

TurboVap® 96 Dual

User Manual



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System Overview

TurboVap® 96 Dual is an automated well plate evaporation system that can process two well plates simultaneously, either in dual or single evaporation mode.

Each well plate can be heated from above using heated gas and from below using forced air convection. To ensure consistency between evaporation runs, both the gas temperature and the plate temperature can be pre-programmed to prevent cold starts.

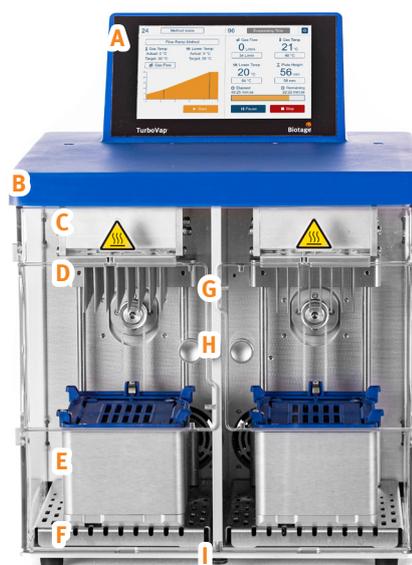
The system software has three different modes, **Manual mode**, **Time mode**, and **Method mode**. Method mode allows for the time, the gas flow, the gas temperature, the plate temperature, and the lift height to be specified and ramped.

The system uses manifolds with 24, 48 or 96 nozzles, to allow for processing of up to 96 samples in each cabinet. The left and right cabinet can perform simultaneous evaporation runs with varying size well plates, varying size manifolds and varying configurations. Alternatively, the same setup can be used in both cabinets.

Using any of the collection plates or the 12 x 32 mm collection rack for Extrahera, it is possible to collect samples in Extrahera and directly run them through the evaporation process in TurboVap® 96 Dual.

Patent pending.

Instrument Overview



- | | |
|----------------|-------------------------|
| A Touch screen | F Lift |
| B LED lights | G Sensor |
| C Gas heater | H Doors |
| D Manifold | I Fume shield set screw |
| E Plate heater | |

Figure 1. System front view.



- | | |
|-----------------------|----------------|
| A Ethernet port | D Mains switch |
| B N ₂ port | E Power inlet |
| C Exhaust outlet | F Fuse |

Figure 2. System connections and inlets.

Evaporation Process

During an evaporation run, heated gas flows through the gas nozzles into each well, heats up the sample in the well and causes the solvent to evaporate. The solvent vapors are extracted from the well by the gas flow, and by the negative pressure applied through the system exhaust fan, see Figure 3.

Simultaneously, the plate heaters maintain the heat for the well plates from underneath, to ensure a rapid evaporation process and prevent the samples from cooling or freezing during evaporation, see Figure 3.

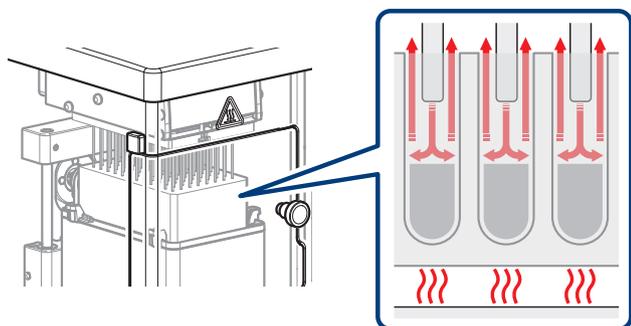


Figure 3. The evaporation process.

Gas Heaters

The gas heaters (see Figure 1) operate over a temperature range from ambient to 65 °C. The heated gas is passed through the manifold and nozzles into the well plates.

To determine the correct gas flow and temperature for an evaporation run, see "Determine Optimal Evaporation Conditions" on page 6.

Plate Heaters

The plate heaters (see Figure 1) operate over a temperature range from ambient to 80 °C, heating the well plates from underneath.

The exact plate height for an evaporation run can be specified in the user interface. When an evaporation run is performed, the lift (see Figure 1) will elevate the plate heater to the predefined height.

If a cabinet door is opened, the evaporation run will pause automatically. During the time period that the evaporation run is paused, the gas flow and the heaters will stop. The plate heaters will descend to the lowest position. When the door is closed, the evaporation run will resume.

To determine the correct plate height for an evaporation run, see "Determine Optimal Evaporation Conditions" on page 6.

Evaporation

To provide consistency and reliability, it is possible to apply different settings to prevent an evaporation run from starting before the gas heater and/or plate heater has reached the correct temperature. Additionally, it is possible to ensure that the gas and plate heater are kept at set temperatures before and between runs. To adjust the settings for each heater and each cabinet, see "Evaporation Settings" on page 9.

Ventilation

Solvent vapors are removed using negative pressure applied through the system exhaust fans and exit from the port at the rear of the system (see Figure 2). While a laboratory fume hood is an ideal location for installation of the system, any location is acceptable if the system is adequately vented through a proper ventilation system. For more information, see the **TurboVap® 96 Dual Installation and Safety**.

Audible Alarm and Lighting

To provide better visibility for the user, two sets of LED lights are located under the lid, one set for each cabinet. The brightness can be adjusted independently for each cabinet, see "Common Settings" on page 8.



Figure 4. The TurboVap 96 Dual with the LED lights at different brightness settings for the two cabinets.

When performing an evaporation run in Time mode or Method mode, the system terminates the gas flow, changes the color of the LED lights to green (see Figure 5), and sounds an alarm as the specified evaporation time is reached. The alarm continues to beep every 30 seconds until the Evaporation Finished dialog is closed or the door is opened.

If an error occurs, an audible alarm will sound and the LED lights change color to red. The alarm volume can be set to Low, Medium, High, or OFF.



Figure 5. When an evaporation run is completed, the LED lights for the cabinet change color to green. When an error occurs, the LED lights change color to red.

Manifolds

The manifolds are attached to the gas heaters and can be replaced (see "Replace the Manifold" on page 11) according to the chosen well plate.

Available manifolds:

- » TurboVap manifold with 24 gas nozzles;
- » TurboVap manifold with 48 gas nozzles;
- » TurboVap manifold with 96 gas nozzles.

Different manifolds can be installed in the left and right cabinets and perform evaporation runs with different well plate configurations simultaneously (see "Evaporate" on page 12).



Figure 6. TurboVap manifolds with 96, 48 and 24 nozzles.

Well Plate and Rack Sizes

The system is compatible with well plates that conform to ANSI SLAS 1-2004 (R2012). For available well plates, see "Accessories and Spare Parts" on page 24.

Determine Optimal Evaporation Conditions

There are several variables that influence the solvent evaporation process. These include sample composition, well plate dimensions, nozzle depth, gas temperature, plate temperature, solvent volume, solvent boiling point, solvent vapor pressure, and general humidity. Given the complexity behind the combined effects of these variables on evaporation rates, suggestions for optimal evaporation/concentration are listed below.

Determine the Appropriate Evaporation Mode

There are three evaporation modes available (see Figure 7):

- » **Manual:** Evaporate until the user presses the **Stop** button.
- » **Time:** Evaporate for a set period of time.
- » **Method:** Evaporate according to pre-set instructions, see "Set Up a Method" on page 15.

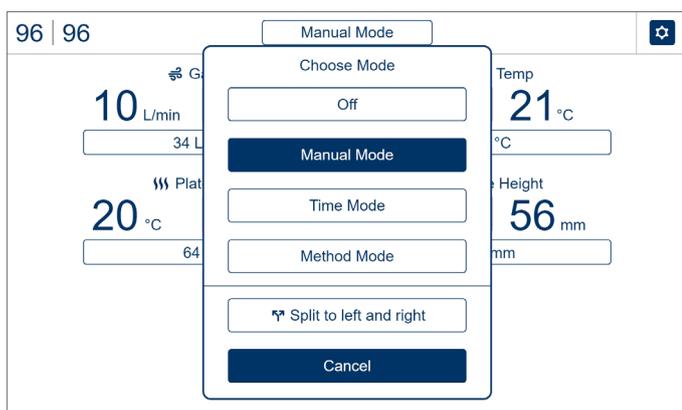


Figure 7. The different evaporation modes that can be selected in the software.

Each mode has different advantages. **Manual** and **Time** evaporation modes offer a quick approach that is easy to use, whereas **Method** mode offers the benefits of programming four steps with the option to ramp the gas temperature, flow rate, and lift height over a specified time.

General Evaporation Settings

Consider the following when selecting the evaporation settings:

- » For best results, avoid cold starts. Always wait until the system reaches its set temperatures and flow rates before starting an evaporation run.
- » The environmental conditions outside of the system should be held constant while an evaporation run is in progress.

