DataApex
Clarity™
CHROMATOGRAPHY SOFTWARE

SHIMADZU LC-10/20 SYSTEM

Clarity Control Module ENG

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DataApex Ltd.
Petrzilkova 2583/13
158 00 Prague 5
Czech Republic

Phone: +420 251 013 400
clarity@dataapex.com
www.dataapex.com

Author: DM

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To facilitate the orientation in the **Shimadzu LC-10/20 System** 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 Shimadzu LC-10/20 System

This manual describes the setting of the **Shimadzu LC-10/20 System**. The control module enables direct control of the instrument over serial line or LAN (in case of **LC-20** series).

Caution: The **Shimadzu LC-10/20 System** control module can not be combined with **Shimadzu LC-10/20 Pump** control module on a single PC where Microsoft .NET Framework is installed.

Caution: A single **Clarity** station can only control one **Shimadzu LC-10/20 System**. This is the restriction of MIMIC libraries used to perform the instrument control.

Fig. 1: Shimadzu Prominence system

As opposed to the **Shimadzu LC-10/20 Pump**, this control module operates the whole system (including detectors, autosampler, thermostat etc.), not just the pump, but requires any of the supported controllers for the operation of any other modules. **Clarity** can currently control following modules:

Controllers: SCL-10Avp, CBM-20A, CBM-20ALite

Clarity does not control following controllers: CBM-10A, SCL-10A.

Pumps: LC-6AD, LC-8A, LC-10AD, LC-10AS, LC-10AT, LC-10Ai, LC-10ADvp, LC-10ATvp, LC-20AT*, LC-20AD*, LC-20ADXR*, LC-20AB*

Detectors: SPD-10A, SPD-10Ai, SPD-10AV, SPD-10Avi, SPD-10Avp, SPD-10AVvp, SPD-20A*, SPD-20AV*, RID-10A, RID-20A**, RF-10A, RF-10Axl, RF-20A**, RF-20Axs**

Autosamplers: SIL-10ADvp, SIL-10AF, SIL-10Axl, SIL-HTA, SIL-HTC, SIL-20A*, SIL-20AC*, SIL-20AHT*°, SIL-20ACHT*°, SIL-20AXR*, SIL-20ACXR*

PDA Detectors: SPD-M10Avp***, SPD-M20A*

Thermostats: CTO-10A, CTO-10AC, CTO-10Avp, CTO-10ACvp, CTO-10ASvp, CTO-20A*, CTO-20AC*

The list continues to extend, for up to date list see the website www.dataapex.com. Some devices also require a firmware of particular minimal version for proper

communication with **Clarity** (for more details see the chapter **Minimal version of device firmware required** on pg. **4**).

* Devices marked with the asterisk will show in the *System Configuration* dialog only after the **CBM-20A (Lite)** controller has been selected.

Caution: If any device from the **LC-20 (Prominence)** line is to be used with the **LC-10** line Controller, it is necessary to set it to the **LC-10 emulation mode**. This is done (for example on the LC-20AD pump) on the devices display by pressing the **VP** key until the *CALIBRATION* screen appears. Then press **func** key, enter the password and keep pressing the **func** key until *OP MODE* screen shows. There, select the correct type of the controller installed. Later in the *System Configuration* dialog it is necessary to set the LC-20AD pump as LC-10AD when selecting the type of the pump in the Shimadzu LC-10/20 System setup.

° The autosamplers **SIL-20AHT** and **SIL-20ACHT** marked with the circle do not possess their specific option in the Shimadzu LC-10/20 System Autosampler dialog. In case of **SIL-20AHT** autosampler is present it should be configured through **SIL-20A** option. If the **SIL-20ACHT** autosampler is present it is necessary to configure it through **SIL-20AC** option.

** **RID-20A**, **RF-20A** and **RF-20AXS** detectors must be always switched to the **LC-10 emulation mode** in order to be controlled (using MIMIC libraries) in **Clarity**.

*** **SPD-M10Avp** PDA detector is not supported on 64-bit Windows.

RF-10AXL and **RF-20AXS** (**RF-20AXS** with minimum firmware version 2.02) fluorescence detectors can be configured as a stand-alone control module developed through **Knauer** company. This control module for **RF-10AXL** and **RF-20AXS** fluorescence detectors supports serial communication via special RS232 cable ***(p/n SK 11)***. If the **RF-20A** detector was purchased through **Knauer** company (with special oem firmware version) it can be connected to **Clarity** with above mentioned special RS232 serial cable and controlled with above mentioned specific control module.

2 Requirements

- **Clarity** installation with **LC control** module (p/n A24). Other parts of the system may need other modules or extensions, namely the autosampler will need the **AS control** module (p/n A26) and the PDA Detector will need the **PDA extension** (p/n A29) to operate.
- Supported Shimadzu system controller (see the full list of supported controllers in the chapter **"Shimadzu LC-10/20 System"** on pg. **1**.). The controller is needed even for the control of standalone PDA detector.
- 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 RS232 port, the **MultiCOM** adapter (p/n MC01) is available.

- Standard RS232-compliant cross DB9F-DB9F serial cable (p/n SK01) or cross LAN cable (p/n SK08) in case of **LC-20** system.

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

- SCSI card for use of the SPD-M10Avp PDA detector. SPD-M20A PDA detector uses LAN communication.

Caution: It is not recommended to have installed **Clarity** and *LabSolutions* chromatography data systems on one PC at the same time. It is known that installation respectively updating one or the other data system jeopardizes the proper functioning of the other data system. These problems are most likely to affect *Windows 10* in combination with *CBM-20A/CBM-20ALite* controllers.

Caution: It is recommended to use Adaptec SCSI cards. Drivers for Adaptec's cards are located on **Clarity** installation CD ROM in directory HW_DRIVERS\ASPI2. Read the README.TXT file before you install the drivers.

Caution: SPD-M10Avp PDA detector is not supported on 64-bit Windows.

2.1 Minimal version of device firmware required

Tab. 1: Controllers:

Name of Device:	Minimal version of firmware required:
SCL-10Avp	5.33
Subcontroller	5.20
OptionBox-L	3.2

Tab. 2: Pumps:

Name of Device:	Minimal version of firmware required:
LC-10ADvp	5.26
LC-10ATvp	5.27
LC-10Ai	3.1
LC-10AD	3.1
LC-10AT	3.1
LC-10AS	3.1
LC-8A	1.5
LC-6AD	1.4

Tab. 3: Autosamplers:

Name of Device:	Minimal version of firmware required:
SIL-10ADvp	5.32
SIL-HTA	6.02
SIL-HTC	6.02

Tab. 4: Column Ovens:

Name of Device:	Minimal version of firmware required:
CTO-10Avp	5.24
CTO-10ACvp	5.24
CTO-10ASvp	5.24
CTO-10A[C]	3.0

Tab. 5: Detectors:

Name of Device:	Minimal version of firmware required:
SPD-10Avp	5.22
SPD-10AVvp	5.22
SPD-10Ai	3.0
SPD-10Avi	3.0
SPD-10A	3.0
SPD-10AV	3.0
RF-20A, Axs	1.10

3 Installation Procedure

3.1 Shimadzu LC-10/20 System communication

Shimadzu LC-10/20 System may be controlled either via standard serial cross DB9F-DB9F cable or via cross LAN cable, depending on the type of connector present on the controller. LAN communication is only present on **LC-20** line controllers.

Serial Connection

The **Shimadzu LC-10/20 System** is controlled by serial (RS232) communication. It uses standard serial cross DB9F-DB9F cable described in the picture.

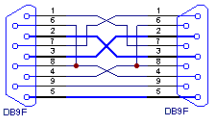

Fig. 2: Serial cross DB9F - DB9F cable

LAN connection

For direct connection between chromatograph and computer, the cross LAN cable should be used. On the other hand, for the connection to the network, the straight LAN cable might be necessary (with older switches) instead.

Shimadzu SCL-10Avp settings

In the controller it is necessary to set the *Classvp* parameter (accessible from the main menu via the system submenu (key **4**, it is located on the bottom of the list) to *5.x* value. Other communication parameters set in the controller should be:

Interface: *RS-232C*

Baud Rate: *19200*

Level: *Enhanced*

Caution: Only COM ports up to COM9 are supported. Serial ports with higher numbers cannot be used. This also means that the **Shimadzu LC-10/20 System** cannot be connected to the serial port on Net-PAD (COM101 and COM102).

LC-20 components with SCL-10Avp controller

Shimadzu LC-20 components have to be set to the **LC-10** emulation mode when they should be working under the **LC-10** controller. This is done from the device's keyboard according to this procedure (procedure presented on the **LC-20** series pump, may differ slightly for other devices):

- Press the **VP** button on the devices's front keyboard until the *CALIBRATION* inscription is shown on the display.
- Press the **func** button to enter the configuration. The password has to be filled in.

Note: The default password is *00000*.

- Press the **func** button repeatedly until the *OP MODE* inscription is shown on the display.
- Enter the desired number (*1* for the pump) to switch the device to the **SCL-10Avp** emulation mode and press the **enter** button.
- Switch the device off and on again. The new communication parameters should be saved and used.

The procedure is in detail described in the **LC-20** hardware manual provided by the **Shimadzu** company.

CBM-20A(Lite) settings

It is necessary to set the communication parameters in the controller. From **Clarity** version 2.6.5, the parameters are:

Communication Mode: *ClassVP*

Interface: *RS232*/*Ethernet* (depending on the desired connection type)

The exact procedure is described in the controllers hardware manual.

3.2 Software Installation

Caution: If the **PDA** detector is to be used, it is necessary to switch it on before the computer is turned on. This way, the SCSI controller will be detected automatically. When turned on later, the **PDA** has to be added manually using the **Add Hardware** function from the **Windows** Control Panel.

Install (or re-install) the **Clarity** software from the installation CD.

- Insert the installation CD into the CD-ROM of the computer and start the installation.
- Select the target directory and press the *Next* button.
- Select **Custom** installation. The control module for the **Shimadzu LC-10/20 System** is automatically included in it.
- If the **PDA** detector is to be used, select the **Detector Control** option (its icon is checked, but grayed) and either click the checkbox to change it to checked (not grayed) state or press the *Details…* button and check the **Shimadzu PDA** option there.
- Follow the instructions given by the installation procedure until the installation procedure ends.

3.3 Clarity Configuration

Caution: If the **PDA** detector will be used, it must be switched on prior to starting the computer.

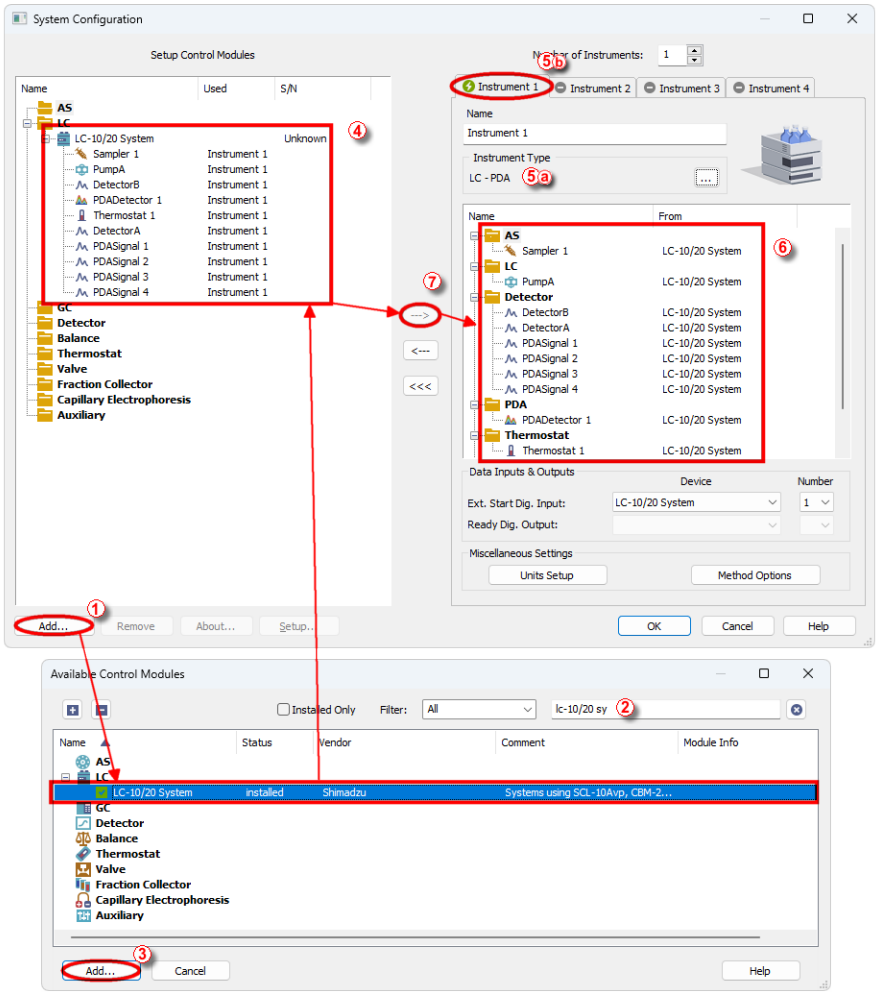

Fig. 3: System Configuration

- 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. **8**.) to invoke the ***Available Control Modules*** dialog.
- You can specify the searching filter ② to simplify the finding of the driver.
- Select the **LC-10/20 System** item and press the *Add* ③ button.

