



SPARK MISTRAL

Clarity Control Module

ENG

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Contents

1 Spark Holland Mistral control module	1
2 Requirements	2
3 Installation Procedure	3
3.1 Spark Mistral setup - communication	3
3.1.1 Digital Inputs and outputs	4
3.2 Clarity Configuration	5
4 Using the control module	7
4.1 Method Setup - Thermostat	7
4.1.1 System	8
4.1.2 Timebase	10
4.2 Method Setup - Valves	11
4.3 Method Setup - Advanced	12
4.4 Hardware Configuration	13
4.5 Spark Mistral Setup	14
4.6 Device Monitor	16
5 Report Setup	17
6 Troubleshooting	18
6.1 Specific Problems	19

To facilitate the orientation in the **Spark Mistral** 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 Spark Holland Mistral control module

This manual describes the setting of the **Spark Holland Mistral** column oven. The control module enables direct control of the instrument over serial line.



Fig. 1: Spark Holland Mistral

Direct control means that the thermostat can be completely controlled from the **Clarity** environment. Instrument method controlling the temperature program will be saved in the measured chromatograms.

Note: It is recommended to check the user manual of the thermostat for its operating principles and restrictions.

2 Requirements

- **Clarity** Installation with LC Control module (p/n A24).

Caution: Minimal thermostat firmware version required is **2.03**.

- Free communication port in the PC, based on the type of communication used - free serial COM port in case of serial communication or free ethernet port in case of LAN communication.

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 straight DB9F-DB9M (p/n SK02) or LAN cross (p/n SK08) cable depending on the type of communication.

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 Spark Mistral setup - communication

The **Spark Mistral** thermostat can be controlled from **Clarity** via serial (RS232) or LAN communication. When using serial communication, it uses straight serial DB9F-DB9M wiring described in the picture. The cable can be ordered as p/n SK02. When using LAN communication, the cable is standard LAN cross cable which can be ordered as p/n SK08.

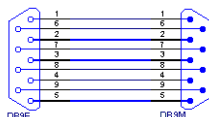


Fig. 2: Serial straight DB9F-DB9M cable

The **Spark Mistral** thermostat has to be set in the *SERIAL MODE* in order to function correctly with its **Clarity Control module**. The *SERIAL MODE* is set by pressing **Set** button on the sampler keyboard, then press **V** button and then press **Set** button again for confirmation. The thermostat is now in mode for serial communication. If more detailed information related this kind of setting refer to documentation provided by the vendor of the thermostat.

In addition, the *ID* of the **Spark Mistral** thermostat must be the same that will be later set in **Clarity**. To find out or change the thermostat *ID*, press the **>** button on the instrument's keyboard, then the **V** button, **Set** button, **V** button again and **>** button to change the value (for more details see the manufacturers documentation). The default *ID* is 50.

3.1.1 Digital Inputs and outputs

The digital inputs and outputs of the **Spark Mistral** thermostat are both present on the back panel of the instrument and simulated over the communication line. In usual cases, the outputs do not have to be connected by wire with the thermostat as they are communicated to **Clarity** digitally.

However, when other instrumentation needs to be acknowledged of the analysis start etc. by wire, the I/O connector on the back panel of the thermostat may be used. The mapping of the pins on the connector is as follows:

Tab. 1: I/O connector pins mapping

Pin	Function	Comment
1	GND	
2	Input 1	Start Temperature Program (TTL).
3	Input 2	Panic Stop (TTL).
4	Not Used	
5	COMM1 Common	Oven Ready
6	COMM1 NC	
7	COMM1 NO	
8	COMM2 Common	Alarm (Vapor and Temperature).
9	COMM2 NC	
10	COMM2 NO	