- » If the gas or plate temperatures are below or exceed the accepted level during evaporation, nonuniform evaporation, analyte loss, or degradation of analytes may be observed.
- » Do not allow samples or solvents to boil.
- » The evaporation time of samples decreases with increasing sample cleanliness. The presence of sample detritus or particulates will have a negative effect on evaporation time.
- » To determine the appropriate evaporation time for the samples, use neat solvents in **Manual** mode and monitor the elapsed time for the samples to evaporate to your desired liquid level.
- » Always consider analyte and solvent volatility when setting evaporation parameters.
- » If the temperature settings in one cabinet greatly exceeds that of the other when the two cabinets are operating independently, the likelihood of experiencing cross temperature effects between the two cabinets is increased. Thus, it is important to consider the settings of both cabinets before an evaporation run is initiated.

Determine the Appropriate Gas Flow

Consider the following when selecting the operating gas flow:

- » If the liquid level is less than 50% of the well volume, set the gas flow to the lowest setting and increase the lift height until it can be confirmed that the gas reaches the liquid without splashing.
- » To conserve gas and determine optimal flow rates, begin with a low to moderate gas flow of 25 to 40 L/min.
- » As the sample volume decreases during the evaporation process, increase the gas flow manually or use the Ramp feature (see "Evaporation Parameters" on page 15) to increase the rate of evaporation. This will assist in reducing the overall evaporation time.
- » To decrease evaporation time, use the highest gas flow possible without causing splashing. Higher gas flow generally increases solvent evaporation rates.
- » Excessively high gas flow can cause analyte loss and cross-contamination due to splashing.

Note: To achieve the correct gas flow, the correct manifold configuration must be selected (see "Common Settings" on page 8).

Determine the Appropriate Gas Heater Temperature

Consider the following when selecting the gas heater temperature:

- » Higher gas temperatures generally increase the solvent evaporation rate; however, at high gas temperatures the likelihood of analyte loss or degradation is increased.
- » Using a gas temperature of 40 °C is a good starting point and will provide uniform temperature control when used with a plate heater temperature 0-20 °C above the gas temperature.
- » Using gas temperatures that exceed the plate heater temperature can overheat the plate and its contents.

Determine the Appropriate Plate Heater Temperature

Consider the following when selecting the plate heater temperature:

- » A higher temperature usually allows for better heat transfer across the well plate, resulting in even evaporation.
- » Heating the well plate prevents sample cooling or freezing, which can occur during evaporation. This is dependent upon the physical properties of the solvent evaporated and the well dimensions.
- » Samples that are highly volatile can be lost if allowed to remain for extended periods of time on a heated plate.
- » Usually, setting the temperature of the plate heater 0-20° C above the gas temperature allows for enhanced evaporation uniformity.
- » Use of the plate heater minimizes cross-contamination of samples when low boiling solvents are evaporated.
- » Allow the plate heaters to cool before performing an evaporation run at a lower temperature than the previous run. Opening the cabinet doors decreases the time for the plate heaters to cool.

Determine the Appropriate Plate Height

Consider the following when selecting the plate height:

- » If the liquid level is greater than 50% of the maximum well volume, set the lift height so that the nozzles are placed inside the sample wells. The recommended start point, depending on the liquid volume, is 1-3 mm below the entry of the wells. (see Figure 8).

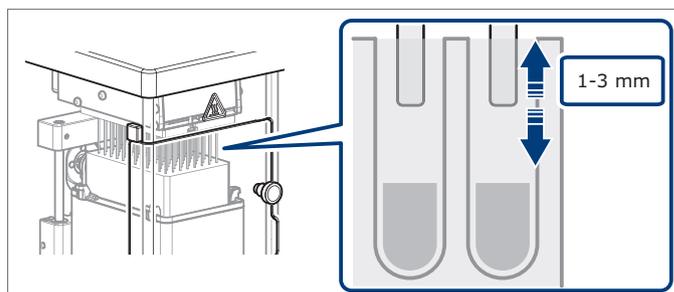


Figure 8. Place the nozzles 1-3 mm below the entry of the well.

- » Nozzles that come in contact with samples can lead to analyte loss and cross-contamination.
 - Note:** Do not allow the nozzles to come in contact with the samples.
- » The gas can cool as the distance between the nozzles and the samples increases. This can lead to increased evaporation time.
- » As the sample volume decreases, the lift height may be increased manually in **Time** or **Manual** mode and automatically in **Method** mode. (See "Change a Setting in Manual or Time Mode" on page 14 and "Set Up a Method" on page 15).

Define System Settings

Enter the System Settings view by pressing the **System Settings** icon, see Figure 9.

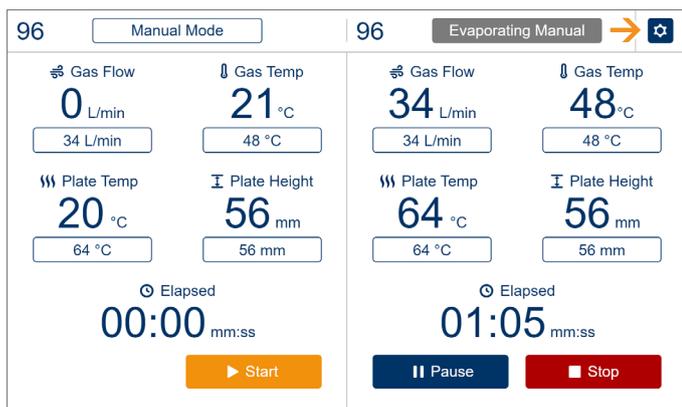


Figure 9. Access the System Settings by pressing the System Settings icon.

There are four modes in the System Settings view, see Figure 10.

- » **Common Settings:** Configure common settings such as manifold setup, cabinet light, alarm volume and screen brightness.
- » **Evaporation Settings:** Configure evaporation settings such as idle gas and plate temperature.
- » **Network and Firmware:** Network and firmware settings. These settings are for service purposes only.
Note: The network connection is for Biotage personnel only.
- » **System Information:** Access to information such as instrument serial number, copyright information, buttons for factory reset, and buttons for accessing wizards for verifying and calibrating the touch screen.

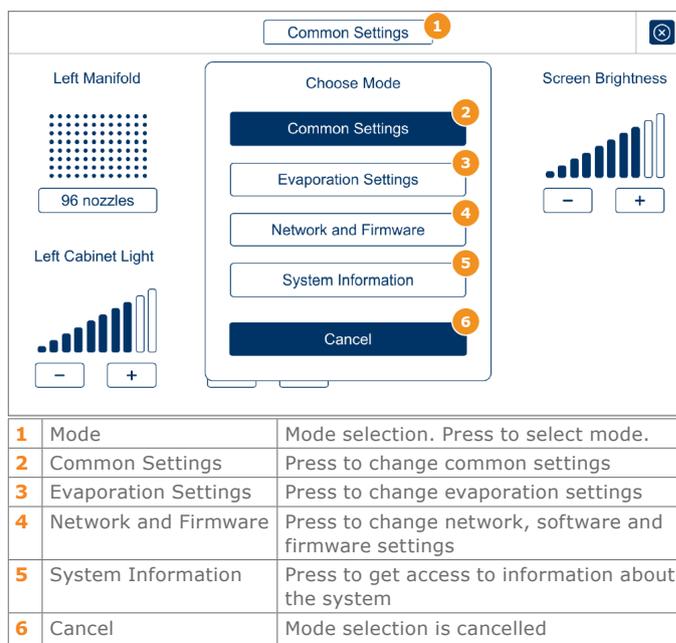


Figure 10. The System Settings view.

Common Settings

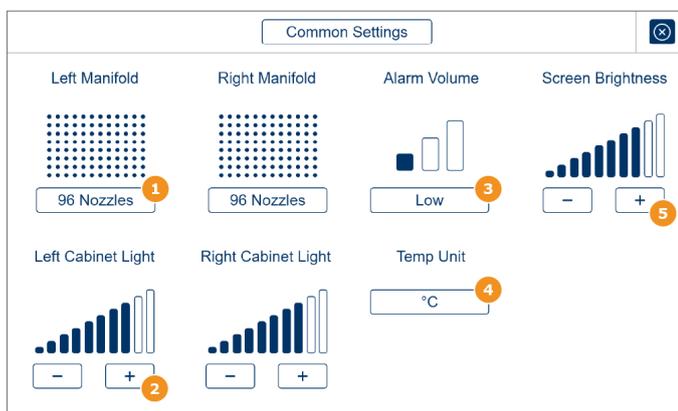
Press the **Common Settings** button (see Figure 10) to enter the Common Settings view (Figure 11).

The following settings can be configured:

- » **Manifold Setup:** The installed manifold to be used. The following options are available:
 - » **96 positions:** The TurboVap 96 Dual manifold with 96 nozzles.
 - » **48 positions:** The TurboVap 96 Dual manifold with 48 nozzles.
 - » **24 positions:** The TurboVap 96 Dual manifold with 24 nozzles.

For instructions on how to replace the installed manifold, See "Replace the Manifold" on page 11.

