to the overall flow rate.

Parameters

Standby Flow

Sets the overall flow rate through the column in the *STANDBY* state reached after the last row of the table has been performed and the time period defined in the *Time to Standby* field has passed. The duration of this state is defined by the *Standby Time* item. The ratio of individual components in the respective *STANDBY* and *IDLE* states is given by the first row of the **Gradient Table** (the *Initial* row).

Time to Standby [min]

Indicates the time during which the flow rate and mobile phase composition changes continuously between the last values entered in the table and the values defined by *Standby Flow* field and the *Initial* row mobile phase composition.

This time is included in the analysis time (the Instrument is in the *CONTROL* state). In case when the *Time to Standby* is zero, there is step change from flow and components percentage specified on the last row of gradient table to that specified for *STANDBY* state.

Standby Time [min]

The time during which the flow rate is maintained at *Standby Flow*. This time is included in the analysis time (the Instrument is in the *CONTROL* state).

Idle State

An item specifying the overall flow rate through the column outside the instrument method. The following options are possible:

Pump Off

The flow rates of all components are zero.

Caution: Be careful as this setting may damage the column in some cases.

Initial

The flow rate is defined by the first row of the gradient table (the *Initial* row).

Standby

The flow rate is the same as in the *STANDBY* mode and, accordingly, corresponds to the value entered in *Standby Flow* field.

The *IDLE* state comes into effect each time an Instrument is opened, at the end or after abortion of an analysis by the *Abort* command, and is also maintained after the **Clarity** program is shut down.

Initial - Standby

After *Send Method* the flow is defined by the first row of the gradient table (the *Initial* row) and after the method finishes the pump keeps Standby Flow.

The *IDLE* state comes into effect each time an Instrument is opened, at the end or after abortion of an analysis by the *Abort* command, and is also maintained after the **Clarity** program is shut down.

The mixing ratio of individual components in both the *IDLE* and *STANDBY* states is given by the first row of the **Gradient Table** (the *Initial* row).

Note: There is a step change in the flow and components percentage from the values specified for the *STANDBY* state to those specified for the *IDLE* state if the *Idle State* field is not set to *Standby*.

4.1.1 Gradient Options

Invoke the *Options...* button in the [Method Setup - LC Gradient](#) dialog to open the *Gradient Options* dialog. This dialog allows to set the custom name for particular solvents, to switch whether they are used or not in the gradient and to set the warning levels for pressure to prevent the damage to hardware.

Fig. 6: Gradient Options

Min. Pressure

Sets the minimum pressure for the given pump. When pressure drops to the set value, the pump will shut down. This prevents the solvent leakage.

Max. Pressure

Sets the maximum pressure for the given pump. When pressure reaches the set value, the pump will shut down. This serves to prevent the damage to the pump when the column is blocked.

Min. Pressure and *Max. Pressure* for the **Hitachi L6200/L6210** pump depends on the type of the Pump Head attached. The possible values are as follows:

Tab. 2: Pressure limitations:

Type of the Pump	Allowed pressures
L-6200	0-40 MPa
L-6210	0-10 MPa

Note: Pressure limits are checked in the pump hardware. Pressure checking doesn't start immediately after the pump is started, but with a few minutes delay. During this delay the pressure in chromatographic system can stabilize.

Max. Pressure for Set Flow

Sets the maximum pressure to be used in the *Set Flow* dialog in the [Device Monitor](#). Initial value is 1 MPa.

Solvent 1 (..3)

It is possible to enable/disable particular solvent, as well as to set custom name to it.