3.2 Clarity Configuration

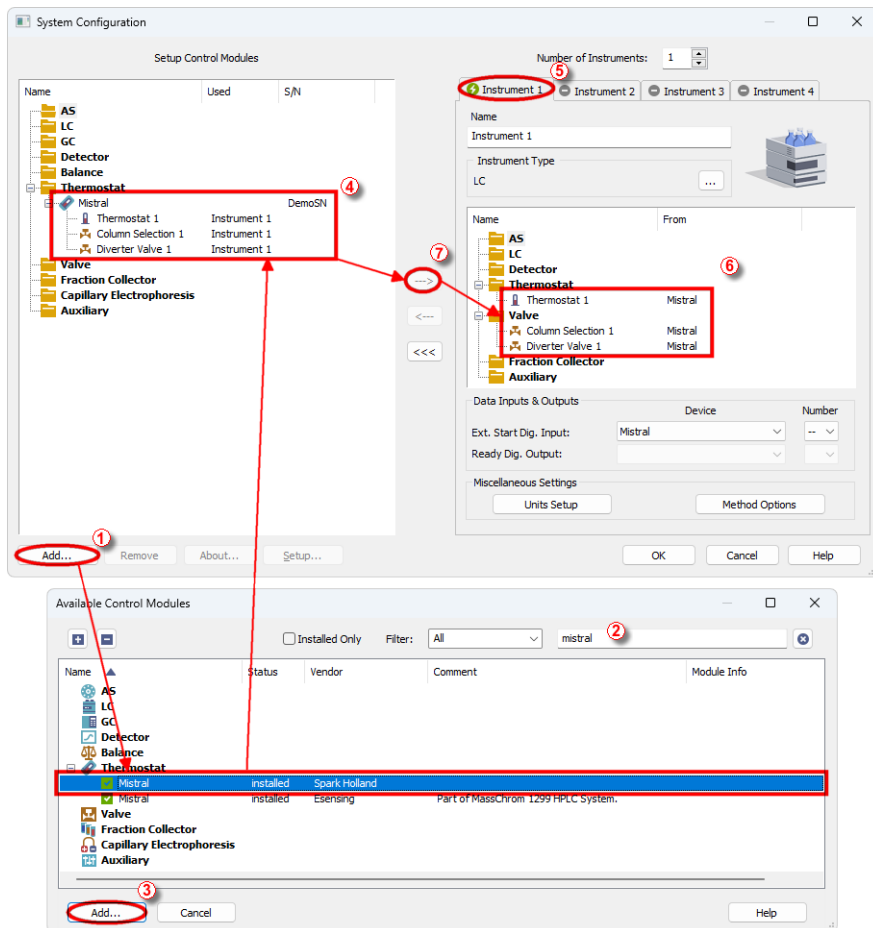



Fig. 3: System Configuration

- Start the **Clarity** station by clicking on the  icon on the desktop.
- Invoke the **System Configuration** dialog accessible from the **Clarity** window using the *System - Configuration...* command.
- Press the **Add** button ① (see Fig. 3 on pg. 5.) to invoke the **Available Control Modules** dialog.
- You can specify the searching filter ② to simplify the finding of the driver.
- Select the **Mistral** sampler and press the **Add** ③ button.

The [Spark Mistral Setup](#) dialog will appear.

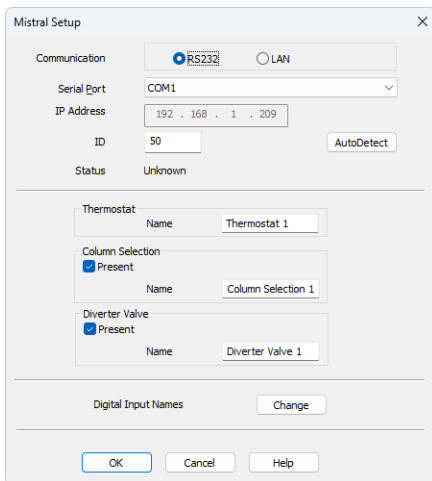



Fig. 4: Spark Mistral Setup

- Fill in the appropriate *Port* and correct *ID* for the thermostat, then press the *AutoDetect* button. If the communication is correct, the *Connected* inscription along with the firmware version and serial number of the **Mistral** thermostat will be shown in the *Status* row. The *ID* must match the device identifier set previously in the thermostat setup, as described in the chapter "Installation Procedure".