The Shimadzu LC-10/20 System Setup dialog will appear.

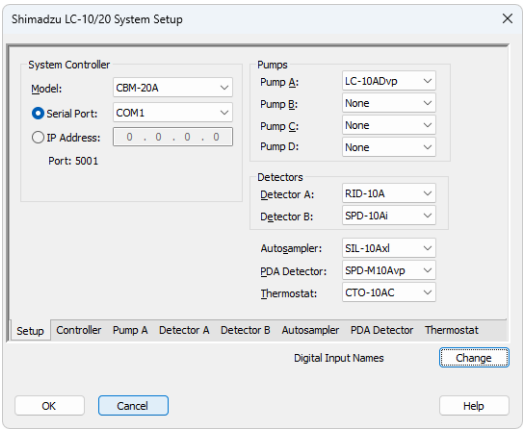

Fig. 4: Shimadzu LC-10/20 System Setup

- Select the type of the controller in the *Model* field and the *Serial Port* or *IP Address* to which the controller is connected.

Note: Only **CBM-20A** and **CBM-20ALite** controllers may be connected through LAN.

- Select other parts of the system that are connected to the controller (such as pumps, detectors, autosampler etc.). Each module selected will add its own tab to the Shimadzu LC 10/20 System Setup dialog.

Note: Other fields and parameters of the Shimadzu LC-10/20 System Setup dialog are described later in the manual(for more details see the chapter **Shimadzu LC-10/20 System Setup - Setup** on pg. **12**).

- Change the *Instrument Type*⑤ ⓐ on the desired *Instrument* tab ⑤ ⓑ to LC or LC-PDA if you want to use the PDA detector.
- Drag the **LC-10/20 System** item from the *Setup Control Modules* list on the left ④ to the *Instrument* tab on the right ⑥ , or use the ---> button ⑦ .

Note: When you only change some of the already configured parts of the **Shimadzu LC-10/20 System**, it is recommended to remove the system from the given *Instrument* tab and add it once more.

- Set the *Ext. Start Dig. Input* and *Ready Dig. Output* numbers ⑧ for your acquisition card according to the wires being used for synchronization.

Caution: The **Shimadzu LC-10/20 System** must have all subdevices configured on the same Instrument (it cannot have parts of it on different Instruments) and no subdevice may be left unconfigured (if any subdevice is configured on the Instrument, all subdevices must be as well).

3.4 Shimadzu LC-10/20 System Setup

Shimadzu LC- 10/20 Pump Setup dialog (accessible through the *System Configuration* dialog) is used to set the connection to the **Shimadzu LC-10/20 System**, select it's configuration and set some other basic parameters. TheSetup tab is always opened by default.

Digital Input Names

Pressing the *Change* button opens the *Digital Input Names* dialog which allows to set the custom name for the virtual **Shimadzu LC-10/20 System** digital input. This input allows to start **Clarity** run by the signal of the **Shimadzu LC-10/20 System** controller.

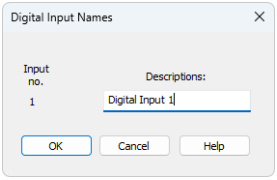

Fig. 5: Digital Input Names

3.4.1 Shimadzu LC-10/20 System Setup - Setup

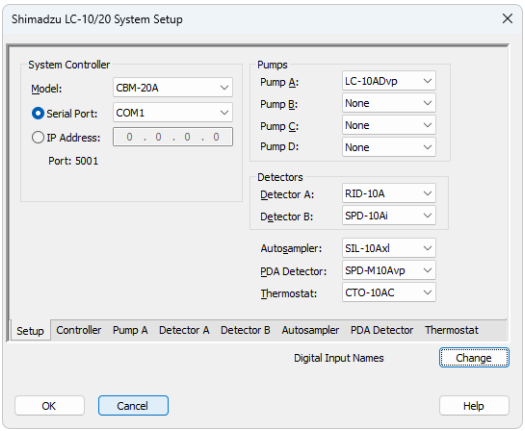

Fig. 6: Shimadzu LC-10/20 System Setup - Setup

System Controller

Section defining the type of the **Shimadzu LC-10/20 System** controller and the connection to it.

Model

Sets the type of the controller unit. Only *SCL-10Avp*, *CBM-20A* and *CBM-20ALite* controllers are supported at the moment.

Note: The selection of the controller influences the number of options that will be displayed when configuring other system devices. If any **LC-20** modules should be used with the **SCL-10Avp** controller, these devices have to be switched to the **LC-10 emulation mode** (for more details see the chapter **Installation Procedure** on pg. **5**).

Serial Port

Selects the serial port to which the **Shimadzu LC-10/20 System** is connected.

IP Address

Sets the *IP Address* if using the LAN connection. LAN can only be used for the Shimadzu **LC-20** controllers.

Connect

Tests the connection to the controller. If it is correctly set, the *Hardware Configuration* dialog with all controller information and other information on added modules will appear.

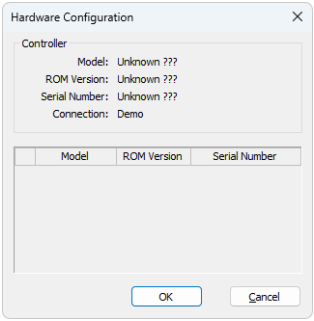

Fig. 7: Hardware Configuration

Pumps

Sets the model of the pump connected. Up to three pumps may be configured in a **Shimadzu LC-10** and four pumps on **Shimadzu LC-20** System.

The first pump may have valves configured, other pumps are not allowed to have any valves. Any pump may be set as gradient or auxiliary, but maximum of four solvents can be used in a gradient, so any further pumps are automatically configured as auxiliary.

Detectors

Sets the model of the detector connected. Up to two detectors may be configured in a **Shimadzu LC-10/20 System**.

Autosampler

Sets the model of the autosampler.

PDA Detector

Set the model of the **PDA** detector.

Thermostat

Sets the model of the thermostat.

Note: It is recommended to add the modules one by one and to check the communication with the *Connect* button in between.

3.4.2 Shimadzu LC-10/20 System Setup - Controller

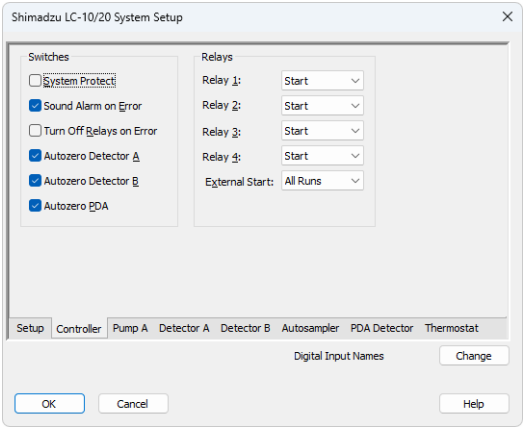

Fig. 8: Shimadzu LC-10/20 System Setup - Controller

Switches

System Protect

While checked, in case of exceeding the maximal pressure the flow rate will be decreased to one half of the set value. If unchecked, the exceeding will shut-off the pump.

Sound Alarm on Error

Check to signalize error messages by sound.

Turn Off Relays on Error

If checked, in case of the controller error the AC power for devices plugged in the multiple terminal box will be turned off.

Autozero Detector A (B)

If checked, the particular detector response will be set to zero at the start of acquisition.

Autozero PDA

If checked, the PDA detector response will be set to zero at the start of acquisition.

Relays

Relay 1 (..4)

These controls define the trigger criterion for each controller relay outputs. Possible criteria are:

Start - Relay closed at the beginning of the analysis.

Stop - Relay closed at the end of the analysis or time program.

Error - Relay closed in the event of the system controller error.

Event - Relay closed on the time basis as the event of the HPLC time program.

External Start

This control sets the conditions for closing the controllers start relays at the beginning of the analysis. Possible options are:

Disable - External start is disabled.

All Runs - Closes start relays at each analysis start including starts with no injection.

Inject Only - Closes start relays only after starting the analysis with the injection performed.

4 Using the control module

Several new tabs appear in the ***Method Setup*** dialog, based on the settings performed in the Shimadzu LC-10/20 System Setup dialog. These new tabs enable the setting of the **Shimadzu** system operation program.

Note: The instrument method is always sent to the **Shimadzu LC-10/20 System** as a whole.

4.1 Pump

4.1.1 Shimadzu LC-10/20 System Setup - Pump

This tab of the Shimadzu LC-10/20 System Setup dialog allows to set the parameters of the given pump.

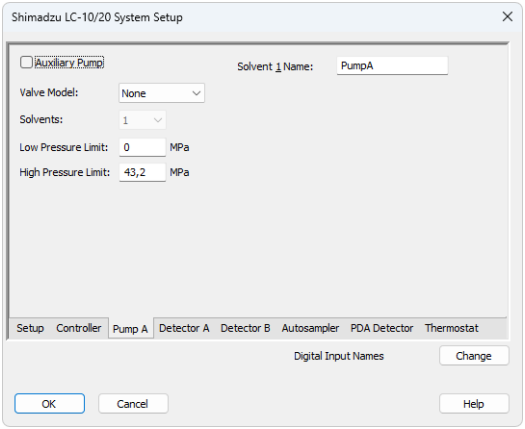

Fig. 9: Shimadzu LC-10/20 System Setup - Pump

Auxiliary Pump

Check for the pump to become auxiliary pump (not part of the **Gradient Table**). If there are more pumps added in the configuration and the first one is set either as low-pressure gradient or binary pump, the other pumps are automatically set as *Auxiliary* pumps.

Valve Model

Select the valve model installed in your pump. This selection influences the number of solvents available.

Solvents

Select the number of solvents to be used.

Note: Only the first pump configured as a gradient pump allows to set the number of solvents in the Low-pressure gradient. Available options depend on the *Valve Model* configured.

Solvent 1 (..4) Name

Change names for the particular solvent.

Low Pressure Limit

Lower pressure limit. Number entered will be sent to the pump and checked by the pump firmware.

High Pressure Limit

Upper pressure limit. Number entered will be sent to the pump and checked by the pump firmware.

Note: Exceeding of *High Pressure Limit* or *Low Pressure Limit* defined here will cause a system error, requiring the closure and reopening of the given Instrument.

4.1.2 Method Setup - LC Gradient

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

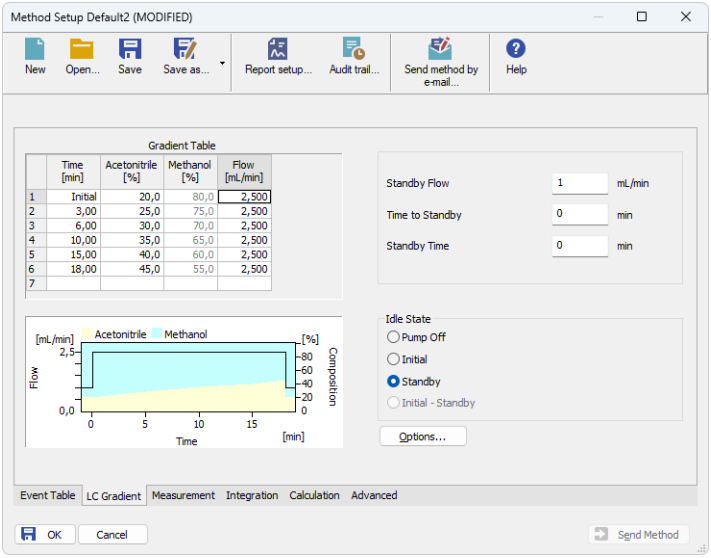

Fig. 10: Method Setup - LC Gradient

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.

Note: The values of the *Flow* for the **Shimadzu LC-10/20** pumps vary in certain range according to the type of the pump. Check the device manual for valid *Flow* ranges for your pump.

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.

Initial - Standby
The flow is defined by the first row of the gradient table (the *Initial* row) after the method is sent, or by the value entered in the *Standby Flow* field after the method finishes.

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*.

4.1.2.1 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.

The abovementioned pressure limits are checked in the software. Pressure check for low pressure limit doesn't start immediately after pump is started, but with few minutes delay. During this delay the pressure in chromatographic system can stabilize.

In addition to those limits, a pressure limits are set in the Shimadzu LC-10/20 System Setup - Pump dialog. Those limits are checked in the pump firmware. As they will cause a system error, they should be set outside the limits defined here in the *Gradient Options* dialog.

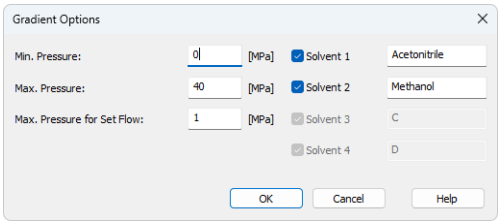

Fig. 11: Gradient Options

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, all pumps on the Instrument will shut down. This serves to prevent the damage to the pump when the column is blocked.

Note: *Min. Pressure* and *Max. Pressure* for the **Shimadzu LC-10/20** pumps vary in certain range according to the type of the pump and valves used. Check the device manual for valid values for your pump.