- » **Cabinet Light:** The light intensity of the two cabinets can be adjusted. Press (–) or (+) to adjust the light intensity. The cabinet light can also be turned **OFF**. The light can be independently adjusted between the two cabinets.
- » **Alarm Volume:** The system will sound when an evaporation run is completed or an error occurs. The sound level can be set to **Low, Medium, High, or OFF**.
- » **Temp Unit:** The temperature unit in use by the system, degrees Celsius or Fahrenheit. Press the button to change the temperature unit.
- » **Screen Brightness:** The brightness level of the touch screen. Press (–) or (+) to adjust the brightness.



1	Manifold	The selected/installed manifold. Press to change manifold setup.
2	Cabinet Light	Cabinet light intensity. Press (–) or (+) to change the light intensity.
3	Alarm Volume	The current and set alarm volume. Press to change the alarm volume.
4	Temp Unit	The set temperature unit used by the system. Press to switch between °C and °F.
5	Screen Brightness	Brightness of the touch screen. Press (–) or (+) to change the brightness.

Figure 11. The Common Settings view.

Evaporation Settings

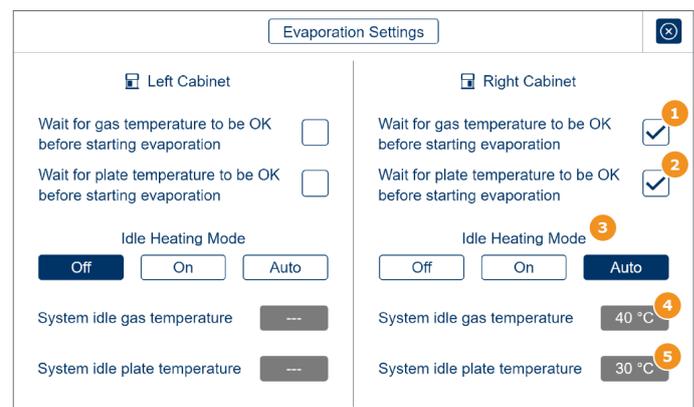
Enter the Evaporation Settings view (Figure 12) by pressing the **Evaporation Settings** button, see Figure 10.

Note: The system cannot run at temperatures below the ambient temperature.

The following settings can be configured:

- » **Wait for gas temperature:** Tick the box to wait for the gas temperature to reach the set value before starting an evaporation.

- » **Wait for plate temperature:** Tick the box to wait for the plate temperature to reach the set value before starting an evaporation.
- » **Idle Heating:** Set the function behavior of the system heaters for when no evaporation run is in progress. Available settings are **Off, On or Auto**.
 - » **Off:** Heating is turned off.
 - » **On:** Enter desired values for gas and plate preheating by pressing the buttons below.
 - » **Auto:** The system reuses the values for gas and plate preheating from the previous method or the last manual run.
- » **System idle gas temperature:** Press the button to set the system idle gas temperature.
- » **System idle plate temperature:** Press the button to set the system idle plate temperature.



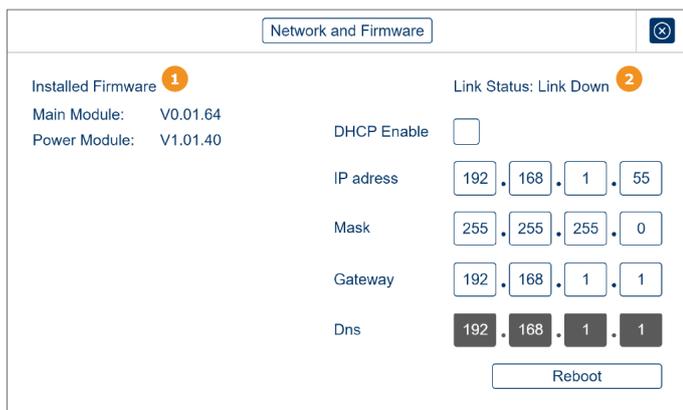
1	Wait for gas temperature	Tick the box to wait for the gas temperature to reach the set temperature before starting an evaporation.
2	Wait for plate temperature	Tick the box to wait for the plate temperature to reach the set temperature before starting an evaporation.
3	Idle Heating Mode	Set the idle gas and plate temperature heating to Off, On or Auto
4	System idle gas temperature	The set system idle gas temperature in °C or °F . Press to change the temperature.
5	System idle plate temperature	The set system idle plate temperature in °C or °F . Press to change the temperature.

Figure 12. The Evaporation Settings view.

Network and Firmware

Press the **Network and Firmware** button, see Figure 10, to enter the Network and Firmware view (Figure 13).

Note: The network connection is for Biotage personnel only.



1	Installed Firmware	See current firmware versions
2	Network Settings	See current network settings

Figure 13. The Network and Firmware view.

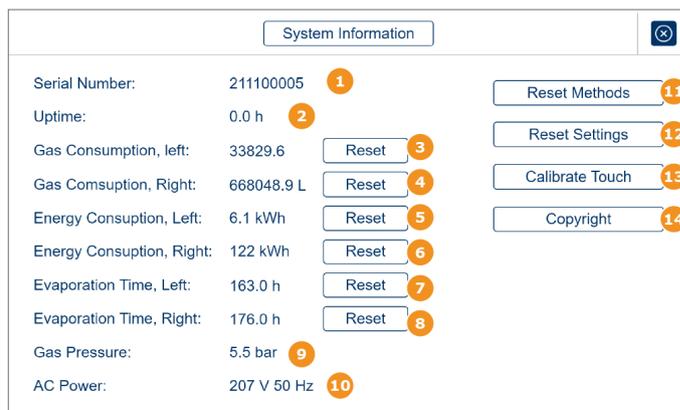
System Information

Press the **System Information** button, see Figure 10, to enter the System Information view (Figure 14).

The System Information view provides access to system information such as instrument serial number, copyright information, buttons for factory reset, and buttons for accessing wizards for verifying and calibrating the touch screen.

- » **Serial number:** Instrument serial number.
- » **Uptime:** The total time of operation for the instrument.
- » **Gas consumption:** The cumulative gas consumption for the two cabinets. Press **Reset** to reset the counter.
- » **Energy consumption:** The cumulative energy consumption for the two cabinets. Press **Reset** to reset the counter.
- » **Evaporation time:** The cumulative evaporation time for the two cabinets. Press **Reset** to reset the counter.
- » **Gas pressure:** Incoming gas pressure.
- » **AC power:** Supply voltage and frequency.
- » **Reset Methods:** Press the **Reset Methods** button to reset all methods to their factory values.
- » **Reset Settings:** Press the **Reset Settings** button to reset all settings in Common settings, Evaporation Settings and Network and Firmware to their default values.

- » **Calibrate Touch:** Press the **Calibrate Touch** button to calibrate the touch panel. Follow the instructions on the screen.
- » **Copyright:** Display legal information and software release year.



1	Serial number	Instrument serial number
2	Uptime	Total time of operation
3	Total gas consumption, left cabinet	
4	Total gas consumption, right cabinet	
5	Total energy consumption, left cabinet	
6	Total energy consumption, right cabinet	
7	Total evaporation time, left cabinet	
8	Total evaporation time, right cabinet	
9	Gas pressure	Incoming gas pressure
10	AC power	The measured voltage and frequency of the mains supply.
11	Reset Methods	Reset methods to their default values
12	Reset Settings	Reset settings to their default values
13	Calibrate touch	Calibrate the touch screen
14	Copyright	Display legal information

Figure 14. The System Information view.

Warnings in the Software

The software has 3 types of messages

	Error	An error message is displayed. The system shuts down, ongoing evaporation runs are terminated, the gas flow is terminated, the plate heaters are turned off and the LED lights change color to red. Follow the instructions displayed in the message.
	Warning	A warning message is displayed. The system continues to run. The LED lights do not change color. Follow the instructions displayed in the message.
	Info	An information message is displayed. Follow the instructions displayed in the message.

Prepare the System

Replace the Manifold

Warning

- » The nozzles may have come into contact with hazardous samples. Avoid contact.
- » Ensure not to bend any of the nozzles. If a nozzle is bent, it is recommended that the manifold is replaced.
- » Do not touch the inside of the gas heater. Touching may leave residues that can contaminate the following runs.
- » Always turn off the system, disconnect the power cord, and let the system cool down before performing maintenance.



Figure 15. Potential biohazard. Use appropriate PPE if the system has processed biohazardous samples.

There are three different manifolds available. The manifold is selected according to the well plate or rack to be used. For further information, see "Manifolds" on page 5.