Note: The [Spark Mistral Setup](#) dialog is more closely described in the chapter "**Spark Mistral Setup**" on pg. 14.

The **Mistral** thermostat item will appear in the *Setup Control Modules* list of the *System Configuration* dialog.

- Drag and drop the **Mistral** icon from the *Setup Control Modules* ④ list on the left side of the *System Configuration* dialog to the desired *Instrument* ⑤ tab on the right side ⑥ (or use the  button ⑦ to do so).

4 Using the control module

New [Method Setup - Thermostat](#) and [Method Setup - Valves](#) tabs appear in the *Method Setup* dialog, enabling the setting of the **Spark Mistral** thermostat control method.

4.1 Method Setup - Thermostat

The *Method Setup - Thermostat* dialog consists of two sub-tabs assigned for the various parts of the **Spark Mistral** thermostat method - [System](#) and [Timebase](#). Additional buttons allow to display the [Hardware Configuration](#) dialog of the **Spark Mistral** thermostat or to read the instrument method from the **Spark Mistral** thermostat. The method is sent to the thermostat every time the *Send Method* or *OK* button is pressed. Other actions in different windows may also cause the sending of the instrument method to the controlled devices including the **Spark Mistral** thermostat - most notable cases being pressing the *Send Method* button in the *Single Run* dialog or starting a new injection from the *Sequence* window (each injection is preceded with sending the instrument method).

To read the **Spark Mistral** method from the thermostat it is necessary to use the *From Th.* button available from both sub-tabs of the *Method Setup - Thermostat* dialog. If the injection method is already established in the thermostat, it is advisable to download it to **Clarity** using the *From Th.* button and save it as a **Clarity** method.

4.1.1 System

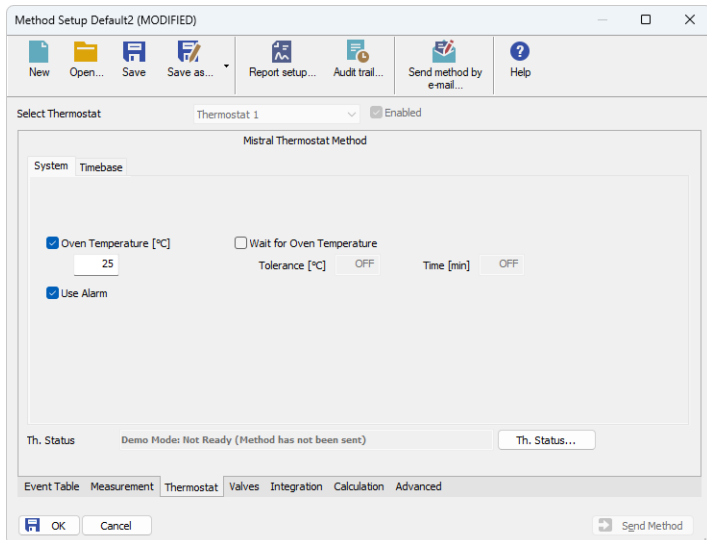


Fig. 5: Method Setup - Thermostat - System

This is the main tab defining the thermostat control method. It defines the **Spark Mistral** system settings and set some other parameters.

Oven Temperature [°C]

Sets the oven temperature outside of the analysis run (for example when the *Instrument* window is opened). When no time program is set on the [Timebase](#) tab, the temperature in the **Mistral** thermostat will be set to *Oven Temperature* for the whole duration of the analysis.

Note: The method can be sent to the thermostat also with the *Oven Temperature* checkbox off, in which case the thermostat will do nothing during the analysis run (but will not block the run).

Wait for Oven Temperature

Sets the behavior of the thermostat when the actual temperature does not equal the set temperature. When checked, the thermostat will not become ready until the equilibrium is reached. When not checked, the thermostat will not block starting the analysis until the temperature is reached (and it will try reaching the temperature during the analysis).