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 (..4)

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

4.1.3 Method Setup - LC

If the only pump was set to *Auxiliary* mode in theShimadzu LC-10/20 System Setup - Pump dialog, the *LC* tab will appear instead of theLC Gradient tab. The *LC* tab will also appear if the second pump is set to *Auxiliary* mode (showing only the *Auxiliary Pump* sub-tab) or when primary pump is configured with valve and only one solvent in theShimadzu LC-10/20 System Setup - Pump dialog (showing only the *LC Valve* sub-tab).

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

From LC

Acquires the status of the auxiliary pump from the controller.

LC Status

Invokes the hardware configuration dialog listing the settings of the **Shimadzu LC-10/20 System**. The upper part shows the settings of the controller, the lower part the settings of other modules.

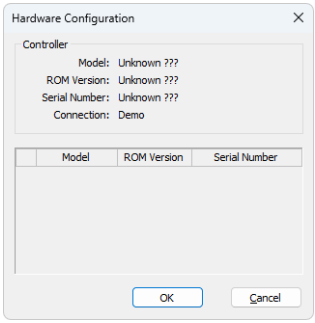

Fig. 12: Method Setup - LC - Hardware Configuration

Auxiliary Pump tab

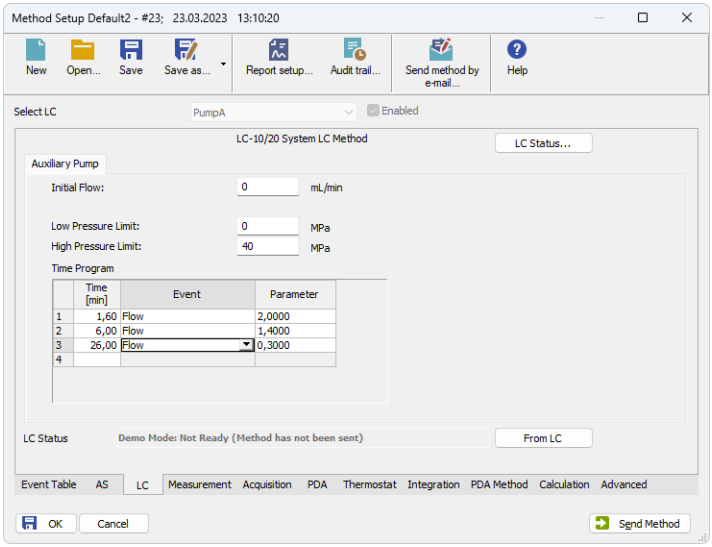

Fig. 13: Method Setup - LC - Auxiliary Pump

Initial Flow

Sets the initial flow of the auxiliary pump.

Solvent B Concentration

Allows to set the percentage of the second solvent in the mixture created by auxiliary binary pump. This field is only present for the **LC-20AB** pump (which is binary) in the auxiliary pump mode.

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.

Time Program

This table sets the flow changes for the auxiliary pump based on the analysis time. Insert the desired time in minutes into the *Time* column, set the *Flow* event in the *Event* column and the desired flow value into the *Parameter* column.

LC Valve tab

Tab listing the **Valve Position** table. Each row defines the change of the valve position in given time. These settings can be later printed as a part of the report.

Note: The valves set on particular pumps may not be governed from the ***Method Setup - Event Table*** dialog, only from the **Time Table** on the *Method Setup - LC - LC Valve* tab.

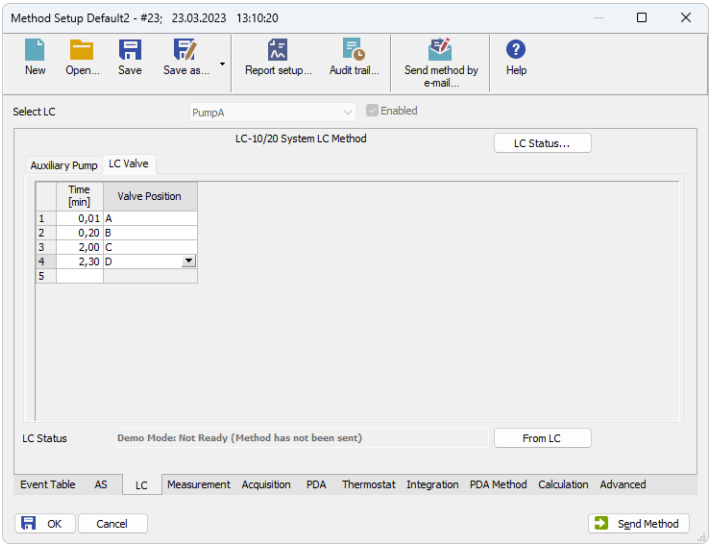

Fig. 14: Method Setup - LC - LC Valve

4.1.4 Method Setup - Advanced

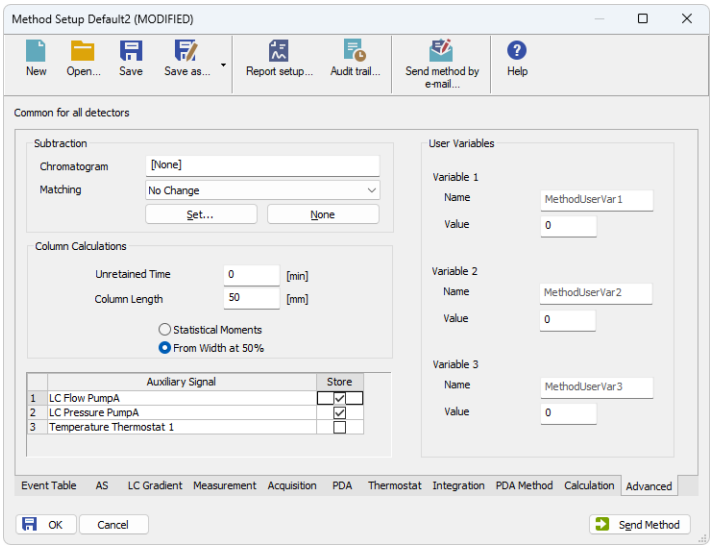

Fig. 15: Method Setup - Advanced

Shimadzu LC-10/20 System 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.

4.1.5 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.

Device Monitor - LC Monitor

It displays the actual flows of particular solvents, as well as the total flow, the total pressure and the analysis time.

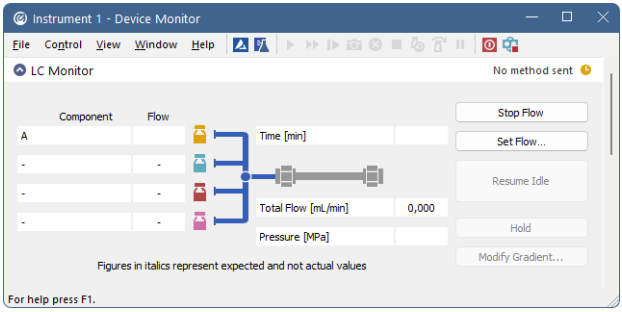

Fig. 16: LC Monitor

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 from the ***Data Acquisition*** window or ***Single Analysis*** dialog.

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 21 of a given method.

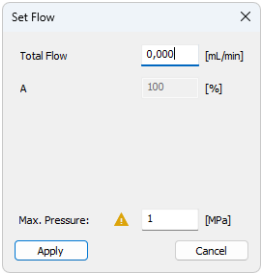

Fig. 17: Set Flow

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 theLC 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.

Device Monitor - Auxiliary Pump

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

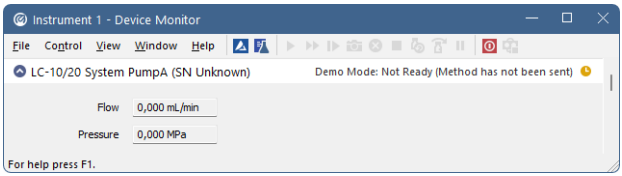

Fig. 18: Device Monitor - Auxiliary pump

4.1.5.1 LC Control Manual Flow

The *LC Control Manual Flow* dialog accessible through using the *Modify Gradient …* button fromDevice Monitor window allows the user to set a custom mobile phase composition and flow while the analysis is running. It resembles theMethod Setup - LC Gradient tab in functionality.

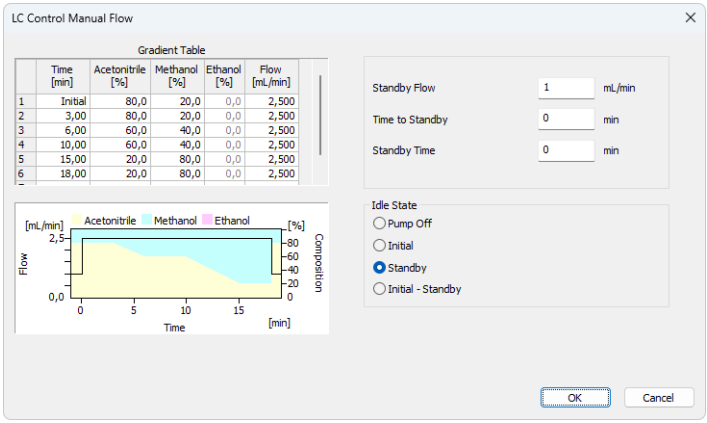

Fig. 19: LC Control Manual Flow dialog

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.

4.1.6 Report Setup

All of the pump settings accessible on theMethod Setup - LC Gradient tab and in theGradient Options dialog are reported, if the pump is configured as the part of the gradient. To do so, the *Instrument Control* parameter on the ***Method*** tab of the ***Report Setup*** dialog must be checked.

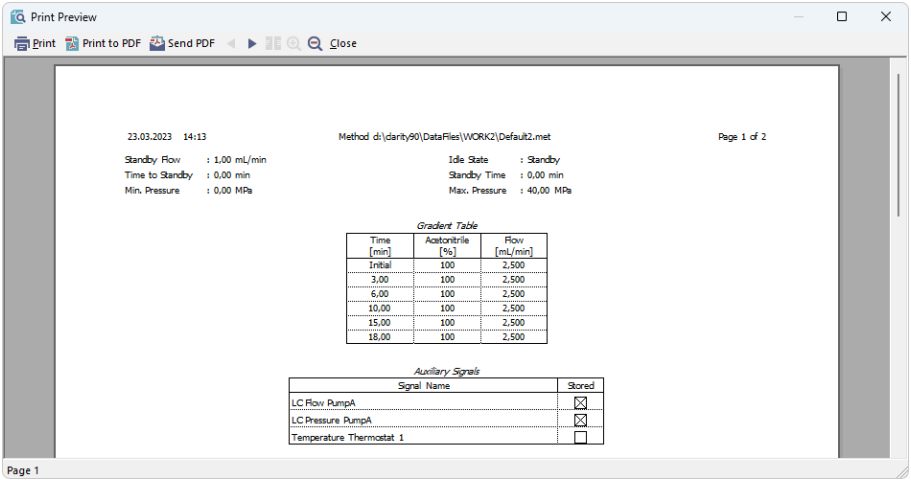

Fig. 20: Report - pump part of the gradient

If the pump is set as an Auxiliary pump, thus excluded of the **Gradient Table**, the values set on the of theMethod Setup - LC tab are reported, including the **Time Table**. To do so, the *Instrument Control* parameter on the Method tab of the Report Setup dialog must be checked.

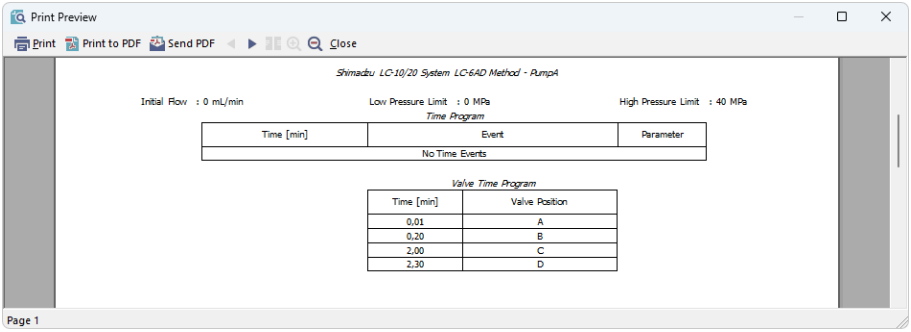

Fig. 21: Report - Auxiliary pump

4.2 Detector

4.2.1 Shimadzu LC-10/20 System Setup - Detector

The *Shimadzu LC-10/20 System Setup - Detector* tab for **SPD** detectors and **RF** detectors looks the same, although some items may be missing depending on the type of the detector.

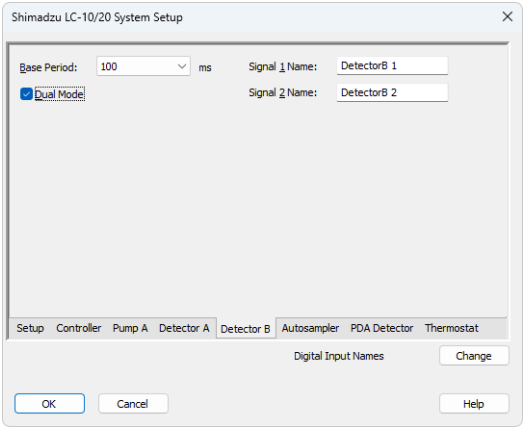

Fig. 22: Shimadzu LC-10/20 Detector setup

Base Period

Specifies the base rate of the detector signal acquisition. The value set here is also limiting the available range of values for the *Sampling Rate* as set in the Method Setup - Acquisition dialog - the lower *Base Period* is, the higher can the *Sampling Rate* be. The possible values are influenced by the checking/unchecking of the *Dual Mode* item.