1. Remove the fume shield. Loosen the fume shield set screw, slide out the fume shield and remove it. See Figure 16.

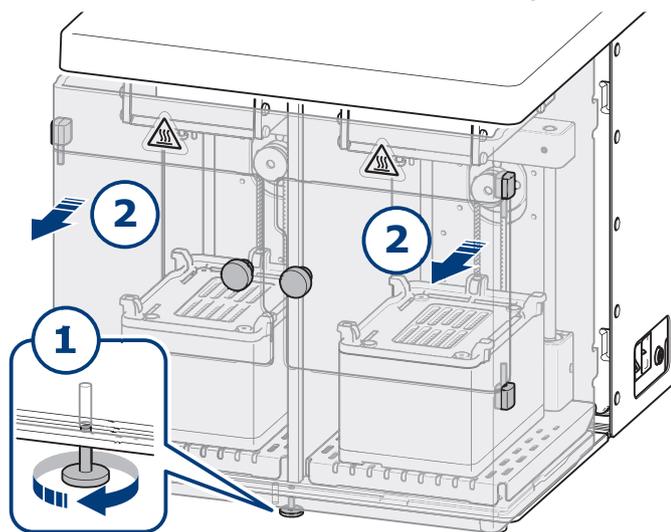


Figure 16. Remove the fume shield.

2. Use the Torx T20 key (P/N 411886) supplied with the system to remove the two screws that secure the manifold to the gas heater, see Figure 17. Ensure that the manifold is held in position while the last screw is removed.
3. With a steady grip, remove the manifold.

Note: Do not hold the manifold by the nozzles as this might bend the nozzles.

4. Examine the new manifold and the gasket for debris. If there is debris between the manifold and the gas heater, gas leaks can occur.

Note: Do not touch the inside of the gas heater. Touching may leave residues that can contaminate the following runs.

5. Use the 2 pins on the gas heater to guide the new manifold in position. See Figure 17.
6. Secure the new manifold with the screws.

Note: Ensure that the screws are tightened by hand using the Torx T20 key.

7. Install the fume shield.
8. Finger tighten the fume shield set screw.
9. Clean the removed manifold and let it dry (see "Clean the Manifolds" on page 20). Store the replaced manifold in a dust free environment.
10. Check that the user interface is set to the correct manifold, see "Common Settings" on page 8.

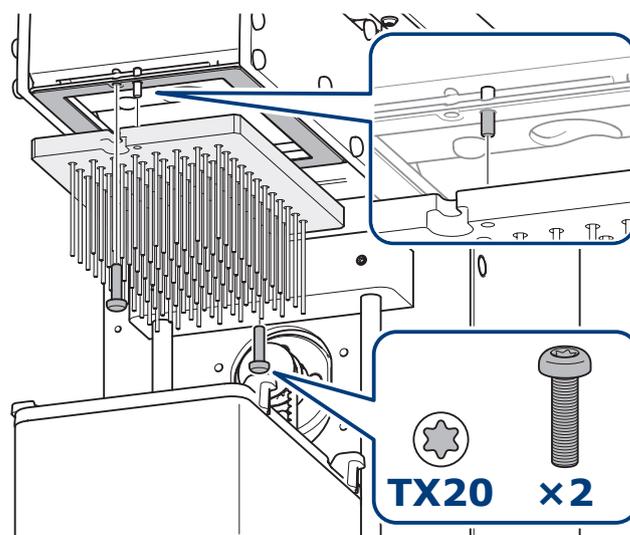


Figure 17. Remove the 2 screws and the the manifold.

Set the Pressure

Warning

- » To avoid injury to person or damage to the system, do not exceed the maximum inlet pressure of 6.5 bar (0.65 MPa, 94 PSI).

To set the appropriate pressure, see TurboVap® 96 Dual Installation and Safety.

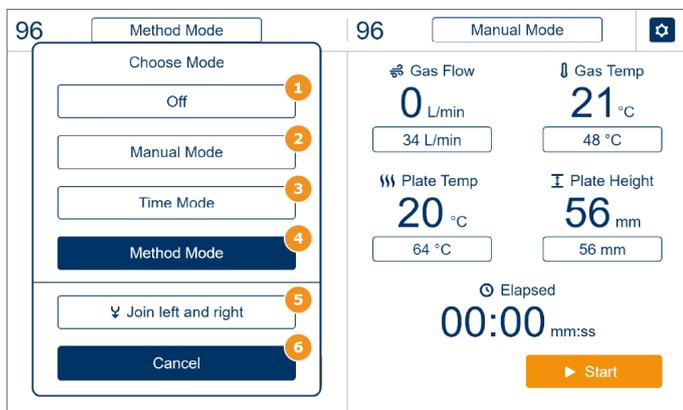
Evaporate

This section describes how to select different evaporation modes and how to configure the evaporation settings. It also describes how to set up and perform an evaporation run and how to set up a method.

1. Prepare the system as described in "Prepare the System" on page 11.
2. Check that the incoming gas supply is turned on and has sufficient reserve for the evaporation run. Set the incoming pressure appropriately to achieve desired flow rates, see "Set the Pressure" on page 11.
3. Select **Mode** from the Mode view, see "Determine the Appropriate Evaporation Mode" on page 6. Select **Split to left and right** or **Join left and right**.
4. Configure the evaporation parameters or select method.
5. Close the cabinet doors and press **Start**.

Evaporation Modes

There are three main evaporation modes available; **Manual** mode, **Time** mode and **Method** mode, see Figure 18.



1	Off	The corresponding side is turned off
2	Manual Mode	Evaporate until the user presses the Stop button
3	Time Mode	Evaporate for a set period of time
4	Method Mode	Evaporate using a predefined method
5	Split to left and right OR Join left and right	The left and right cabinets operate independently OR The left and right cabinets operate the same evaporation run
6	Cancel	Press to cancel mode selection

Figure 18. The different evaporation modes that can be selected. This figure shows a dual system setup where left and right cabinets both have the same manifold configuration (96).

- » **Manual Mode:** Evaporate until the **Stop** button is pressed.
- » **Time Mode:** Evaporate for a set period of time.
- » **Method Mode:** There are several options, see "Method Mode" on page 14.

Mode can also be set to:

- » **Off:** The corresponding cabinet is turned off, see Figure 19.
 - » **Split to left and right:** The left and right cabinets operate independently. The manifold settings do not have to be synchronized in this mode.
- OR**
- » **Join left and right:** The left and right cabinets operate the same evaporation run. The manifold settings must be synchronised in this mode.
 - » **Cancel:** Mode selection is cancelled.

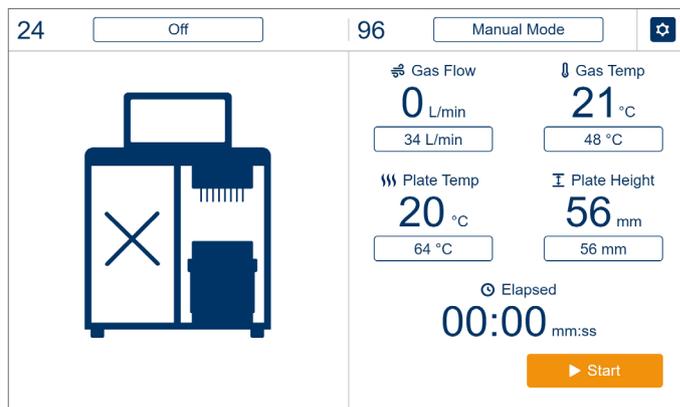
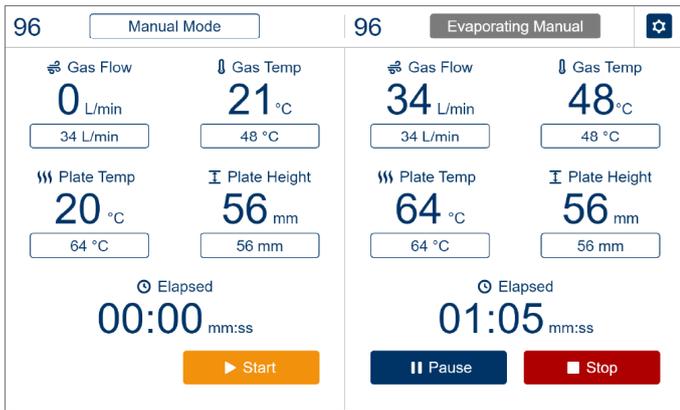


Figure 19. In this figure the left side is turned off and the right side is paused in Manual mode. The left and right sides have different manifolds (24 and 96 respectively).

Manual Mode

Figure 20 displays the Manual mode view. The display shows that the left side is idle (the orange **Start** button is active) and the right side is running an evaporation (the blue **Pause** button and the red **Stop** button are active).

To perform a Manual mode run, enter desired evaporation parameters (gas flow, gas temperature, plate temperature, and plate height). To initiate the run, press the **Start** button. To terminate the run, press the **Stop** button. To pause the run, press the **Pause** button.