Tolerance [°C]

Sets the temperature difference for which the module will consider actual temperature the same as the set temperature.

Time [min.]

Defines the time needed to get the temperature equilibrium. The time of the equilibration interval will start to count when the actual temperature varies from the set temperature by the value set in the *Tolerance* field. Any deviation of more than the *Tolerance* from the set temperature will reset the counter once more.

Use Alarm

Sets the Vapor Alarm sensor in the thermostat oven. When the checkbox is unchecked, the whole alarm is off.

4.1.2 Timebase

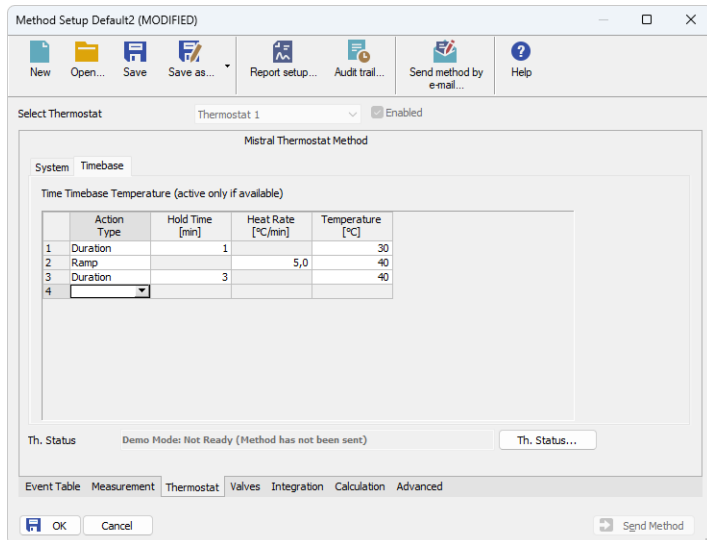


Fig. 6: Method Setup - Thermostat - Timebase

This tab defines the temperature program of the **Spark Mistral** thermostat. In case the table on this tab is not filled in, the thermostat will get to the *READY* state after getting to the *Oven Temperature* as defined on the [System](#) tab and will allow starting the analysis, but the thermostat will not indicate *RUNNING* state. Only Natural numbers are allowed for the *Hold Time* column.

There are two types of the *Action* available - the *Duration* action and the *Ramp* action. For the *Duration* action, the thermostat will try to hold the *Temperature* defined for that line for a specified amount of *Hold Time*, while using the *Ramp* action will cause the thermostat to increase the temperature by the value defined in the *Heat Rate* column each minute until the *Temperature* set on that line is set.

Caution: When the *Ramp* action is defined in the timetable, the timetable cannot be read from the thermostat to **Clarity**. This is the limitation of the thermostat communication protocol.

4.2 Method Setup - Valves

Tab for governing the behavior of the valves optionally present on Spark Mistral thermostat - *Column Selection* and/or *Diverter Valve* may be present. Which valve method settings are displayed is governed by the Select Valve dropdown on top of the page. Method page sets the behavior at the start and end of the analysis, particular valve switching during the run is performed using the *Method Setup - Event Table*.