Dual Mode

Check to perform the data acquisition on two wavelengths.

Use Recycle Valve

Defines whether the solvent recycling valve is used during the acquisition.

Signal 1 (2) Name

Sets the name of the given detector.

RID-10A Detector Setup

The *Shimadzu LC-10/20 System Setup - Detector* tab for the **RID-10A** detector differs somewhat from the classical one. All options are the same except for the *Large Scale Preparative Option Installed*.

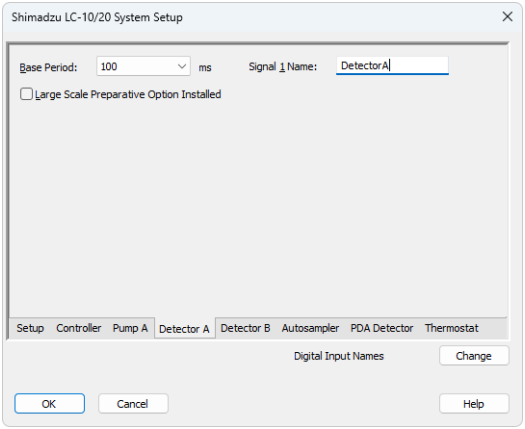

Fig. 23: Shimadzu LC-10/20 Detector setup - RID-10A

Large Scale Preparative Option Installed

Defines whether the optional **Large Scale Preparative Option** is installed in the **RID-10A** detector.

4.2.2 Method Setup - Acquisition - Detector

In case of greater number of detectors configured on one Instrument, it is possible to switch to the desired detector by selecting it in the *Select Detector* menu on the upper part of the ***Method Setup - Acquisition*** window.

The chapter describes the SPD detectors, other detector types are described later in the manual.

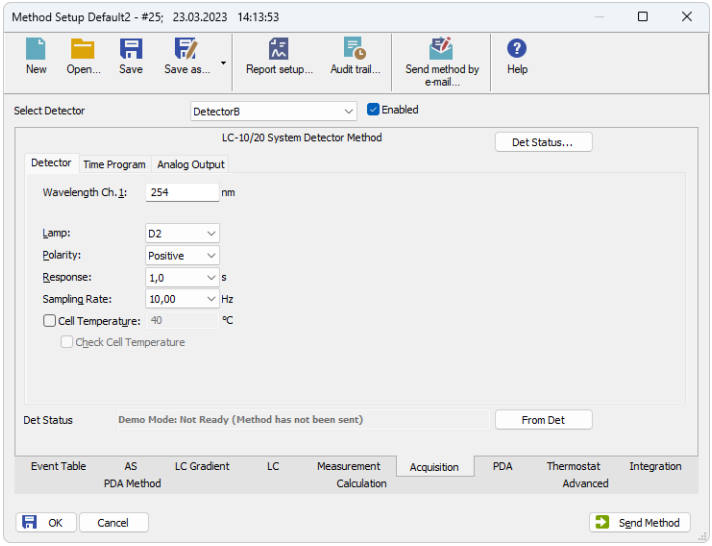

Fig. 24: Method Setup - Acquisition - Detector

Wavelength Ch.1

Defines the initial wavelength of the first channel.

Wavelength Ch.2

Defines the initial wavelength of the second channel, available only in the *Dual Mode*. Any changes made on the tab of one channel will be also changed on the other channel of the *Dual Mode* detector.

Lamp

Sets the lamp used at the beginning of the analysis. Available options are (based on the type of the detector): *Off*, *D2*, *W*, *D2+W*

Polarity

Selects the initial polarity of the detector.

Response

Defines the level of the digital noise filter. The higher the number set, the lower the noise level is. On the other hand, some peaks may not be detected.

Sampling Rate

Sets the sampling rate of the detector. The available detector sample rates are dependent on the *Base Period* settings on the Shimadzu LC-10/20 System Setup - Detector tab - by using the shortest *Base Period* of *20 ms*, the *Sampling Rate* can be set up to *50 Hz*. Please note that in dual mode the *Base Period* is limited to *100 ms* and maximum *Sampling Rate* to *10 Hz*.

Cell Temperature

Sets the cell temperature of the given detector. The Value range is between *9* and *50* °C.

Check Cell Temperature

If checked, doesn't allow the Instrument to become *READY* until the temperature is not close to the temperature set in the *Cell Temperature* field (with the tolerance of 1,5 °C).

4.2.2.1 Method Setup - Acquisition - RF Detector

This sub-tab replaces theDetector sub-tab when one of the configured **RF-10A** and **RF-10AxI** detectors is selected in the *Select Detector* field.

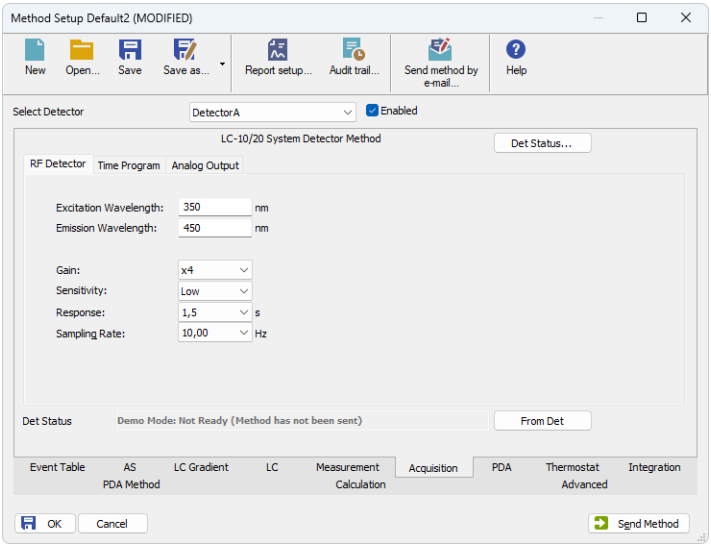

Fig. 25: Method Setup - Acquisition - RF Detector

Excitation Wavelength

Sets the excitation wavelength. The possible values are in the range *200* to *900* nm.

Emission Wavelength

Sets the emission wavelength. The possible values are in the range *200* to *900* nm.

Lamp

Sets whether the lamp should be activated prior to the analysis.

Gain

Selects the detector gain amplification value. Possible options are *x1*, *x4* and *x16*.

Sensitivity

Sets the detector sensitivity by adjusting the voltage on the photomultiplier.

Response

Defines the detector signal response. Possible values vary for the **RF-10A** and **RF-10AxI** detector.

Sampling Rate

Sets the sampling rate of the detector. The available detector sample rates are dependent on the *Base Period* settings on the Shimadzu LC-10/20 System Setup - Detector tab - by using the shortest *Base Period* of *20 ms*, the *Sampling Rate* can be set up to *50 Hz*. Please note that in dual mode the *Base Period* is limited to *100 ms* and maximum *Sampling Rate* to *10 Hz*.

4.2.2.2 Method Setup - Acquisition - RID Detector

This sub-tab replaces theDetector sub-tab when the configured **RID-10A** detector is selected in the *Select Detector* field.

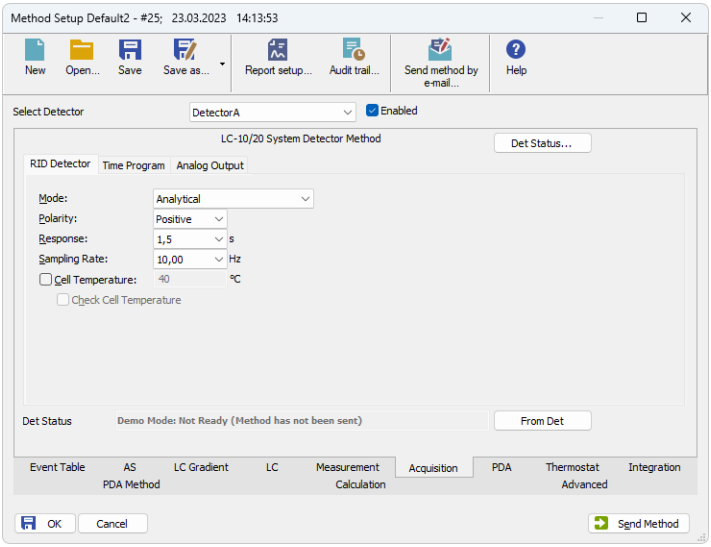

Fig. 26: Method Setup - Acquisition - RID Detector

Mode

This field specifies the operating mode of the detector. The contents of the field depend on the state of the *Large Scale Preparative Option Installed* checkbox in theShimadzu LC-10/20 System Setup - Detector dialog for **RID** detector. If the checkbox is checked, the *Large Scale Preparative* text is the only option to be selected in the field. If the checkbox is left unchecked, the *Analytical* and *Semi-preparative* options are available.

Polarity

Sets whether the increasing refraction value will be counted as more *Positive* or more *Negative* voltage signal.

Response

Defines the level of the digital noise filter. The higher the number set, the lower the noise level is. On the other hand, some peaks may not be detected.

Sampling Rate

Sets the sampling rate of the detector. The available detector sample rates are dependent on the *Base Period* settings on the Shimadzu LC-10/20 System Setup - Detector tab - by using the shortest *Base Period* of *20 ms*, the *Sampling Rate* can be set up to *50 Hz*. Please note that in dual mode the *Base Period* is limited to *100 ms* and maximum *Sampling Rate* to *10 Hz*.

Cell Temperature

Sets the temperature of the detector cell.

Check Cell Temperature

When checked, the Instrument will not be ready until the actual temperature will reach the set value (with the 1.5 °C tolerance). While the checkbox is unchecked, no temperature verification will be performed.

4.2.3 Method Setup - Acquisition - Time Program

This sub-tab allows to reset the detector parameters defined on other tabs based on the analysis time. Note that the options listed in the *Event* column depend on the type of the detector (not all events listed under the picture are accessible).

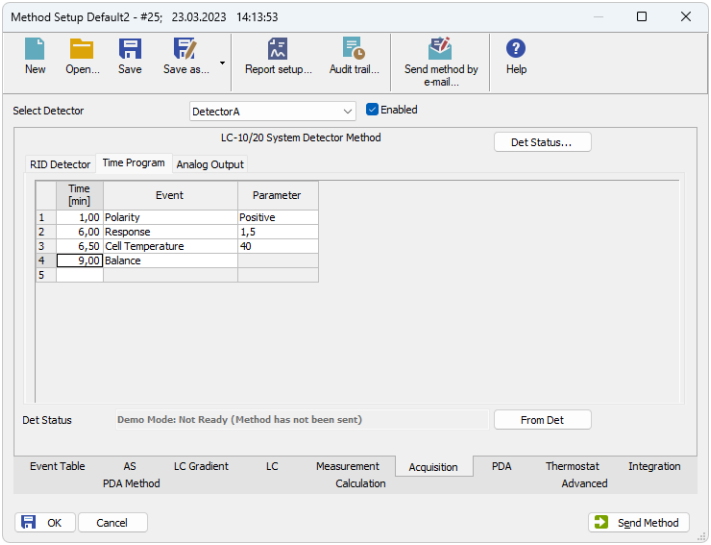

Fig. 27: Method Setup - Acquisition - Time Program

Time Table

The initial analysis settings defined on theDetector sub-tab can be changed during the analysis by events programmed in the **Time Table**. Possible events are:

Zero - Set the current absorbance value to zero.

Mark - Marks recorder output.

Polarity - Change the polarity of the signal.

Recorder Range - Change the range of the output signal.

Response - Change the settings of the digital noise filter.

Sensitivity - Changes the sensitivity parameter. Only available for **RF** detectors.

Lamp - Select the lamp type to be used.

Wavelength - Set the wavelength of the chosen detector.

Cell Temperature - Set the desired cell temperature. Allowed values are in range *9 - 50* °C, *0* means that the cell temperature control is off.

Flow - Switches the flow in the detector reference cell *On* and *Off*. Only available for **RID** detectors. The function of the command is the same as the function of the *Flow Off/On* button in theDevice Monitor window.

Balance - Sends the *Balance* command to the detector. Only available for **RID** detectors. The function of the command is the same as the function of the *Balance* button in theDevice Monitor window.

Gain - Change the current *Gain* parameter. Only available for **RF** detectors.

Excitation Wavelength - Change the current *Excitation Wavelength* parameter. Only available for **RF** detectors.

Emission Wavelength - Change the current *Emission Wavelength* parameter. Only available for **RF** detectors.