1	Gas flow	The current and set gas flow
2	Gas temperature	The current and set gas temperature
3	Plate temperature	The current and set plate temperature
4	Plate height	The current and set plate height. Press to move the plate up or down.
5	Start	Press to start the evaporation
6	Pause	Press to pause the evaporation
7	Stop	Press to stop the evaporation

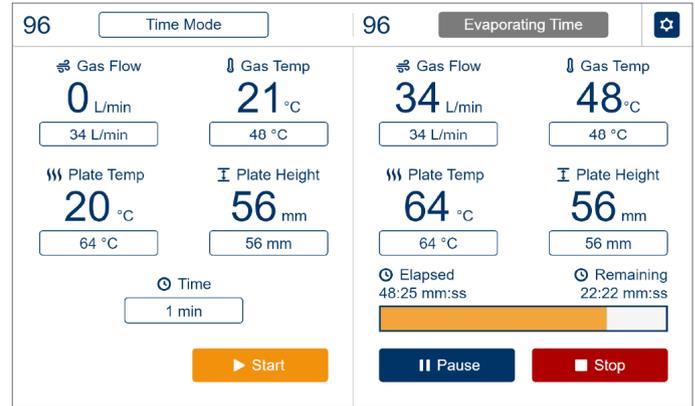
Figure 20. The Manual Mode View. In this figure the manifold settings are synchronized.

Time Mode

Figure 21 displays the Time mode view. The display shows that the left side is ready to start (the orange **Start** button is active) and the right side is running an evaporation (the blue **Pause** button and the red **Stop** button are active).

To perform a Time mode run, enter desired evaporation parameters, including time. To start the run, press the **Start** button. The progress bar displays the remaining and elapsed time for the current evaporation. To change a setting, see "Change a Setting in Manual or Time Mode" on page 14.

To terminate the run before it reaches the set end time, press **Stop**. To pause the run, press **Pause**. The pause will temporarily turn off the gas flow.



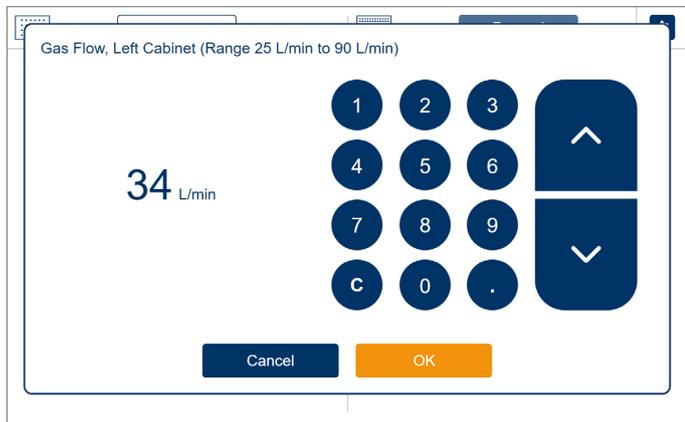
1	Gas flow	The current and set gas flow
2	Gas temperature	The current and set gas temperature
3	Plate temperature	The current and set plate temperature
4	Plate height	The current and set plate height. Press to move the plate up or down.
5	Time	The set evaporation time in minutes
6	Start	Press to start the evaporation
7	Elapsed/Remaining time	The progress bar shows remaining and elapsed time of the current evaporation.
8	Pause	Press to pause the evaporation
9	Stop	Press to stop the evaporation

Figure 21. The Time Mode View. In this figure the manifold settings are synchronized.

Change a Setting in Manual or Time Mode

To change the settings in Manual or Time mode, proceed as follows:

1. Press the button for the setting to be changed (gas flow, gas temperature, plate temperature or plate height), see Figure 20 and Figure 21.
2. Press the **Up and Down** arrows in the appearing dialog to change the setting step by step. Alternatively, use the numeric keypad to enter numbers, see Figure 22.



- 1 Change a setting by pressing the Up and Down arrows
- 2 Change a setting by entering numbers

Figure 22. The Change a setting dialog. In this figure the setting to be changed is the gas flow for the left cabinet.

Split to Left and Right (Single Mode)

The Split to left and right mode enables the left and right cabinets to operate independently. The left cabinet can, for example, operate a Manual mode run and at the same time the right cabinet can operate a Time mode run. The two cabinets can also operate individually with predefined methods.

For instructions regarding method configuration, see "Method Mode" on page 14.

Join Left and Right (Dual Mode)

In the Join left and right mode, the left and right cabinets operate the same evaporation run with the same parameters, see Figure 23.

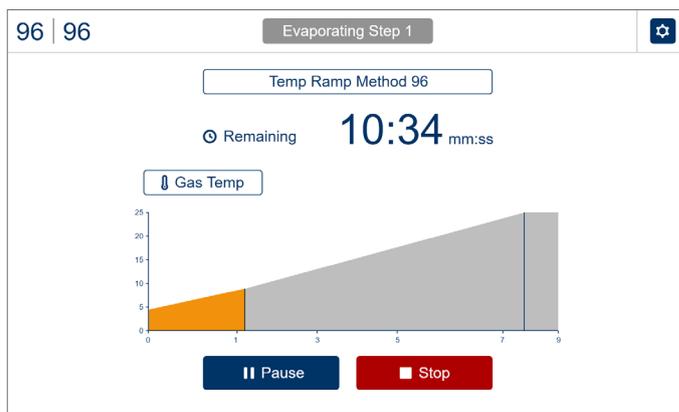


Figure 23. Temp Step Method 96 run in Join left and right mode (Dual mode).

Note: When using Dual mode, the manifolds in the left and right cabinet must be of the same type, see Figure 24. To configure the manifold settings, see "Common Settings" on page 8. The Idle Heating settings can differ between the left and right cabinets. The system will wait for all system heaters with Idle Heating settings set to **On** or **Auto** to reach their target temperatures before starting an evaporation run.

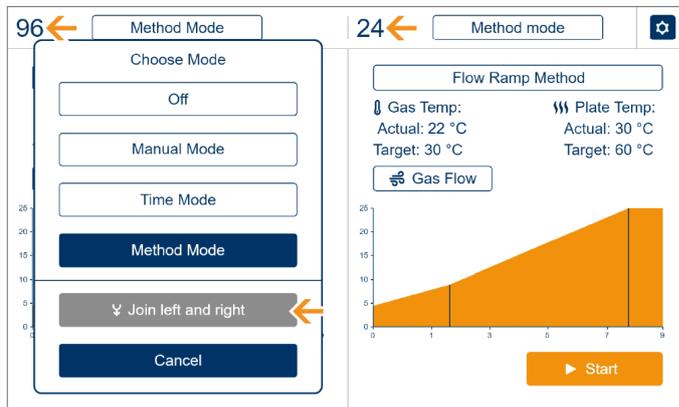


Figure 24. In order to select the Join left and right mode, the left and the right manifolds need to be of the same type. In this figure the manifold settings are unsynchronized (96 and 24, respectively).

Method Mode

It is possible to save up to 10 different evaporation methods per manifold configuration. The methods can be set up to evaporate using a ramp gradient of gas flow, gas temperature and plate height with a maximum of four time segments. The left side and the right side can be set up individually, running two separate methods at the same time. The left and right side can also operate as a dual unit, performing the same evaporation run with the same evaporation parameters.

Note: Changes made to methods cannot be undone. Overwritten data will be lost.

Set Up a Method

Before setting up a method, read "Determine Optimal Evaporation Conditions" on page 6. Also make sure that desired evaporation settings are defined, see "Evaporation Settings" on page 9.

To set up a method, proceed as follows:

1. Select **Method mode** from the Evaporation Modes view, see Figure 25.
2. Press the **Method** button in the appearing Evaporate view, see Figure 26, to access the methods.
3. The Methods view dialog opens, see Figure 27.

Note: There are 10 default methods per manifold configuration. To access them, make sure to configure the correct manifold settings for the method, see "Common Settings" on page 8.

4. Select the method of choice and press the **Edit method** button, see Figure 27.

Note: All methods can be reset to their default values, see "System Information" on page 10.

5. In the Evaporation Parameters view (see Figure 28), enter the desired evaporation parameters and press the **Edit name** button to enter the desired name, see "Evaporation Parameters" on page 15.
6. When done, press **Save**.

Note: Once a method has been saved, its previous settings cannot be recovered.

7. In the Methods view, press **OK** to return to the Evaporate view, see Figure 27.

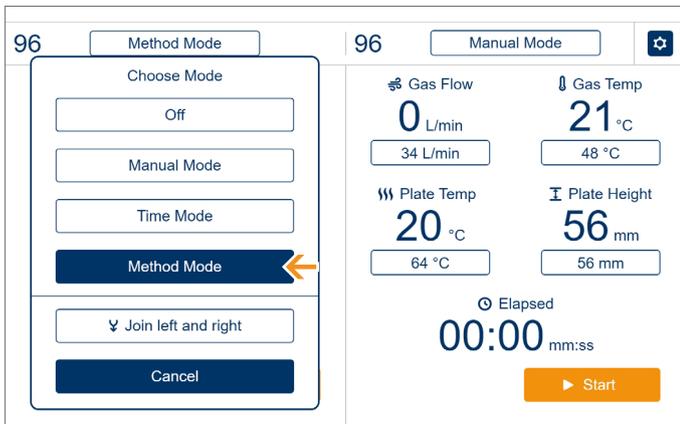


Figure 25. The Evaporation Modes view.