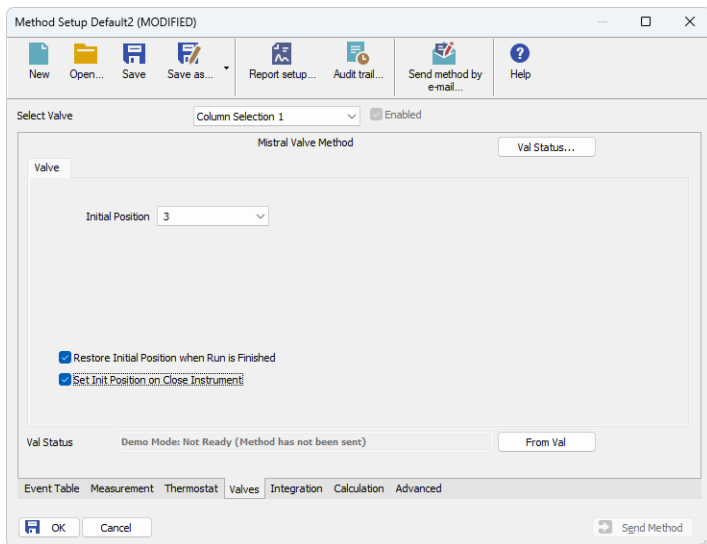


Fig. 7: Method Setup - Valves

Initial Position

Specifies the initial position to which the valve is switched at the sending of the method. Possible values for the column selection valve are *Keep Current*, 1, 2, ..., 6, possible values for the diverter valve are *Keep Current*, 0: *Waste* and 1: *Detector*. *Keep Current* option does not change the valve position at the sending of the method.

Restore Initial Position when Run is Finished

This checkbox specifies what will happen after the acquisition is finished. If checked, the valve will return to the state specified in the *Initial Position* field.

Set Init Position on Close Instrument

This checkbox specifies what will happen after the Instrument is closed. When checked, the valve will return to the state specified in the *Initial Position* field. When unchecked, the valve will stay in current position or move to position set in Event Table. Default state is "checked".

4.3 Method Setup - Advanced

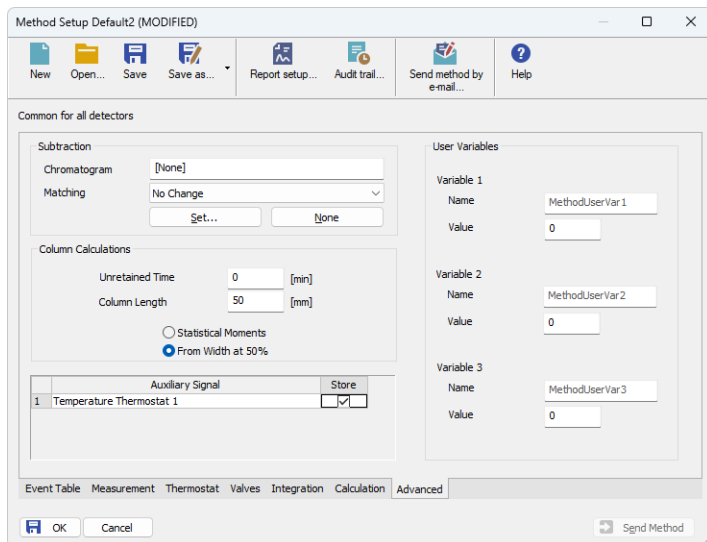


Fig. 8: Method Setup - Advanced

Spark Mistral provides the thermostat temperature auxiliary signal for use in **Clarity**. To save the auxiliary signal into each chromatogram measured according to the given method, check the particular checkbox in the lower section of the **Method Setup - Advanced** dialog.

4.4 Hardware Configuration

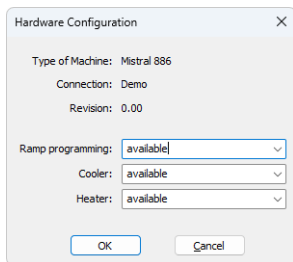


Fig. 9: Hardware Configuration

The *Th. Status* button in the [Method Setup - Thermostat](#) dialog displays the *Hardware Configuration* dialog. In the full version, this dialog displays thermostat model, com port used, firmware revision and the presence of several optional parts of the **Spark Mistral** thermostat.

In the demo version the presence of the particular options can be set to demonstrate the possibilities of the thermostat with selected configuration.

Type of Machine

Shows the **Spark Mistral** thermostat type as automatically detected by the control module.

Connection

Shows the communication port or IP Address including the used port as detected from the thermostat.

Revision

Shows the firmware revision loaded into the **Spark Mistral** thermostat.