4.2.4 Method Setup - Acquisition - Analog Output

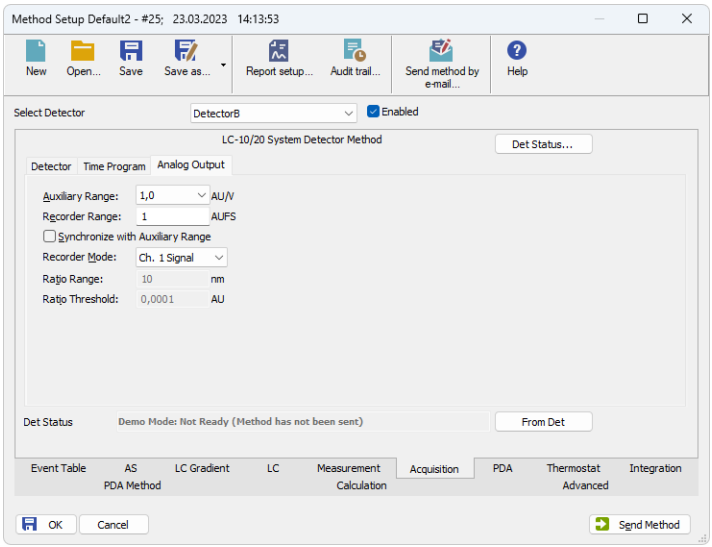

Fig. 28: Method Setup - Acquisition - Analog Output

Auxiliary Range
Sets output range of integrator terminals.

Caution: Auxiliary range will affect the acquired signal. For **RID-10A** and **RID-20A** detectors use *0.25 mRIU/V* to get correct signal values

Recorder Range
Sets the range of the recorder.

Synchronize with Auxiliary Range
Synchronizes the *Recorder Range* with the *Auxiliary Range* value.

Recorder Mode
Sets the output mode of the recorder terminals.

Ratio Range
Sets the range of the signal ratio calculation.

Ratio Threshold
Sets the threshold of the signal ration calculation.

4.2.5 Device Monitor

The *Device Monitor* window can be invoked by the *Monitor - Device Monitor* command from the ***Instrument*** window or using the Device Monitor icon. It displays the actual wavelength and the lamp used, the cell temperature (if configured) and allows to perform the *Autozero* action and switch the signal on outside of the analysis.

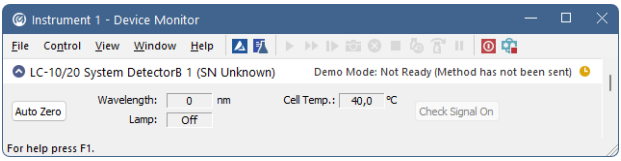

Fig. 29: Device Monitor - Detector

It is possible to control the detector operation during the analysis in the *Device Monitor* window.

Auto Zero
Sets the response of the detector to *0*.

Wavelength
Displays the wavelength set in the method.

Lamp
Displays the type of lamp set in the detector.

Cell Temp.
Shows the actual temperature on the detector cell.

Check Signal On
Turns the detector signal monitoring on and off. Active only when analysis is not running.

Note: This type of detectors is giving data only during analysis. Pressing this button starts a "dummy" analysis run (all data discarded) that allows to check the detector signal before the actual analysis. It should be turned *OFF* before starting the analysis by external contact.

Caution: The *Check Signal On* function can not be activated when a *Purge* was used to set the flow and composition manually from the *Device Monitor*. You need to use the *Resume Idle* function from the LC Device Monitor first.

Device Monitor - RID Detector

The **RID** detectors has slightly different *Device Monitor* window with other options on the monitor pane. Only new items are described:

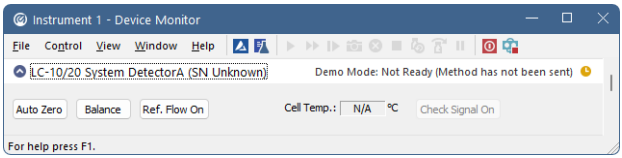

Fig. 30: Device Monitor - RID Detector

Balance

When invoked, sends the *Balance* command to the detector. For the description of the command see **Shimadzu RID-10A** detector documentation.

Flow Off/On

When invoked, the flow in the reference detector cell is switched off and the button changes to the *Flow On*. If invoked again, the flow will be renewed and the button returns to the *Flow Off* state.

Device Monitor - RF Detector

The **RF** detectors has slightly different *Device Monitor* window with other options on the monitor pane. Only new items are described:

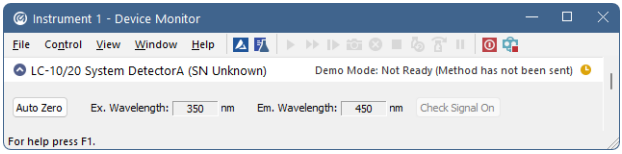

Fig. 31: Device Monitor - RF Detector

Ex. Wavelength

Displays the currently set *Excitation Wavelength*. This value may be changed in the Time Table on the Method Setup - Acquisition - Time Program tab of the **RF** detectors.

Em. Wavelength

Displays the currently set *Emission Wavelength*. This value may be changed in the Time Table on the Method Setup - Acquisition - Time Program tab of the **RF** detectors.

4.2.6 Report Setup

All detector settings accessible on theMethod Setup - Acquisition tab (including sub-tabs) are reported if the *Instrument Control* parameter on the ***Method*** tab of the ***Report Setup*** dialog is checked. For each detector set in the Shimadyu LC-10/20 System Setup dialog, a specific section of the report will be printed.

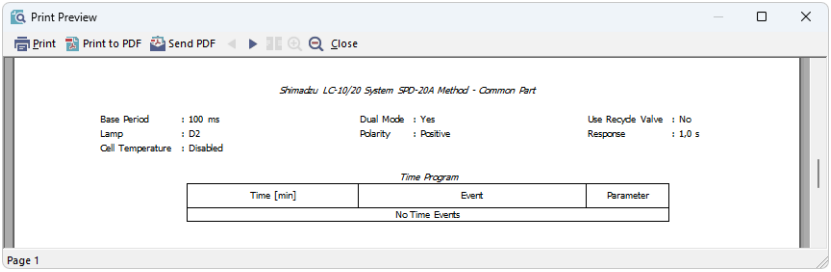

Fig. 32: Report Setup

Two groups of parametres are then printed, one common to all channels of a given detector, the other specific to particular channels. The first section also includes the **Time Table** from theMethod Setup - Acquisition - Time Program tab. The other part of the report is the detector specific parametres. When the Dual Mode is off, only one set of parametres will be printed in this section, while in the Dual Mode, two sets will be present, one for each channel.

Report Setup - RID Detector

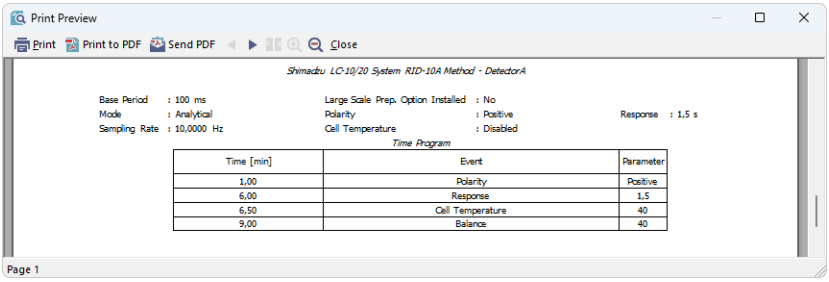

Fig. 33: Report Setup - RID Detector

The report setup of the **RID-10A** detector differs only in the items displayed, it is the same in all other respects.

Report Setup - RF Detector

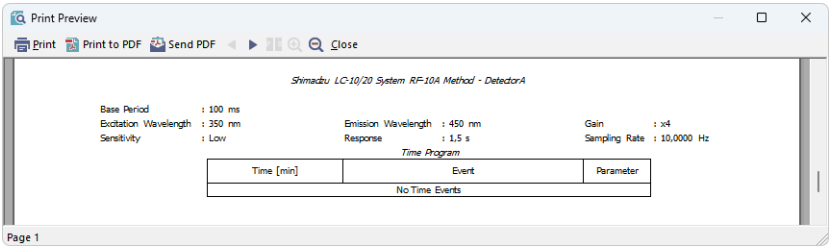

Fig. 34: Report Setup - RF Detector

The report setup of the **RF** detectors differ only in the items displayed, it is the same in all other respects.

4.3 Autosampler

The autosamplers used with the **Shimadzu LC-10/20 System** allow for automated injection of samples. This can only be performed from the *Sequence* window, not from the *Single Analysis* dialog (where it is impossible to specify from which position the injection will be performed).

4.3.1 Shimadzu LC-10/20 System Setup - Autosampler

Some options may be missing or shaded depending on the type of the autosampler installed.

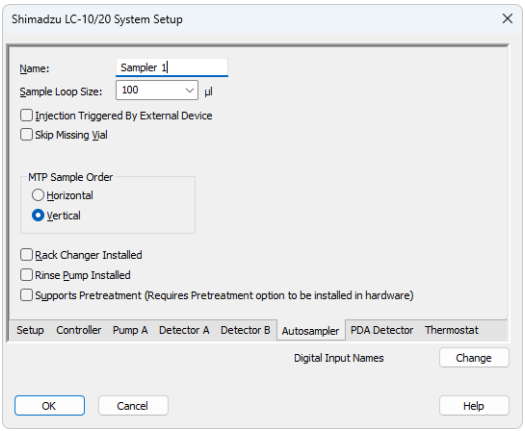

Fig. 35: Shimadzu LC-10/20 System Setup - Autosampler

Name

Sets the name of the autosampler.

Sample Loop Size

Defines the volume of the injector loop. Some parameters are predefined, but any whole number in certain range can be entered. The range depends on the type of the autosampler.

Injection Triggered By External Device

Sets whether the injection will be performed only after the external start contact on the controller is closed.

Skip Missing Vial

Defines whether the missing vial in the sequence measurement should be skipped. Otherwise, the sequence would be stopped when encountering the missing vial.

Sample Cooler Installed

Defines whether the tray cooler is installed.

MTP Sample Order

Defines the numbering of wells in the plate when the MTP Tray is used. If other trays are used, this option is ignored. Possible parameters are *Horizontal* or

Vertical.

Rack Changer Installed
Enables the rack changer control in case a rack changer is installed.

Rinse Pump Installed
Enables the control of the rinse pump (if it is installed).

Supports Pretreatment
Enables the display of the Pretreatment sub-tab of the Method Setup - AS dialog. For this option to function, it is necessary to have the **Pretreatment option** installed in the hardware.

4.3.2 Method Setup - AS - Sampler

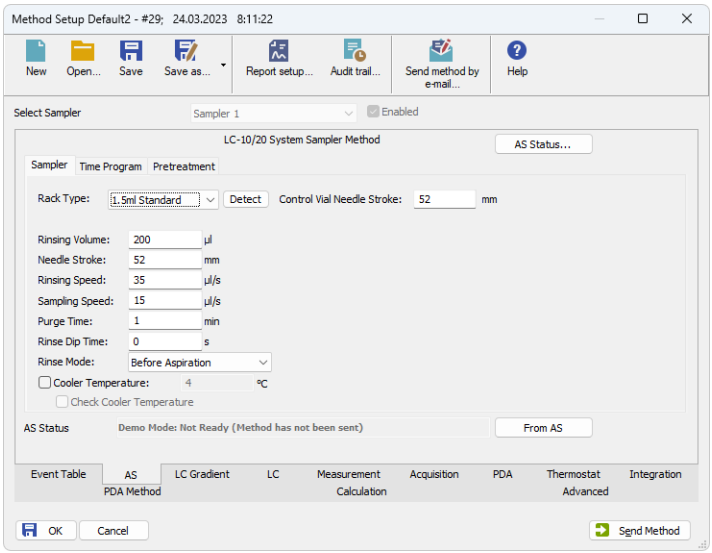

Fig. 36: Method Setup - AS - Sampler

Rack Type
Defines the sample rack type. For some trays, it is also necessary to choose the correct *Tray Type* (*Single* or *Dual*).

Detect
Auto detects the *Rack Type* and sets the *Needle Stroke* parameter.

Note: Vial number mapping on various types of trays can be found in the chapter **"Vial Plate Numbers"** on pg. **72**.

Rinsing Volume
Sets the volume of the solvent used for rinsing the flow lines.

Needle Stroke
Sets the depth of the needle penetration into the vial. The *Needle Stroke* is defined by the *Rack Type* installed.

Rinsing Speed
Sets the solvent discharge speed when rinsing.

Sampling Speed
Sets the speed of the sample aspiration into the syringe.

Purge Time
Sets the duration of the Purge operation.

Rinse Dip Time
Sets the time for which the needle tip will remain immersed in the rinsing solvent.

Rinse Mode
Sets the time when the rinsing will be performed. Available options are *No Rinsing*, *Before Aspiration*, *After Aspiration* and *Before and After Aspiration*.

Cooler Temperature
Enables the cooling of the autosampler. This option is available only after the *Sample Cooler Installed* option was checked in the Shimadzu LC-10/20 System Setup - Autosampler dialog. The field than allows to set the desired temperature.

Check Cooler Temperature
If checked, doesn't allow the Instrument to become *READY* until the temperature is not close to the temperature set in the *Cooler Temperature* field (with the tolerance of 1,5 °C).

Control Vial Needle Stroke
Sets the needle depth used when aspirating from the **Control Rack** (used with the **SIL-20** samplers).