4.2 Method Setup - Advanced

Method Setup default3 (MODIFIED)

New Open... Save Save as... Report setup... Audit trail... Send method by e-mail... Help

Common for all detectors

Subtraction
Chromatogram [None]
Matching No Change
Set... [None]

Column Calculations
Unretained Time 0 [min]
Column Length 50 [mm]
 Statistical Moments
 From Width at 50%

	Auxiliary Signal	Store
1	LC Flow LC 1	<input checked="" type="checkbox"/>
2	LC Pressure LC 1	<input checked="" type="checkbox"/>
3	LC Flow LC 2	<input checked="" type="checkbox"/>

User Variables
Variable 1
Name MethodUserVar1
Value 0
Variable 2
Name MethodUserVar2
Value 0
Variable 3
Name MethodUserVar3
Value 0


Event Table LC Gradient Measurement Integration PDA Method Calculation **Advanced**

OK Cancel Send Method

Fig. 7: Method Setup - Advanced

Hitachi L6200/L6210 provides the pump flow and pressure auxiliary signals for use in **Clarity**. To save the auxiliary signals into each chromatogram measured according to the given method, check the particular checkbox in the lower section of the Method Setup - Advanced dialog.

4.3 Device Monitor

The pump status dialog can be invoked by the *Monitor - Device Monitor* command from the *Instrument* window or using the Device Monitor  icon. It displays the actual flows of particular solvents, as well as the total flow, the total pressure and the analysis time.

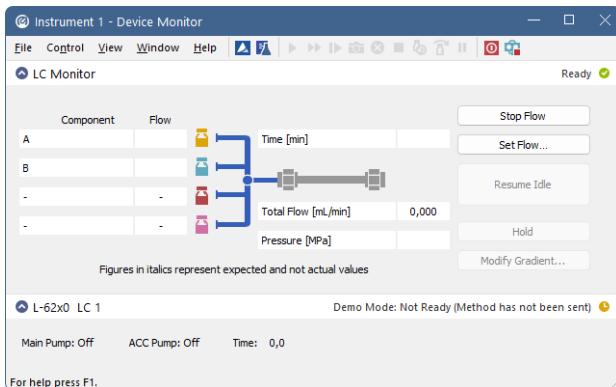


Fig. 8: Device Monitor

Stop Flow

The pumps can be stopped from this window using the *Stop Flow* button. This action will stop the pump only, the analysis run will continue and must be stopped or aborted separately by the *Stop/Abort* button in the toolbar.

Set Flow...

Sets the desired total flow and solvent ratios in the opened *Set Flow* dialog. *Max. Pressure* allows to set a different pressure than set in the "Gradient Options" on page 9 of a given method.

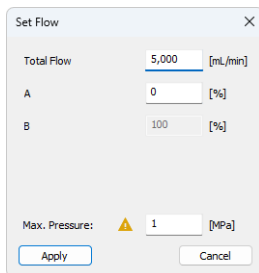


Fig. 9: Set Flow

The number of solvents and their names displayed in the Set Flow dialog correspond to the solvent number and names set in the [Gradient Options](#) dialog. The last available solvent field is always grayed and is automatically counted as a rest of the percentage of the other solvents.

Resume Idle

Returns the pumps to *IDLE* state as defined in the appropriate field on the [LC Gradient](#) tab of the *Method Setup* dialog.

Hold/Resume

Clicking on the *Hold* button will keep the current gradient conditions until *Resume* is clicked.

Modify Gradient...

Opens the [LC Control Manual Flow](#) dialog allowing to set custom flow and mobile phase composition, disregarding the **Gradient Table** set in the method. The command is only available during the analysis run.

4.3.1 LC Control Manual Flow

The *LC Control Manual Flow* dialog accessible through using the *Modify Gradient* ... button from [Device Monitor](#) window allows the user to set a custom mobile phase composition and flow while the analysis is running. It resembles the [Method Setup - LC Gradient](#) tab in functionality.