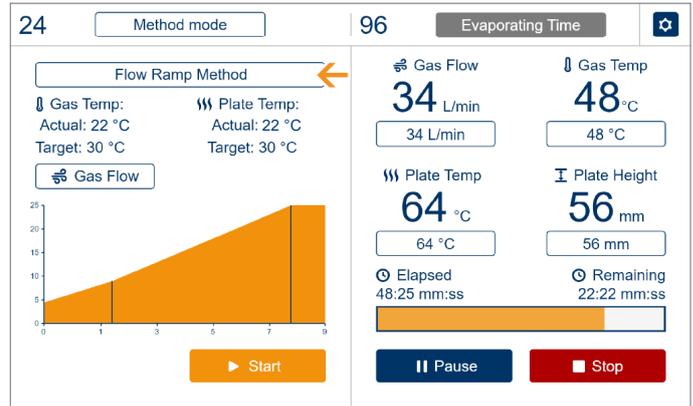


Figure 26. The Evaporate view where methods can be accessed. In this view, the Flow Step Method is selected, as displayed on the Method button.

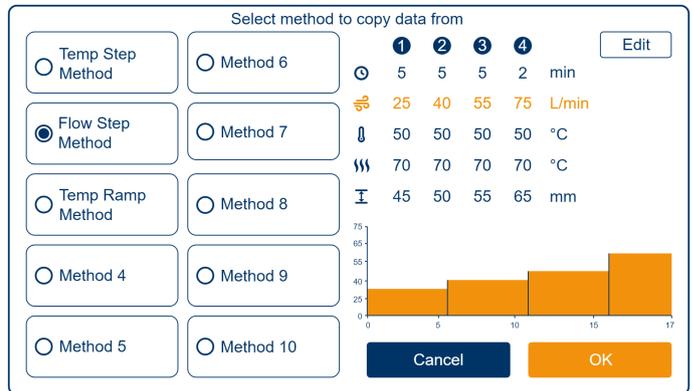


Figure 27. The Methods view where the method to be run or modified can be accessed.

Evaporation Parameters

The evaporation parameters are displayed in the Evaporation Parameters view, see Figure 28. Four time segments can be configured: **Step 1 – Step 4**.

To change a setting, proceed as follows:

1. Press the button for the setting to be configured; **Time, Gas flow, Gas temperature, Plate temperature and Plate height**, see Figure 28.

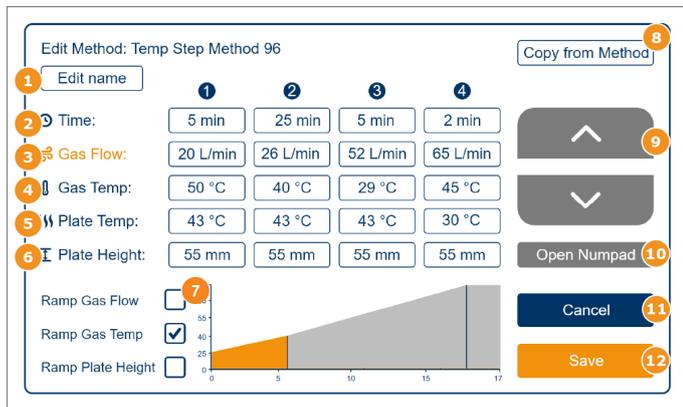
Note: If the plate height button is continuously pressed down, it will change color to red. In this mode, pressing the **Up and Down** arrows will elevate and lower the lift, see Figure 29.

2. Press the **Up and Down** arrows to change the setting step by step. Alternatively, press the **Open numpad** button to open the numeric keypad and enter numbers, see Figure 28.

3. If desired, tick the corresponding box to ramp the settings; **Ramp Gas Flow, Ramp Gas Temp** and **Ramp Plate Height**. If the settings are ramped, the settings change gradually as opposed to incrementally changed settings.

Note: Ramped and incremental settings can be mixed.

Note: If the step time is set to zero, the step will not be executed, see Figure 30.



1	Edit name	Edit current method name
2	Time	The set evaporation time
3	Gas flow	The set gas flow
4	Gas temp	The set gas temperature
5	Plate temp	The set plate temperature
6	Plate height	The set plate height
7	Ramp settings	Ramp gas temperature, gas flow and/or plate height settings
8	Copy from Method	Copy settings from one method to another
9	Up and Down arrows	Change a setting step by step
10	Open numpad	Change a setting with numeric keypad
11	Cancel	Cancel changed settings
12	Save	Save changed settings

Figure 28. The Evaporation Parameters view where the evaporation parameters or the method name can be edited or a method can be copied.

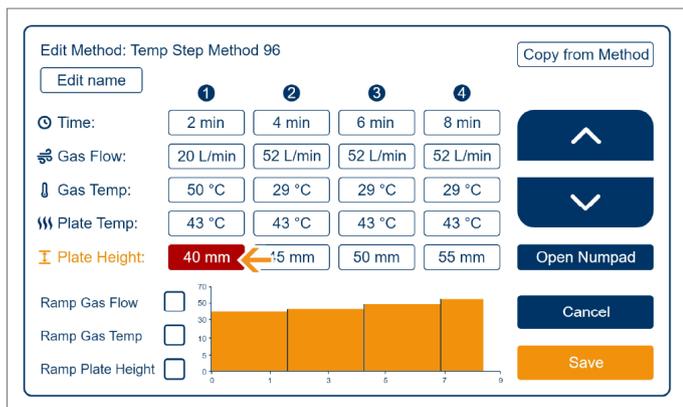


Figure 29. Press and hold the Plate height button, then move the left by pressing the Up and Down arrows.

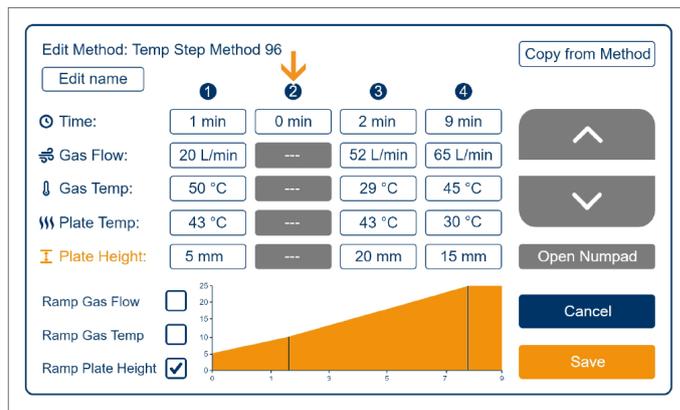


Figure 30. Time is set to zero for step 2, and therefore step 2 will not be executed.

Copy From a Method

It is possible to copy the evaporation parameters from an existing method and save them under a new method name.

Note: There are 10 default methods per manifold configuration. To access them, make sure to configure the correct manifold settings for the method, see "Common Settings" on page 8.

To copy settings from an existing method, proceed as follows:

1. Press the button **Copy from Method** in the Evaporation Parameters view, see Figure 28.
2. In the Copy Method view, select method to copy from, see Figure 31.
3. Press the **Copy Method** button.
4. In the appearing view, edit the method name by pressing the **Edit Name** button, see Figure 32.
5. Type in the new method name and press **Save**.

Note: Changes made to methods cannot be undone. Overwritten data will be lost.

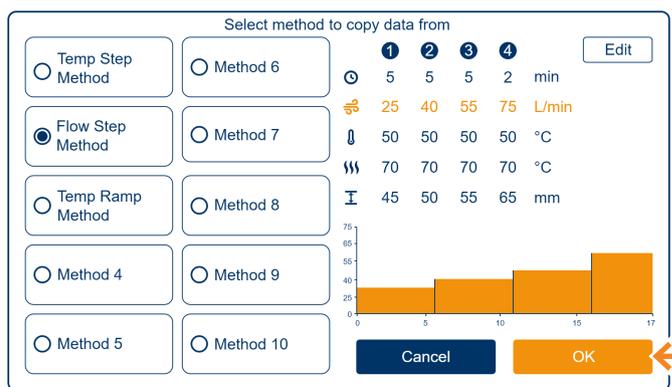


Figure 31. The Select method to copy data from view where the method to be copied is selected.