Rinse Pump
Section enabled by checking the *Rinse Pump Installed* option in the Shimadzu LC-10/20 System Setup - Autosampler dialog.

Rinse Method
Sets the method for the *Rinse Pump*. *Port Only*, *Pump Only*, *Pump Then Port*, *Port Then Pump*, *Pump And Port Between Analyses* and *Auxiliary 1 (2)* methods are available.

Rinse Time
Sets the length of the rinse. Possible values are integers in the range *1 - 9*.

Rack Changer
Section enabled by checking the *Rack Changer Installed* option in the Shimadzu LC-10/20 System Setup - Autosampler dialog.

Rack Type D..A
Sets the type of the rack for each position in the rack changer.

Needle Stroke D..A
Sets the needle stroke depth (in mm) for each particular rack in the rack changer.

Note: When the *Rack Changer* tray type has been selected, the common *Needle Stroke* parameter is not used and thus is disabled. Moreover, do not use values less than *20* for rack types 4, 5, 14 or 15.

4.3.2.1 Method Setup - AS - Sampler (SIL-10AxI)

This sub-tab replaces the Sampler sub-tab when the **SIL-10AxI** sampler is configured on the Instrument. The majority of items in the dialog is the same, the differing items are described below:

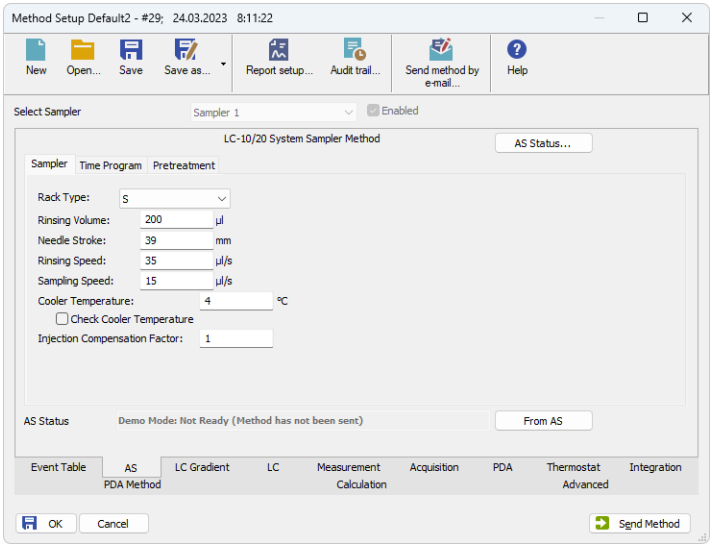

Fig. 37: Method Setup - AS - Sampler (SIL-10AxI)

Caution: Due to the error in the MIMIC Libraries, SIL-10AXL sampler does not support the non-default rack types. Only *S* rack type should be used while operating this sampler from **Clarity**.

Check Cooler Temperature

While checked, the temperature set in the *Cooler Temperature* field is validated against the real cooler temperature. When both values don't match, the Instrument will not become ready.

Injection Compensation Factor

The value that is used to compensate the actual volume of different injectors. The specified *Injection volume* is multiplied by the *Injection Compensation Factor* value to produce the real injection volume. Possible values are *1.00 - 1.30*, although usually the value *1.00* is used.

4.3.2.2 Method Setup - AS - Sampler (SIL-10AF)

This sub-tab replaces the Sampler sub-tab when the **SIL-10AF** sampler is configured on the Instrument. The majority of items in the dialog is the same, the differing items are described below:

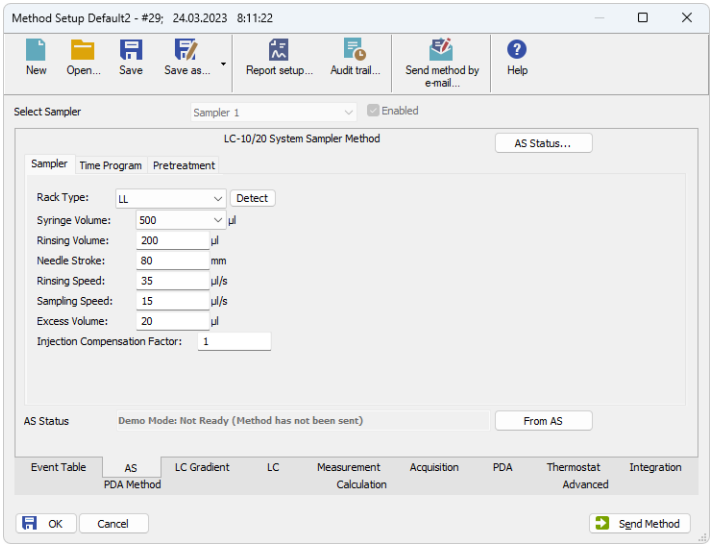

Fig. 38: Method Setup - AS - Sampler (SIL-10AF)

Excess Volume

Allows to set the excess volume of the sample drawn into the syringe during each injection. This portion of the sample is not injected, but serves for better precision of the injection. Allowed values in the *Excess Volume* field are between *10* and *100* µl.

Injection Compensation Factor

The value that is used to compensate the actual volume of different injectors. The specified *Injection volume* is multiplied by the *Injection Compensation Factor* value to produce the real injection volume. Possible values are *1.00* - *1.30*, although usually the value *1.00* is used.

4.3.3 Method Setup - AS - Time Program

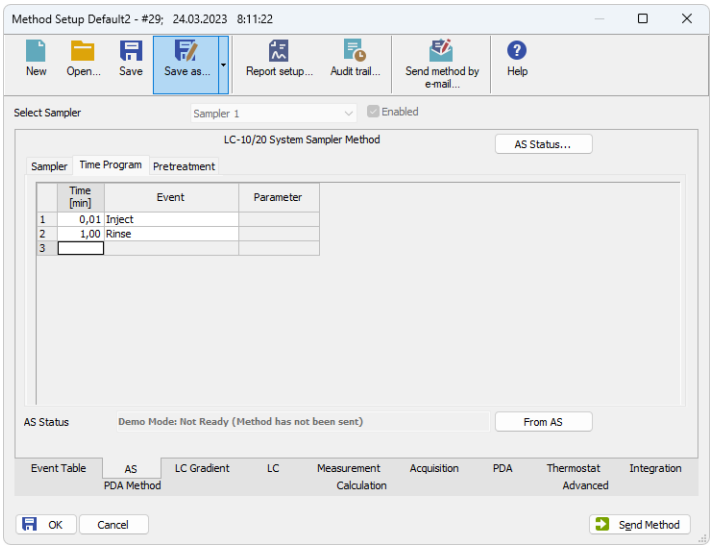

Fig. 39: Method Setup - AS - Time Program

Time Table

It is possible to set events to be performed during the analysis run based on the analysis time, namely the *Inject*, *Rinse* and *Start Pretreatment* actions.

Note: The time needed to perform the *Rinse* operation is longer than 1 minute, for exact duration it is necessary to test it in the given configuration.

4.3.4 Method Setup - AS - Pretreatment

The logic for all calculations of pretreatment vials goes as follows: The vial specified in the Sequence window for the injection (called the *Sample vial*, *SV*) needs to be empty when performing pretreatment. The actual sample is in the *Source Vial* (specified on the *Method Setup - AS - Pretreatment* tab), while the diluent is placed in the *Diluent Vial* and reagents are placed in *Reagent Vials 1..3*.

When using the *Auto* calculation of the *Source Vial*, the source vials are found on the second half of the vial tray; the first half of the tray is reserved for the empty vials used for mixing (diluting). These vials are specified in the Sequence window and from these vials the injection is performed.

Note: In case of racks with odd number of vials, the middle vial cannot be used as *Sample Vial* with pretreatment operation as it would have no corresponding *Source Vial*.

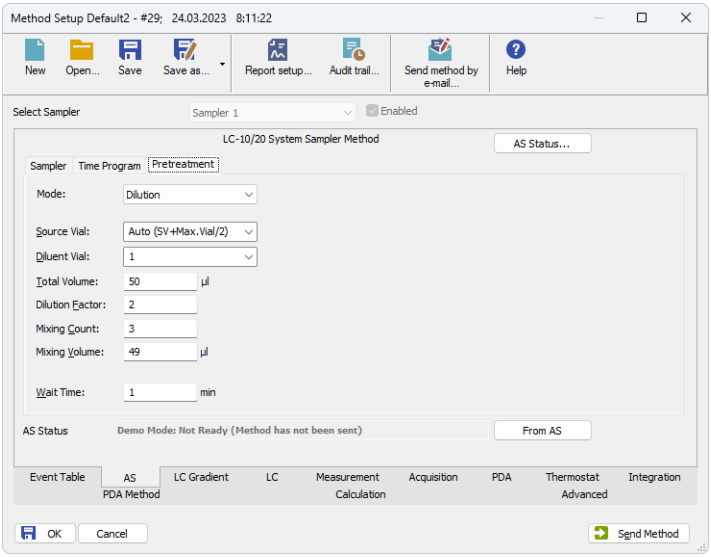

Fig. 40: Method Setup - AS - Pretreatment (Dilution)

Mode

Selects the pretreatment mode. There are 3 types of pretreatment available:

Standard - Standard type of autosampler operation with no special pretreatment. No other parameter fields are available on the *Pretreatment* tab. This mode is also used when the *Pretreatment* tab is unavailable.

Dilution - Sample will be diluted before the injection.

Reagent - Sample will be mixed with the reagent and then injected.

Inner Needle Wash - Sampler inner needle will be washed prior and/or after the injection.

Note: The *Advanced* pretreatment mode is not currently supported by **Clarity**.

The set of other parameters available differ according to the *Mode* selected.

Dilution

Source Vial
Specifies the source vial for the original sample (before dilution).

Note: The vial used for dilution and injection is specified in the Sequence window.

Diluent Vial
Specifies the vial from which the diluent (solvent) will be taken.

Total Volume
Specifies the final volume of the diluted sample without the respect to the volume contraction.

Dilution Factor
Specifies the factor for the dilution. For example, the factor *5* means that the resulting diluted sample will consist of 1/5 of pure sample and 4/5 of diluent.

Mixing Count
Specifies the number of mixing cycles the dilution will consist of (range *1 - 10* cycles).

Mixing Volume
Specifies the volume to be aspirated and flushed back in every mixing step. This volume must be lower than the *Total Volume*.

Bubbling
When checked, a bubble is aspirated during the mixing cycle in addition to the specified volume. The bubble is dispensed into the vial during mixing.

Wait Time
Sets the time interval from the last mixing cycle to the injection. Possible values are *0.1 - 120* minutes.

Reagent

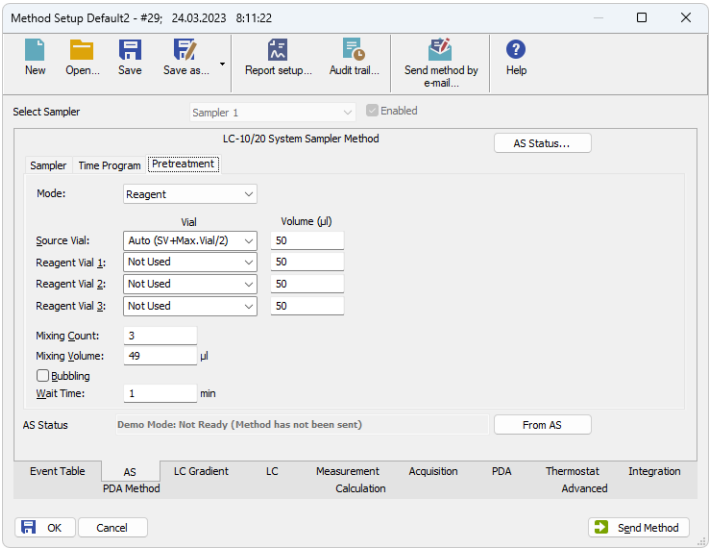

Fig. 41: Method Setup - AS - Pretreatment (Reagent)

Part of the fields (namely *Mixing Count*, *Mixing Volume*, *Bubbling* and *Wait Time*) in the *Reagent* mode has the same meaning as in the *Dilution* mode. Different fields are described lower:

Source Vial

Specifies the source vial for the original sample (before reaction). The automatic calculation uses the same rules as in the *Dilution* mode.

Reagent Vial 1..3

Specifies vials used for particular reagents. It is possible to select the *Not Used* option.

Volume

Specifies the volume of the sample and each reagent used.

Inner Needle Wash

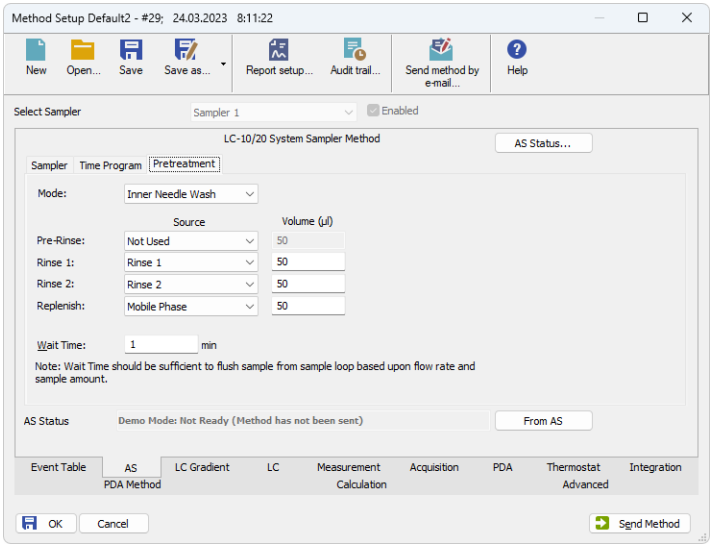

Fig. 42: Method Setup - AS - Pretreatment (Inner Needle Wash)

Pre-Rinse

Sets the rinsing prior to the injection (which is not recommended). The same options as for the *Rinse* operation (see below) apply.

