Clarity Controls

Bischoff 2250

LC **ENG**

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1 Bischoff 2250 Control module

This manual describes the setting of the **Bischoff 2250** pump. The control module enables direct control of the instrument over serial line.

Fig. 1. Bischoff 2250 Pump

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

2 Requirements

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

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-DB25F cable (p/n SK04).

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 HW setup - Bischoff 2250 communication

The Bischoff 2250 pump is controlled by serial (RS232) communication. It uses standart serial cross cable DB9F-DB25F (computer side/ pump side) wiring described in the picture. Only three cords (2-2, 3-3, 5-7) are necessary.

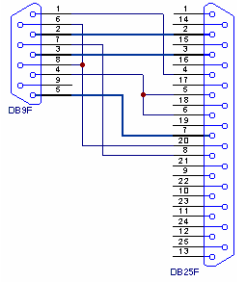

Fig. 2. Serial cross cable DB9F – DB25F

Note: *As the serial cross cable DB9F-DB25F is not widely available, it is possible to use serial cross cable DB9F-DB9M with the DB9F-DB25F reduction.*

The communication parameters are:

Baud rate *9600*, parity *N*, bits *8*, stop bit *1*.

3.2 Clarity Configuration

- In the **System Configuration** dialog press the **Add** button (① in ***Fig. 5***, pg. ***7***) to invoke the **Available Control Modules** dialog.

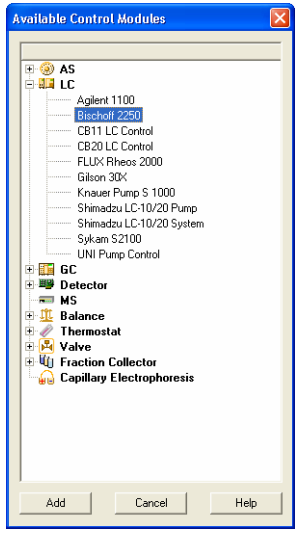

Fig. 3. Available Control Modules

- Go to the LC section, select the **Bischoff 2250** and press the **Add** button.
- The **Bischoff 2250 Setup** dialog will appear.

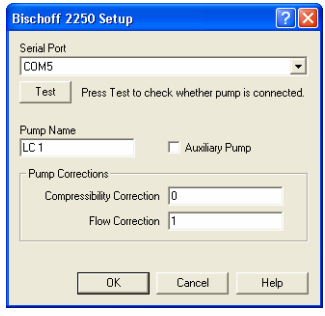

Fig. 4. Bischoff 2250 Setup

- Select the **COM Port** and fill in the Pump Name.

Note: *Other fields from this dialog are described later in the manual (see chapter **4.4** on pg. **15**).*

The **Bischoff 2250** item ② will appear in the **Setup Control Modules** list of the **System Configuration** dialog.

- Drag the LC icon from the **Setup Control Modules** list on the left side to the desired **Instrument** tab ③ on the right side ④, or use the ⇢ button ⑤ to do so.

Note: *If the gradient elution with several solvents will be used, the **Bischoff 2250** pump has to be added several times, once for each pump. **Fig. 5** shows the use of three Bischoff pumps.*

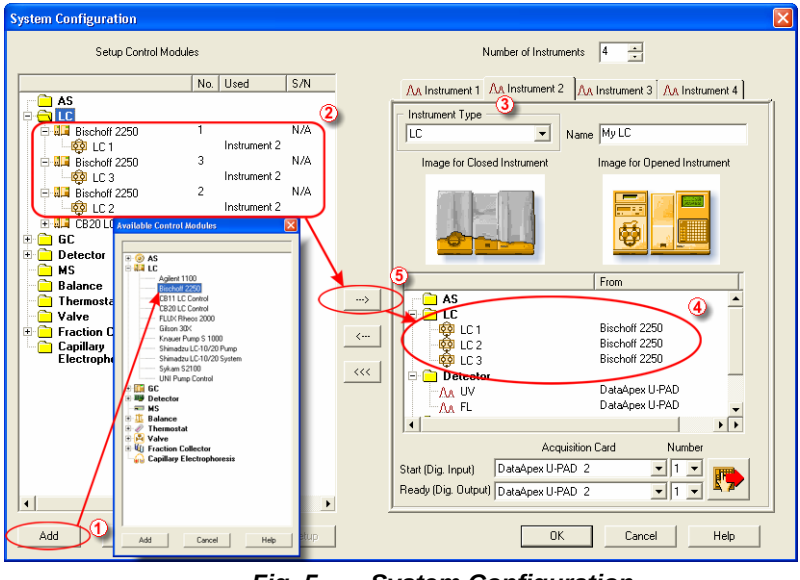

Fig. 5. System Configuration

4 Using the control module

New **LC Gradient** tab appears in the **Method Setup** dialog, enabling the setting of the LC gradient program.