Ramp programming

Shows whether the **Spark Mistral** thermostat is equipped with the Ramp programming option.

Cooler

Shows whether the **Spark Mistral** thermostat is equipped with the cooling option.

Heater

Shows whether the **Spark Mistral** thermostat is equipped with the heating option.

4.5 Spark Mistral Setup

Spark Mistral Setup dialog (accessible through the *System Configuration* dialog) allows to manually set the parameters needed for the communication with the **Spark Mistral** thermostat.

Fig. 10: Spark Mistral Setup

Communication

Allows to select between *RS232* and *LAN* communication for **Spark Mistral** thermostat - some units may have only one of the communication means, while some others support both ways (please check your unit before connecting).

Serial Port

Sets the COM Port used for the communication between the **Spark Mistral** thermostat and **Clarity** in case *RS232* Communication is used.

IP Address

Sets the IP Address used for the communication between the **Spark Mistral** thermostat and **Clarity** in case *LAN* Communication is used. It is necessary to use static IP address for the thermostat or prevent it's changing if DHCP is used.

ID

Sets the device identifier of the **Spark Mistral** thermostat. The number listed here must be the same as the one set in the thermostat and can be in the range 50 - 59. For more details see the chapter **Installation Procedure** on pg. 3.

AutoDetect

When pressed, checks whether there is the **Spark Mistral** thermostat present using the selected *Serial Port* and *ID*. The result of the autodetection is then displayed in the *Status* row.

Status

Shows the status of the communication with the **Spark Mistral** thermostat after the *AutoDetect* button has been used. The displayed information, in case of the successful communication attempt, includes the version of the firmware in the thermostat and the thermostat's serial number.

Thermostat Name

Allows to set the custom name of the **Spark Mistral** thermostat, which will be then shown in the [Device Monitor](#) window, in the reports and on other places in **Clarity**.

Column Selection

This option defines the presence of the optional column switching valves set. The presence is automatically detected using the *AutoDetect* function, the name of the column switching valve can be custom-changed in the *Name* field.

Diverter Valve

This option defines the presence of the optional diverter valve. The presence is automatically detected using the *AutoDetect* function, the name of the diverter valve can be custom-changed in the *Name* field.

Digital Input Names

Pressing the *Change* button opens the *Digital Input Names* dialog which allows to set the custom name for the virtual **Spark Mistral** digital input. This input allows to start **Clarity** run by the signal received by the **Spark Mistral** thermostat, simulated over the communication line.

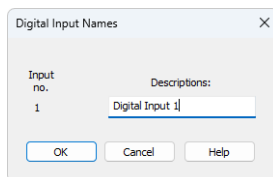


Fig. 11: Digital Input Names

4.6 Device Monitor

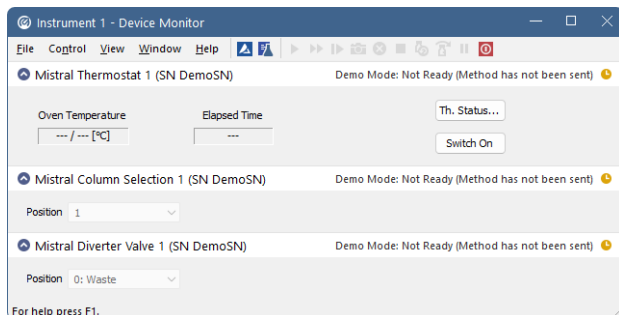


Fig. 12: Spark Mistral Device Monitor

The Device Monitor window for the **Spark Mistral** thermostat enables to monitor and control some of the actions of the **Spark Mistral** thermostat.

Oven Temperature

Displays the set and the actual temperature of the **Spark Mistral** thermostat.

Elapsed Time

Displays the time that elapsed from the start of the thermostat program. The time is only displayed in whole minutes, which is a limitation of the **Spark Mistral** thermostat communication protocol.

Th. Status

Opens the [Hardware Configuration](#) dialog described in the chapter "**Hardware Configuration**" on pg. 13.