Rinse 1[2]

Sets the first (second) rinse solvent. It is possible to select from the *Not Used*, *Rinse 1*, *Rinse 2* and *Mobile Phase* options.

Replenish

Select whether or not to replenish the Inner Needle by the mobile phase after rinsing. If any *Pre-Rinse* or *Rinse* step is used, the only option is *Mobile Phase*, otherwise *Not Used* option is also available.

Wait Time

Sets the time for which the injection loop will be switched into the flow path to wash away the sample from there. After elapsing of this time period the *Rinse 1* and *Rinse 2* operations will be performed. Available time span for this field is *0.1 - 120* minutes.

4.3.5 Device Monitor - Shimadzu LC-10/20 System

The *Device Monitor* window can be invoked by the *Monitor - Device Monitor* command from the ***Instrument*** window or using the Device Monitor icon. It displays the actual cooler temperature (if configured) and allows to perform the *Purge* and *Rinse* actions.

Fig. 43: Device Monitor - Autosampler

Purge

Runs the **Purge** operation according to the settings in the Method Setup - AS - Sampler dialog.

Rinse

Rinses the syringe according to the settings in the Method Setup - AS - Sampler dialog.

Cooler Temp.

Displays the temperature of the cooler. Only available when the autosampler is equipped with the sample cooling unit and the *Sample Cooler Installed* checkbox is checked in the Shimadzu LC-10/20 System Setup - Autosampler dialog.

4.3.6 Report Setup

The autosampler settings accessible from the Method Setup - AS tab and Shimadzu LC-10/20 System Setup - Autosampler dialog may also be included in the report. To do so, the *Injection Control* parameter on the ***Method*** tab of the ***Report Setup*** dialog must be checked.

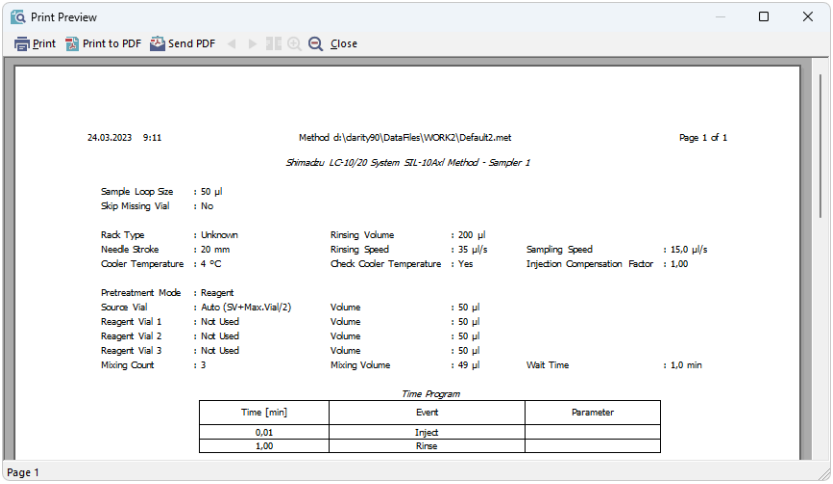

Fig. 44: Report Setup - Autosampler

The first part of the parametres is taken from the Shimadzu LC-10/20 System Setup - Autosampler dialog settings, the second part contains parametres set on the Method Setup - AS tab (including the **Time Table**).

4.4 PDA

4.4.1 Shimadzu LC-10/20 System Setup - PDA Detector

Caution: It is necessary to switch the **PDA** detector on before switching on the PC.

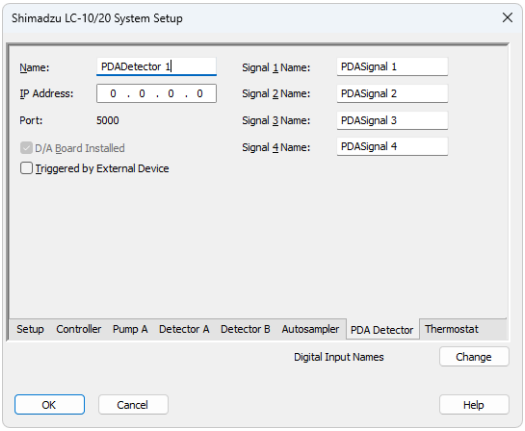

Fig. 45: Shimadzu LC-10/20 System Setup - PDA Detector

Name
Sets the name of the **PDA** Detector.

Host ID
Uniquely identifies the SCSI adapter board. This number is assigned by the operation system and can be found in the Device Manager. The default value is *0*. See Shimadzu **SPD-M10Avp** manual for more details.

Device ID
Number of the **PDA** Detector unit (set on the back of the unit). The default value is *4*. See Shimadzu **SPD-M10Avp** manual for more details.

Note: When using the **SPD-M20A** device, the *IP Address* and *Port* commands are displayed instead of *Host ID* and *Device ID*. These two specify the parameters of the connection through LAN.

D/A Board Installed
Sets whether the optional D/A output converter (not autodetected) is installed in the **PDA** unit.

Triggered by External Device
Check if the **PDA** should start acquisition based on the external signal (by wire from the back of the device).

Note: In the standard operation mode, the **PDA detector** is started by the controller (this checkbox should be unchecked).

Signal 1 (..4) Name

Defines the names of the particular detector signals.

4.4.2 Method Setup - PDA

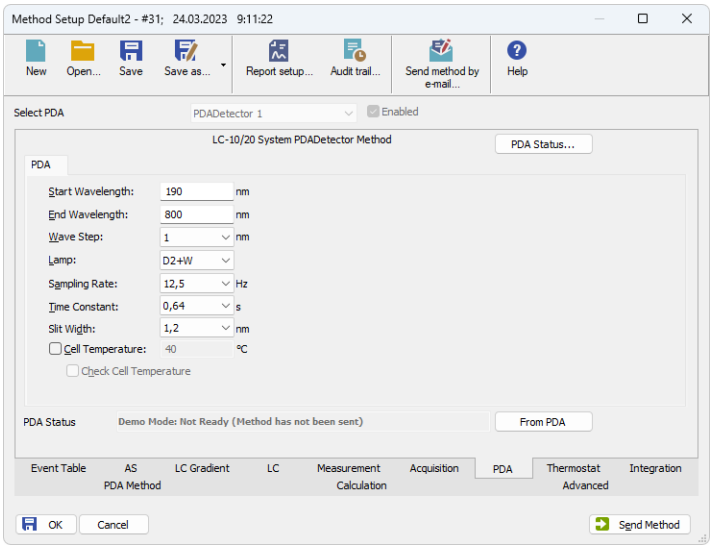

Fig. 46: Method Setup - PDA

Start Wavelength
Defines the lowest value of the wavelength to be used for the acquisition of spectra. This value also influences the lowest possible value of the *Wavelength* parameter on the Method Setup - Acquisition tab for the single-wavelength **PDA** detector signals. The value must be in range <*190*, *799*> and lower than the *End Wavelength* value.

End Wavelength
Defines the highest value of the wavelength to be used for the acquisition of spectra. This value also influences the highest possible value of the *Wavelength* parameter on the Method Setup - Acquisition tab for the single-wavelength **PDA** detector signals. The value must be in range <*191*, *800*> and greater than the *Start Wavelength* value.

Wave Step
Sets the wavelength step for the **PDA** spectra gathering. The lowest possible value is *1* nm.

Lamp
Defines the lamp type that will be used in the measurement. Possible options are *Off*, *D2*, *W* and *D2+W*.

Sampling Rate
Defines the sampling rate of the **PDA** detector, set in the Hz.

Time Constant

Sets the amount of time from which will the raw spectra be averaged to get one reported spectrum. The value should be set so that it is longer than it takes to gather one spectrum (based on the *Sampling Rate* parameter).

Slit Width

Defines the wavelength accuracy provided by the hardware.

Cell Temperature

Sets the temperature of the detector cell.

Check Cell Temperature

When checked, the Instrument will not be ready until the actual temperature will reach the set value (with the 1.5 °C tolerance). While the checkbox is unchecked, no temperature verification will be performed.

4.4.3 Method Setup - Acquisition

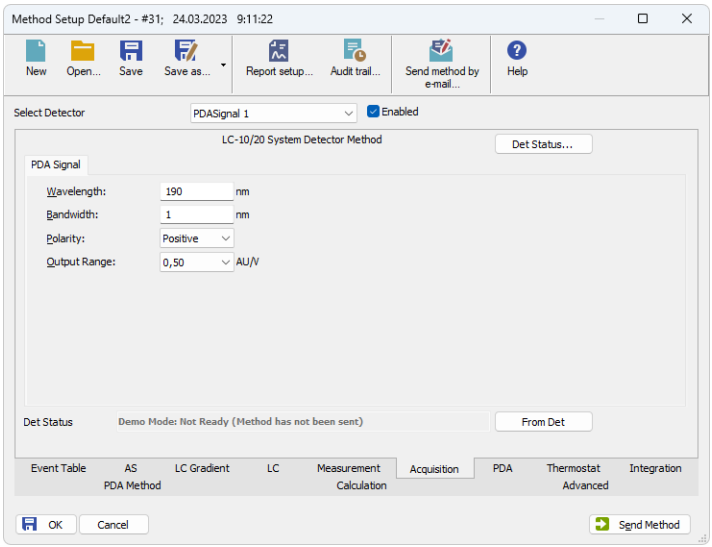

Fig. 47: Method Setup - Acquisition - PDA Signal

Wavelength

Sets the wavelength of the desired analog signal. This value must lie in the range set by the *Start Wavelength* and *End Wavelength* parameters defined on the Method Setup - PDA tab.

Bandwidth

Sets how "wide" will the wavelength window be for the purpose of the analog signal creation. This signal is created by calculation from several wavelengths, not by hardware settings.

Polarity

Sets whether the increasing absorbance value will be counted as more *Positive* or more *Negative* voltage signal.

Output Range

Defines the maximal output value of the analog signal.

4.4.4 Device Monitor

The *Device Monitor* window can be invoked by the *Monitor - Device Monitor* command from the ***Instrument*** window or using the Device Monitor icon. It allows to Autozero the detector, turn its lamp(s) on or off and start the data monitoring outside of the analysis run. The Device Monitor window also displays the actual lamp state and the detector cell temperature.

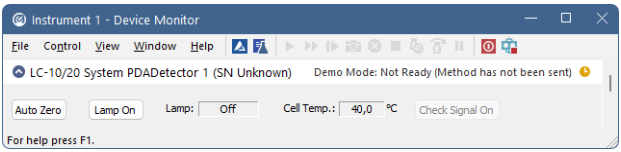

Fig. 48: Device Monitor - PDA Detector

Auto Zero
Sets the response of the detector to *0*.

Lamp Off (On)
Turns the lamp Off and On again. The actual state of the lamp(s) can be seen in the *Lamp* field.

Lamp
Shows the actual state of the detector lamp(s).

Cell Temp.
Shows the actual temperature on the detector cell.

Check Signal On (Off)
Turns the detector signal monitoring on and off. Active only when analysis is not running.

Note: This type of detectors is giving data only during analysis. Pressing this button starts a "dummy" analysis run (all data discarded) that allows to check the detector signal before the actual analysis. It should be turned *OFF* before starting the analysis by external contact.

Caution: The *Check Signal On* function can not be activated when a *Purge* was used to set the flow and composition manually from the *Device Monitor*. You need to use the *Resume Idle* function from the LC Device Monitor first.

4.4.5 Report Setup

All **PDA** detector settings accessible on theShimadzu LC-10/20 System Setup - PDA tab, in the Method Setup - Acquisition tab for the **PDA** signals and settings from theMethod Setup - PDA tab are reported if the *Instrument Control* parameter on the ***Method*** tab of the ***Report Setup*** dialog is checked. For each detector set in the Shimadzu LC-10/20 System Setup dialog, a specific section of the report will be printed, as well as dedicated section for common **PDA** parameters.