The dialog shows a Gradient Table with the following data:

	Time [min]	Acetonitrile [%]	Methanol [%]	Ethanol [%]	Flow [mL/min]
1	Initial	80,0	20,0	0,0	2,500
2	3,00	80,0	20,0	0,0	2,500
3	6,00	60,0	40,0	0,0	2,500
4	10,00	60,0	40,0	0,0	2,500
5	15,00	20,0	80,0	0,0	2,500
6	18,00	20,0	80,0	0,0	2,500

The graph below the table shows Flow [mL/min] on the left y-axis (0,0 to 2,5) and Composition [%] on the right y-axis (0 to 80) against Time [min] on the x-axis (0 to 15). The flow is constant at 2.5 mL/min. The composition starts at 80% Acetonitrile and 20% Methanol, then transitions to 60% Acetonitrile and 40% Methanol at 6 minutes, and finally to 20% Acetonitrile and 80% Methanol at 15 minutes.

Control options in the dialog:

- Standby Flow: 1 mL/min
- Time to Standby: 0 min
- Standby Time: 0 min
- Idle State:
 - Pump Off
 - Initial
 - Standby
 - Initial - Standby

Fig. 10: LC Control Manual Flow dialog

The *LC Control Manual Flow* dialog is only available during the analysis run. When it is invoked and the **OK** button is pressed, the original **Gradient Table** from the acquisition method is discarded and replaced by the **Gradient Table** from the *LC Control Manual Flow* dialog. Any such operation is recorded in the audit trail of the measured chromatogram.

Caution: After the analysis run which used manual flow changes ends, the original method is automatically sent to all controlled devices to make sure **Clarity** station returns to the original method.

4.4 Hitachi L-6200 Setup

The *Hitachi L-6200 Setup* dialog serves for the correct setting of the communication between **Clarity** and the pump.

The dialog shows the following settings:

- Port: COM1
- Pump Model: L-6200
- LC1 Name: LC 1
- LC2 Name: LC 2
- LC3 Name: LC 3
- Low Gradient:
- High Gradient:
- Isocratic:
- Don't stop pump when closing Clarity Instrument:

Fig. 11: L-6200 Setup

Port

Sets the communication port.

Pump Model

Sets the **L-6200** or **L6210** model of pump you are using.

LC1 (.3) Name

Sets the names of particular gradients.

Low Gradient

Sets the low gradient.

High Gradient

Sets the high gradient. Only two solvents are available in this mode.

Isocratic

Sets the isocratic mode. Only one solvent is available.

Don't stop pump when closing Clarity Instrument

If checked, the pump keeps its flow even if the *Instrument* is closed.

Test Connect

This button is used to test the connection to the **Hitachi L-6200** pump using the previously set *Port*.

5 Report Setup

Only the pump specific settings are reported in the pump-specific section of the report if the pump participates in the **Gradient Table**. Other settings of the method are reported as a part of the LC Gradient method. These setting are displayed in the report after the *Instrument Control* checkbox of the *Report Setup - Method* dialog is used.

25.04.2023 16:02 Method d:\clarity90\DataFiles\WORK2\default3.met Page 1 of 1

Standby Flow : 1.00 mL/min
 Time to Standby : 0.00 min
 Min. Pressure : 0.00 MPa

Idle State : Standby
 Standby Time : 0.00 min
 Max. Pressure : 40.00 MPa

Time [min]	Acetonitrile [%]	Methanol [%]	Flow [mL/min]
Initial	80	20	2,500
3.00	80	20	2,500
6.00	60	40	2,500
10.00	60	40	2,500
15.00	20	80	2,500
18.00	20	80	2,500

Signal Name	Stored
LC Flow LC 1	<input checked="" type="checkbox"/>
LC Pressure LC 1	<input checked="" type="checkbox"/>
LC Flow LC 2	<input checked="" type="checkbox"/>

Page 1

Fig. 12: Print Preview of the Report Setup

6 Troubleshooting

When the remedy for some problem cannot be discovered easily, the recording of communication between **Clarity** and the detector 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:

```
[COM1]
echo=on
textmode=on
filename=L62x0_%D.txt
reset=off
```

Note: Instead of COM1 type the correct serial port used to communicate with the **Hitachi L6200/L6210** pump. This port number is set in the [Hitachi L-6200 Setup](#) 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 unrecognized errors and problems in communication.