Switch Off / Switch On

Switches the thermostat off and back on. The option is only available when the analysis is not running.

Position

Allows to manually change the state of the optional column switching valve or diverter valve. Automated changes of the valves position can be performed in the Method Setup - Event Table dialog.

5 Report Setup

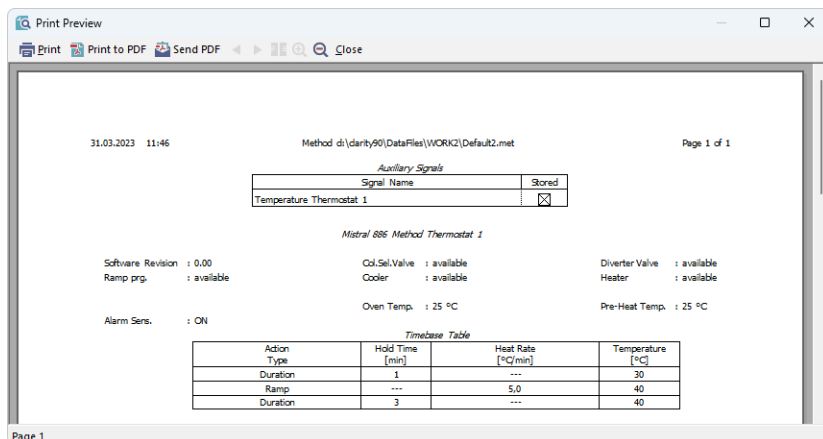


Fig. 13: Spark Mistral report preview

All thermostat-specific settings (that means the data from both sub-tabs of the [Method Setup - Thermostat](#) tab and from the [Method Setup - Valves](#) tab) are reported as a part of the data displayed by the use of *Instrument Control* checkbox of the *Report Setup - Method* dialog.

6 Troubleshooting

When the remedy for some problem cannot be discovered easily, the recording of communication between **Clarity** and the thermostat can significantly help the **DataApex** support to discover the cause of the problem.

The recording can be enabled by adding or amending the COMMDRV.INI file in the **Clarity** installation directory (C:\CLARITY\CFG by default). The file can be edited in any text editor (e.g. Notepad). Following section should be edited or added:

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

Note: %D (or %d) in the filename parameter means that the log will be created separately for each day. The *reset=off* parameter disables deleting the content of the log each time the station is started during the same day.

Note: Instead of COM1 type the correct port used to communicate with the **Spark Mistral** thermostat. This information is displayed when the *Th. Status* button in the [Method Setup - Thermostat](#) dialog is invoked or in the [Spark Mistral Setup](#) dialog. The correct settings should have a format similar to the ones shown in the table for different types of the communication:

Tab. 2: Format of the port settings in COMMDRV.INI

Communication	Format syntax
Serial communication	COMx (where x is the number of the COM port)
LAN communication	TCP_IP x.x.x.x:2101 (where x.x.x.x is the IP address)

The created *.TXT files will greatly help in diagnosis of unrecognized errors and problems in communication. Note that the file size may be quite significant, so in case the error occurs on a regular basis, it might be better to set the *Reset=on*, start **Clarity**, invoke the error, close **Clarity** and send the diagnostics file (the file will be once more reset during the next start of **Clarity**).

6.1 Specific Problems

An error message “Cannot establish communication with ...” appears when opening Clarity Instrument.

Solution: Check the power cable (**Spark Mistral** thermostat must be switched on), communication cable and communication settings in the [Spark Mistral Setup](#) dialog.

Spark Mistral thermostat performs the temperature cycle, but Clarity run does not start after the injection.

Description: This happens when the thermostat digital input is used for starting the analysis. In case the thermostat is still in the control time and the start input comes, it is stored and runs the temperature program of the thermostat, but does not transmit the start to **Clarity**.

Solution: Ensure that the thermostat will be ready when the external start signal comes, e.g. by setting the longer analysis time to the non-controlled autosampler.