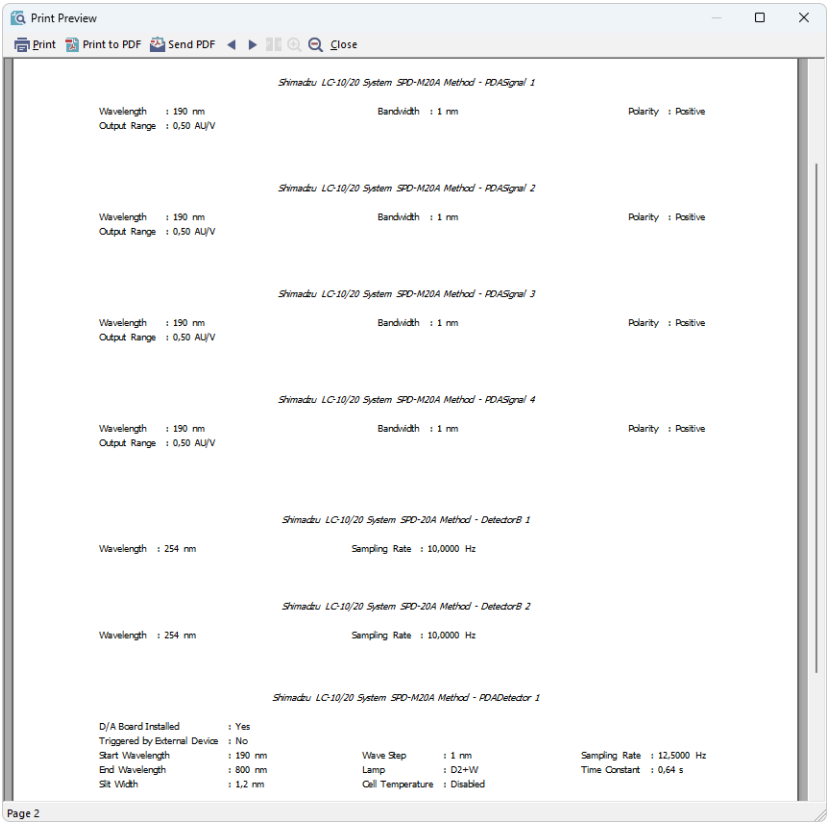

Fig. 49: Report Setup

4.5 Thermostat

TheMethod Setup - Thermostat tab serves for setting the temperature program of the analysis using the thermostat (column oven) configured in theShimadzu LC-10/20 System Setup - Thermostat dialog.

Note: The *Ready Range* (temperature range, in which the actual temperature is considered as matching the set value) and *Wait Time* (time to stabilize the system between the temperature is reached and the device is ready) could be set only from the thermostat keyboard, those parameters are not supported in the software control.

4.5.1 Shimadzu LC-10/20 System Setup - Thermostat

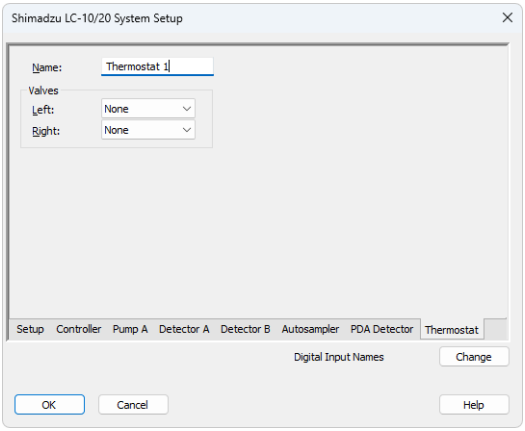

Fig. 50: Shimadzu LC-10/20 System Setup - Thermostat

Some options may be missing or shaded depending on the type of the thermostat installed.

Name

Defines the name of the thermostat to be shown in the Method Setup dialog and on other places.

Valves

When using the **CTA-20A** or **CTA-20AC** thermostat, fill in the type of valves installed (if any).

4.5.2 Method Setup - Thermostat - Thermostat

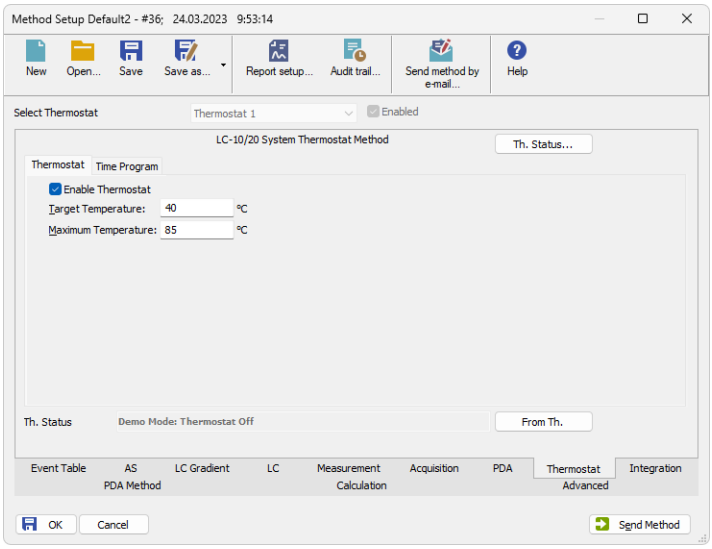

Fig. 51: Method Setup - Thermostat - Thermostat

Enable Thermostat

Enables the temperature control of the thermostat. When unchecked, all other fields on the tab will be grayed and no thermostat control will be performed.

Target Temperature

Sets the target temperature. The control module will not switch to the *READY* state until this temperature is reached.

Maximum Temperature

Sets the maximal allowed temperature. When the temperature in the thermostat exceeds the value entered here, the controller will report error and the analysis will stop.

Initial Valve Position

Sets the initial position of the valves (if there are any installed).

4.5.3 Method Setup - Thermostat - Time Program

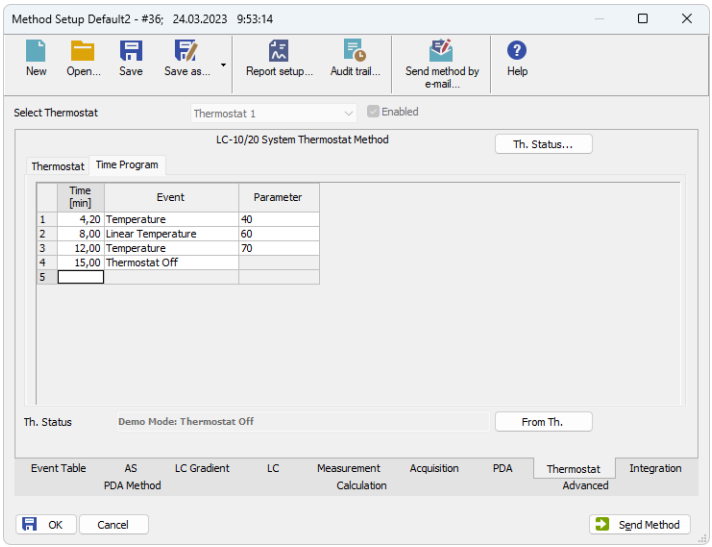

Fig. 52: Method Setup - Thermostat - Time Program

Time Table

The initial analysis settings defined on the Thermostat sub-tab can be changed during the analysis by events programmed in the **Time Table**. Possible events are:

Thermostat Off - At specified time, switches of the thermostat.

Temperature - Changes the temperature to the specified value in one step.

Linear Temperature - Changes the temperature using the temperature ramp.

Left Valve - Changes the position of the left valve.

Right Valve - Changes the position of the right valve.

4.5.4 Device Monitor

The *Device Monitor* window can be invoked by the *Monitor - Device Monitor* command from the ***Instrument*** window or using the Device Monitor icon. Thermostat *Device Monitor* serves for monitoring the actual thermostat temperature and allows to switch the thermostat on and off. The room temperature is also displayed.

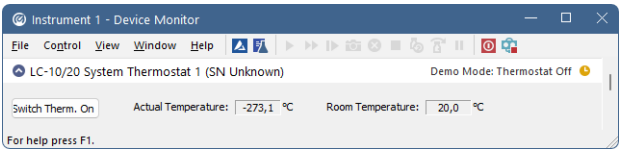

Fig. 53: Device Monitor - Thermostat

Switch Therm. On (Off)

Toggles the thermostat program (as set on the[Method Setup - Thermostat](#) tab) on and off.

Actual Temperature

Field displaying the actual thermostat temperature.

Room Temperature

Field displaying the actual room temperature.

4.5.5 Report Setup

Both parameters set on the Shimadzu LC-10/20 System Setup - Thermostat tab (valve types used) and parameters set on the Method Setup - Thermostat tab (including the **Time Table**) can be printed. To do so, it is necessary to check the *Instrument Control* option on the ***Method*** tab of the ***Report Setup*** dialog.

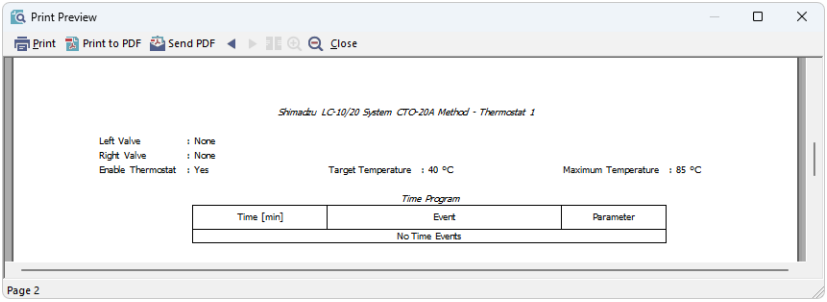

Fig. 54: Report Setup

5 Troubleshooting

The *Shimadzu LC-MIMIC libraries are not correctly registered in the registration database* error message shows when adding theShimadzu LC-10/20 System to the configuration.

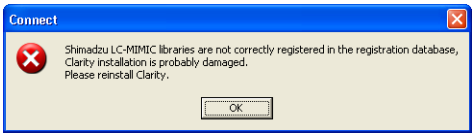

Fig. 55: Missing MIMIC error message

Description: MIMIC libraries (needed by the control module) were probably not installed.
Solution: To be able to use the **Shimadzu LC-10/20 System** control module it is necessary to reinstall the **Clarity** station. During the installation, the *Custom* installation must be chosen.

The Shimadzu PDA detector is not present while trying to configure it.

Solution: The **PDA** detector was probably switched on after the computer. It will be necessary to add the hardware manually to the **Windows** configuration. Use the *Control Panel* section (available through the *Start* menu) in the **MS Windows** and invoke the *Add Hardware* icon. You will be guided through the rest of the process.

The SPD-M10Avp PDA detector does not work on 64-bit Windows.

Solution: Reset the **SCSI** card and run **Clarity** in **Win XP Ser3** emulation mode.

The switching of *Ref. Flow Off/On* function of the RID-10Avp detector from the Time Table is not functioning.

Solution: This is known problem of the MIMIC libraries. The *Ref. Flow Off/On* functions can still be invoked from the *Device Monitor* window by pressing the appropriate button on the **RID-10Avp** detector section.

LC-20AB Pump doesn't show Solvent B concentration % correctly.

Solution: This is known problem in gradient configuration. Set the LC-20AB pump as Auxiliary pump.

6 Vial Plate Numbers

The following tables show the Vial Number mapping on the various trays used with **Shimadzu LC-10/20 System** autosamplers:

Tab. 6: Vial numbers on vial trays:

Rack type	Subtype or model	Vial numbers
1, 11		0 - 149
2, 12, 12A		0 - 69
3, 13		0 - 59
4, 4U, 14, 14A, 14DDW	Single	1 - 96
	Dual	1 - 192
5, 5U, 15	Single	1 - 384
	Dual	1 - 768
6, 16		0 - 99
7		0 - 69
S		0 - 99
S Peltier		0 - 59
L		0 - 79
L Peltier		0 - 49
LL		0 - 24
MTP Dual		1 - 192
1.5ml Standard	SIL-HTA, SIL-HTC	1001 - 1105, 2001 - 2105
	Other	1 - 105
1.5ml Cooled	SIL-HTA, SIL-HTC	1001 - 1070, 2001 - 2070
	Other	1 - 70
1ml Standard, 1ml Cooled	SIL-HTA, SIL-HTC	1007 - 1175, 2001 - 2175
	Other	1 - 175
4ml Standard, 4ml Cooled	SIL-HTA, SIL-HTC	1001 - 1050, 2001 - 2050
	Other	1 - 50
MTP96 Standard, MTP96 Cooled, DW96 Standard, DW96 Cooled	SIL-HTA, SIL-HTC	1001 - 1096, 2001 - 2096, 3001 - 3096, 4001 - 4096
	Other	1001 - 1096, 2001 - 2096
MTP384 Standard, MTP384 Cooled	SIL-HTA, SIL-HTC	1001 - 1384, 2001 - 2384, 3001 - 3384, 4001 - 4384
	Other	1001 - 1384, 2001 - 2384

With a **Rackchanger** (device usable with the SIL-20 autosamplers) the vial number mapping changes a bit: A **Rackchanger** has four holders, each with three trays. All vial trays in a single holder must be the same, but can differ between different holders. The vial's numbering is performed so that each tray has its own number (1-

12) and vials on that tray are numbered according to the tray number multiplied by 1000 and the vial position on that tray (based on the tray type):

Tab. 7: Vial numbers in the Rackchanger:

Tray type	Vial numbers
MTP96, DWP96	1001 - 1096, 2001 - 2096, ..., 12001 - 12096
MTP384, DWP384	1001 - 1384, 2001 - 2384, ..., 12001 - 12384
1.5ml Standard, 1.5ml Cooled	1001 - 1054, 2001 - 2054, ..., 12001 - 12054

The **Control Rack** used on SIL-20 autosamplers has vials numbered 20001 - 20010.