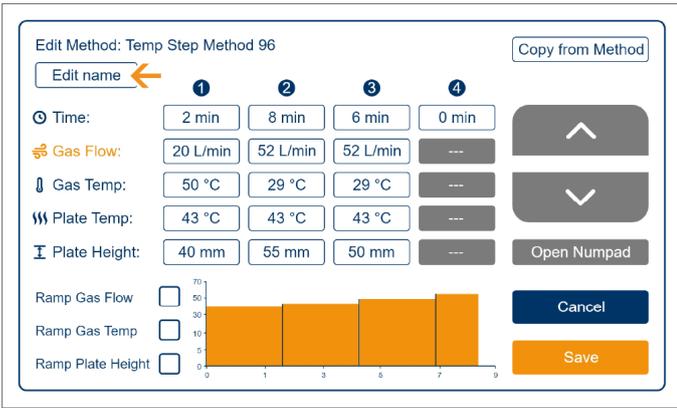
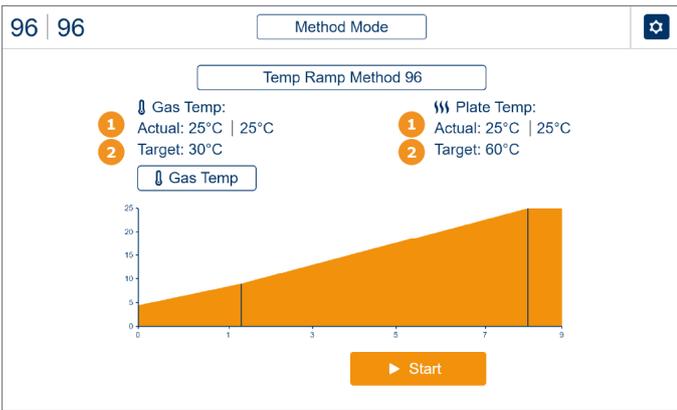


Figure 32. The Edit Method view where the copied method can be saved under a new method name.

Monitor an Evaporation Run

During the evaporation run, the current and set values for the gas flow, gas temperature, plate temperature, plate height, and time can be monitored on the touch screen.

Actual is the measured gas and plate temperatures and **Target** is the gas and plate temperatures set by the user, see Figure 33. If **Wait for gas temperature** or **Wait for plate temperature** has been set, the evaporation will not start until these values are reached, see "Evaporation Settings" on page 9. The plate heater fan will activate and assist in reaching the target plate temperature.



1	Actual	The actual gas and plate temperatures for both left and right cabinet
2	Target	The set gas and plate temperatures for both left and right cabinet.

Figure 33. Actual and Target temperatures.

Edit an Evaporation Run in Progress

During Manual mode and Time mode evaporation runs, it is possible to change the evaporation parameters. When running in Method mode, the evaporation parameters cannot be changed. To edit the evaporation parameters, see "Change a Setting in Manual or Time Mode" on page 14.

Pause or Abort an Evaporation Run

To pause an evaporation run, press **Pause**. The heating and the gas flow are terminated and the timer is paused. Resume the evaporation run by pressing **Resume**.

Additionally, it is possible to pause an evaporation run by opening the cabinet door. The heating is turned off, the gas flow is turned off, the timer is paused and the lift is lowered. Resume the evaporation run by closing the door. Once the door is closed, the lift will return to its position and the evaporation run is resumed.

To abort the run before the specified evaporation time has passed, press **Stop**.

End of an Evaporation Run

When the specified evaporation end time is reached, the gas flow is turned off, the heating is turned off, and the lift is returned to its home position. The color of the LED lights changes to green and an alarm sounds. If operating each cabinet separately, then the LED lights in each cabinet will turn green independently. The **Evaporation Finished** dialog appears on the screen, see Figure 34. The alarm continues to beep every 30 seconds until the Evaporation Finished dialog is closed or the door is opened.

The run can also be terminated by pressing the **Stop** button.

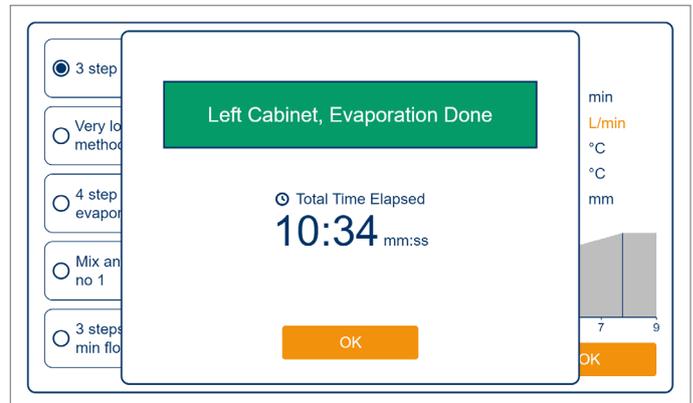


Figure 34. The Evaporation Finished dialog is displayed when the specified evaporation end time is reached.

Unload the Samples

Warning

- » The nozzles may have come into contact with hazardous samples. Avoid contact.
- » The surface temperatures of the gas heater and the plate heater can be very high. Avoid contact. There is a potential risk for burn damage.

Open the cabinet door. The well plate will descend. Carefully remove the well plate or rack. Be careful not to come in contact with the nozzles. See Figure 35.

Note: The lift will return to its home position if the cabinet door is opened or an evaporation run is complete. Prompt removal of the sample tubes is important since highly volatile compounds can be lost if allowed to sit for an extended period of time.



Figure 35. Carefully remove the well plate.

Maintenance

Warning

- » Always turn off the system, disconnect the power cord, and let the system cool down before performing maintenance.
- » There are no user serviceable parts other than the fume shield and manifolds. Covers may only be removed by an authorized Biotage service engineer. Potential electrical hazard exist due to high voltage circuits inside the system.
- » The power cord should be inspected periodically and replaced if damaged or altered. Use only a power cord supplied by Biotage.
- » The exhaust hose should be inspected periodically and replaced if damaged or altered. Use only an exhaust hose supplied by Biotage.
- » Handle chemical and liquid waste according to the Safety Data Sheets and to local/national guidelines on laboratory safety procedures.

Clean the Exterior of the System

If the touch screen has been contaminated by chemicals, it must be cleaned immediately.

1. Turn off the system and disconnect the power cord.
2. Clean the touch screen and the exterior of the system with a soft and clean cloth. The cloth can be lightly dampened with isopropanol or ethanol.
3. When the system has been cleaned, connect the power cord and turn on the system.

Clean the Interior of the System

Warning

- » Never clean the surface where the manifolds are secured to the gas heaters, and be careful when cleaning the outside of the gas heaters. If a foreign substance comes in contact with the inside of a gas heater it may contaminate future evaporation runs and the gas heater may need to be replaced.

Clean the interior of the system as often as required.

1. Turn off the system and disconnect the power cord.
2. Loosen the fume shield set screw and slide out the fume shield to remove it. See Figure 16.
3. Clean the fume shield with a non-alkaline detergent and put aside.
4. Clean the interior with a soft and clean cloth. The cloth can be lightly dampened with water and a non-alkaline detergent.

Note: Do not clean the steel columns, as it will remove the lubrication, see Figure 36.

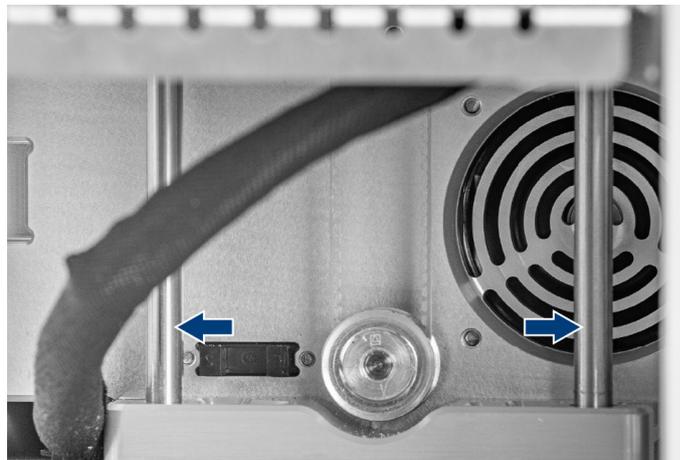


Figure 36. Do not clean the steel columns.

5. Use one hand to lift the plate heaters and clean underneath. See Figure 37.
6. Install the fume shield and secure the fume shield set screw.
7. After cleaning is complete, connect the power cord and turn on the system.

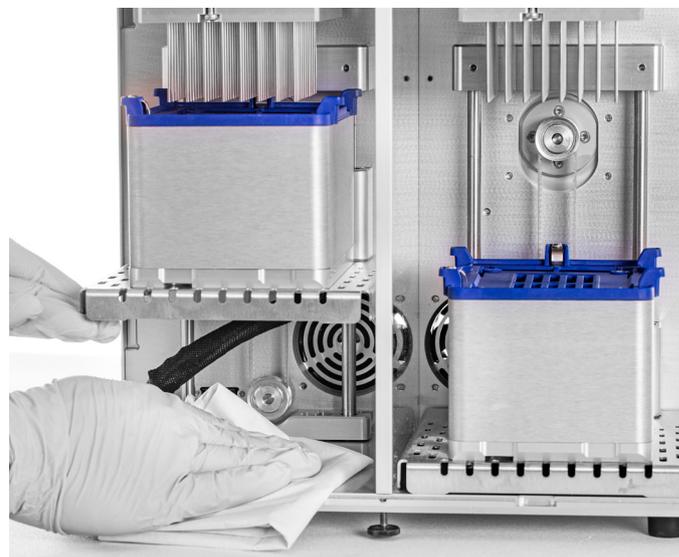


Figure 37. Lift the plate heater and clean under the lift.