4.1 Method Setup – LC Gradient

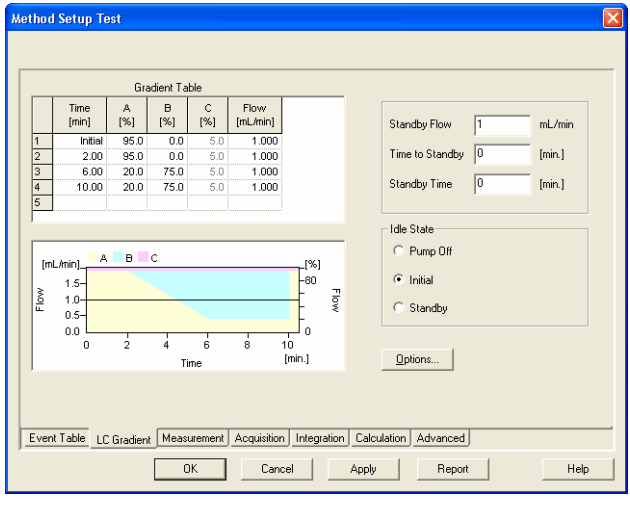

Fig. 6. Method Setup – LC Gradient

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.). Upon clicking a cell by the left mouse button that cell is highlighted by dots and ready to receive values. A cell that fails to highlight is not available for editing.

Time [min.]

The entered value represents 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 box). 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.

Note: *The values of the **Flow** for the **Bischoff 2250** pump vary in ceratin range according to the type of the Pump Head attached. The possible values are as follows:*

Type of the Pump Head	Allowed flows
M	0.001-0.999 ml/min
A	0.01-4.99 ml/min
P	0.1-19.9 ml/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. Assignment of colours to individual components is shown in the header. The assignment is fixed and individual components are displayed in the graph from bottom to top.

The flow rate is displayed in black.

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

Parameters

Standby Flow
Indicates 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 to Standby** has passed. The time period during which the flow rate is so maintained is defined by item **Standby Time**. (The ratio of individual components in the respective *STANDBY* and *IDLE* states is given by the first row of the Table (the **Initial** row).

Time to Standby [min]
Indicates the time during which the flow rate varies continuously between the last values entered in the table and the value defined by *Standby Flow*.
This time is included in the analysis time (the *CONTROL* state). In case when *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 (*CONTROL* state).

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

Pump Off
The flow rates of all components are zero.

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**.

The *IDLE* state enters into effect each time an instrument is opened, at the end or after abortion of an analysis by the **Abort** command, and is maintained also when 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 step change from flow and components percentage specified for the STANDBY state to that specified for IDLE state.*

4.1.1 Options

Invoke the **Options** button in the **Method Setup – LC Control** dialog to open the **Gradient Options** dialog.

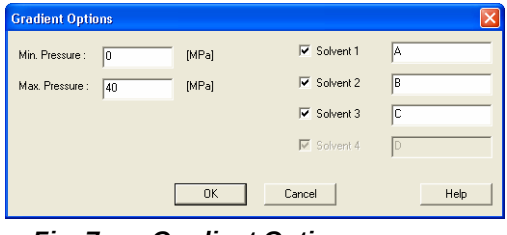

Fig. 7. Gradient Options

Min. Pressure

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

Max. Pressure

Sets the maximum pressure for the given auxiliary 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.

Note: *Pressure limits are checked in pump hardware. Pressure checking doesn't start immediately after pump is started, but with few minutes delay. During*

this delay pressure in chromatographic system can stabilize.

Note: ***Min. Pressure*** *and* ***Max. Pressure*** *for the* ***Bischoff 2250*** *pump depends on the type of the Pump Head attached. The possible values are as follows:*

Type of the Pump Head	Allowed pressures
M	0-60 MPa
A	0-50 MPa
P	0-15 MPa

Solvent 1 (..4)

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

4.2 Method Setup – LC

If the pump was set to Auxiliary pump in the **System Configuration – Bischoff 2250 Setup** dialog, the **LC** tab will appear instead of the **LC Gradient** tab.

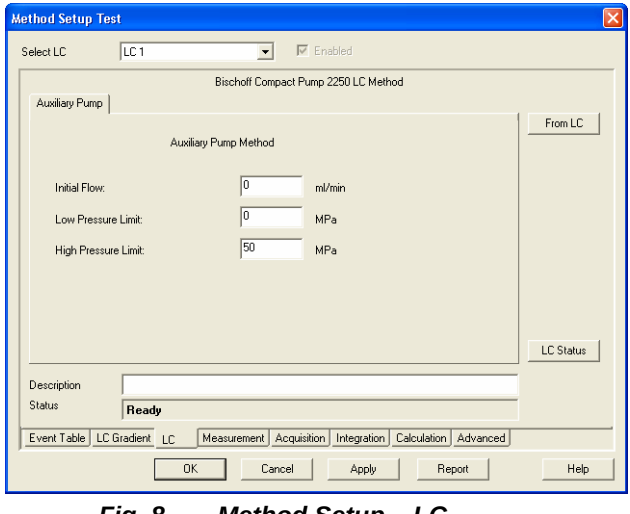

Fig. 8. Method Setup – LC

In case several auxiliary pumps are configured on the same **Clarity Instrument**, is possible to switch between them using the **Select LC** menu on the top of the **LC** tab.

Initial Flow

Sets the initial flow of the auxiliary pump.

Low Pressure Limit

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

High Pressure Limit

Sets the maximum pressure for the given auxiliary 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.

From LC

Acquires the status of the auxiliary pump from the device.

LC Status

Invokes the hardware configuration dialog listing the settings of the pump. These settings are dependent on the Head Type.

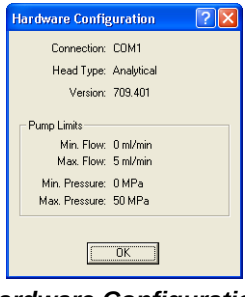

Fig. 9. Hardware Configuration

4.3 Device Monitor

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

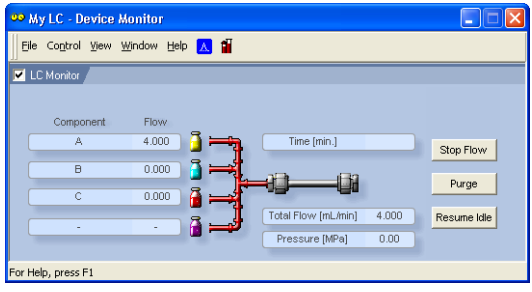

Fig. 10. LC Monitor

Stop Flow

The pumps can be stopped from this window by using the **Stop Flow** button. This action will stop the pump only, the analysis run will continue and must be stopped or aborted from the **Data Acquisition** or **Single Analysis** dialogs.

Purge

The pumps may be purged by pressing this button. Set the desired total flow and solvent ratios in the separate dialog.

Resume Idle

Pressing this button will return the pumps to *IDLE* state as defined in the appropriate fiel in the **LC Gradient** tab of the **Method Setup** dialog.

4.3.1 Device Monitor – Auxiliary pump

Each Auxiliary pump has its own device monitor displaying the actual flow and pressure on the device.

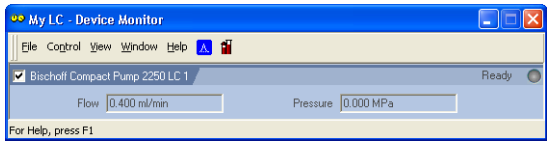

Fig. 11. Device Monitor – Auxiliary pump

Note: *If the control module does not optain the necessary figures from all connected pumps, the missing values will be displayed in italics in the form of data sent to instrument (expected values). Warning message will also be displayed in the bottom of the Device Monitor.*

4.4 Bischoff 2250 Setup

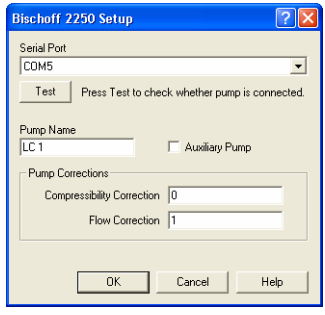

Fig. 12. Bischoff 2250 Setup

Serial Port

Selection of the communication port.

Test

Tries to connect with the pump and shows results in text status line. Displays the kind of Head Type on the pump.

Pump Name

Sets the pump name

Auxiliary Pump

Sets the pump to auxiliary state, thus excluding it from the gradient table. This serves for the possibility to add more than four pumps to single instrument.

Pump Corrections

Compressibility Correction

Sets the correction for the compressibility of solvents at high pressures. For more details, see Bischoff 2250 manufacturers manual.

Flow Correction

Sets the correction for the flow. This number can be set in the range (0.9 – 1.1) in 0.01 increments, allowing for the correction of the flow inaccuracy caused by the manufacturing of the pump.

5 Report

Only the pump specific settings (e.g. Flow and Compressibility corrections) are reported if the pump participates in the gradient table. Other settings of the method are reported as a part of the gradient table.

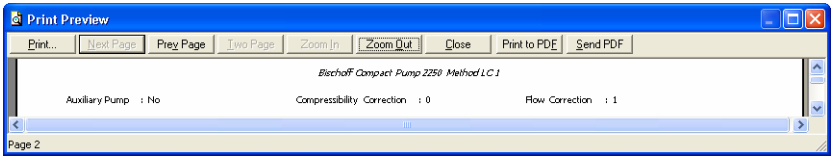

Fig. 13. Report – pump part of the gradient

If the pump is set as an Auxiliary pump, thus excluded of the gradient table, the values set on the of the **Method Setup - LC** tab are reported as well.

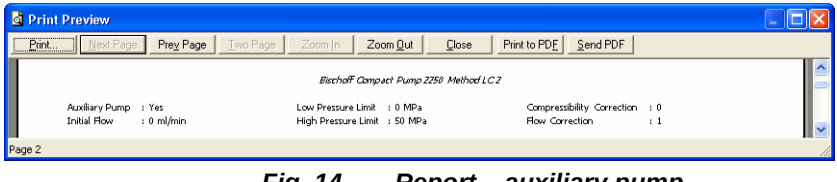

Fig. 14. Report – auxiliary pump