Clean the Manifolds

Warning

- » Ensure not to bend any of the nozzles. If a nozzle is bent, it is recommended that the manifold is replaced.
- » The nozzles may have come into contact with hazardous samples. Avoid contact.

Clean the manifolds regularly. The frequency of cleaning should be determined by the needs of the laboratory, but it is recommended that the manifolds should be cleaned when:

- » a manifold may have been contaminated,
- » a manifold has been in contact with harsh solvents or additives,
- » a nozzle is obstructed,
- » before long term storage.

The most thorough way to clean the needle assemblies is to remove the manifolds and clean them outside of the instrument. However, in-situ rinsing can be performed as a quick alternative.

The nozzles are made of 316 stainless steel (EN 1.4404), and the head assembly is made of anodized aluminum (aluminum, EN AW-6082). Always consider the material of the instrument parts when selecting cleaning agent.

Clean a Manifold in Place

This method requires a suitable container that can be filled with cleaning agent and that fits on the plate heater. A well collection plate (2 mL or larger) is recommended, see "Consumables" on page 24.

Note: Ensure that the well collection plate fits the manifold, i.e. for a 24-nozzle manifold use a 24-well collection plate.

1. Fill the container with an appropriate cleaning solvent. The solvent is dictated by analyte solubility and the following is recommended:
 - a. For polar analytes chose solvent combinations with a high aqueous content, e.g., an 80/20 solution of water and methanol.
 - b. For lipophilic analytes chose solvent combinations with a high organic solvent content, e.g., an 80/20 solution of methanol and water.
2. Place the container on the plate heater under the manifold.
3. Close the door and lift the container so that the nozzles are submerged in the desired cleaning solvent. (Do not start an evaporation run.)

4. Keep the nozzles submerged in the solvent for 5-10 minutes.

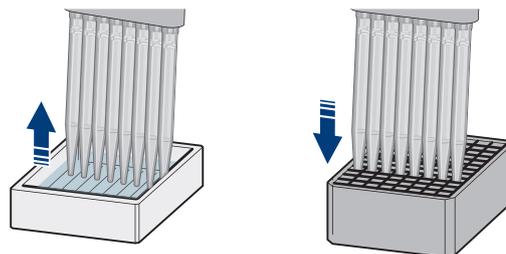
Note: For polar analytes it is recommended to repeat step 1 to 4 with a high organic solvent combination after the high aq rinse.

5. Lower the container and remove it.
6. Ensure that the nozzles are dry before initiating an evaporation run. Either wait until they are dry, or perform an evaporation run with an empty cabinet and unheated gas. (25 °C/77 °F)

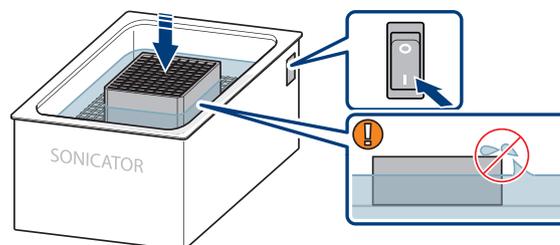
Clean a Manifold Outside of the Instrument

This method requires the manifold to be removed from the instrument and placed in a sonicator. Additionally, the method requires a suitable container that can be filled with solvent. A well collection plate (2 mL or larger) is recommended, see "Consumables" on page 24 .

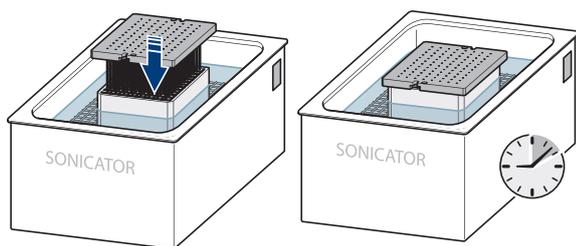
1. Remove the manifold as described in "Replace the Manifold" on page 11.
2. Prepare a container as in "Clean a Manifold in Place" on page 20.



3. Place the container in a sonicator. Ensure that the water level is below the edge of the container. Water in the container will lead to contamination.



4. Carefully lower the manifold into the container and sonicate for 5-10 minutes.
 - a. If contamination is present, the times and solvent variants may need to be adjusted.



- Remove the assembly from the sonicator and either place the manifold into storage or attach it to the instrument as described in "Replace the Manifold" on page 11.
- Check that the nozzles are dry before initiating an evaporation run. Either wait until they are dry, or perform an evaporation run with an empty cabinet and unheated gas. (25 °C/77 °F)

Clean the Plate Heaters

The plate heaters must be kept clean. If the inside of a plate heater is contaminated the plate heater should be replaced.

- Turn off the system and disconnect the power cord.
- Loosen the fume shield set screw and remove the fume shield.
- Clean the plate heaters with a non-alkaline detergent.
- Put the fume shield back in place and secure the fume shield set screw.
- Connect the power cord and turn on the system.

Inspections

Inspect the power cord, plate heater and exhaust hose regularly. Replace them if they are damaged or altered. See "Clean a Manifold in Place" on page 20.

Replace the Fuse

Warning

- » Use only exact replacement fuses supplied by Biotage. Incorrect fuses will void the warranty of the system and creates a potential fire hazard and a risk of personal injury.

- Turn off the system and disconnect the power cord.
- Using a flat-bladed screwdriver, push and turn the slotted center of the fuse holder counterclockwise until the holder pops out; see Figure 38.

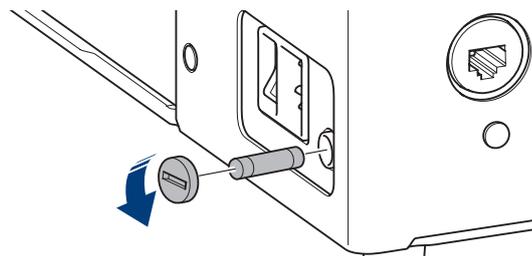


Figure 38. Replace the fuse.

- Clean the new fuse (P/N 415578SP) using a cloth lightly dampened with ethanol and wipe it dry with a dry cloth.

Note: Do not touch the metal surfaces after the fuse has been cleaned.

- Replace the old fuse.
- Insert the fuse holder into the socket and turn clockwise until it locks.

If the fuse blows shortly after replacing it, please contact Biotage® 1-Point Support™.

Long Term Storage

Warning

- » The nozzles have sharp edges and may have come into contact with hazardous samples. Avoid contact.

- Turn off the system and disconnect the power cord.
- Turn off the gas supply.
- Clean the exterior of the system as described on page 19.
- Clean the interior of the system as described on page 19.
- Clean the manifolds as described on page 20.
- Decontaminate the system according to local procedures.
- Store the system in a dust free environment with the fume shield closed.

Put a Manifold into Storage

Warning

» Ensure not to bend any of the nozzles. If a nozzle is bent, it is recommended that the manifold is replaced.

1. Remove and clean the manifolds as described on page 20.
2. Place the manifold in its original packaging and store it in a dust free environment.

Troubleshooting

Evaporation

- » If the evaporation is uneven between wells:
 - » One or more nozzles may be clogged. Clean or replace the nozzle manifold, see page 11 and page 20.
 - » One or more nozzles may be bent. Make sure the nozzles are aligned in straight rows. If the nozzles cannot be aligned, contact Biotage[®] 1-Point Support™.
 - » The manifold and the well plate may be misaligned. To align the bottom heater to the manifold, contact Biotage[®] 1-Point Support™.
- » If the evaporation rate is too slow:
 - » Check that the gas flow is not too low; see "Determine the Appropriate Gas Flow" on page 6.
 - » Check there is no gap between the manifold and the gas heater. Check the screws are tightened.
 - » Check that the gas inlet tube is not leaking.
 - » Check that the pressure regulator is set to the appropriate range. See the technical specification in TurboVap[®] 96 Dual Installation and Safety, (P/N 418002).
- » If the evaporation rate is too rapid or splashing occurs:
 - » Check that the gas flow is not too high, see "Determine the Appropriate Gas Flow" on page 6 and the technical specification in TurboVap[®] 96 Dual Installation and Safety, (P/N 418002).
 - » Check that the nozzles are not too close to the surface of the samples.
- » If there is no gas flow:
 - » Check that the gas supply is turned on and that the pressure is higher than the minimum pressure specified in TurboVap[®] 96 Dual Installation and Safety, (P/N 418002).
 - » Check that the gas inlet tube is not obstructed or damaged.
- » If the recovery of sample is low:
 - » Check that the plate heater temperature is not too high, thereby causing the solvent to boil; see "Determine the Appropriate Plate Heater Temperature" on page 7.
 - » Check that the sample is not left too long on the plate heater after the evaporation is completed.
 - » Check that the gas flow is not too high and causing splashing; see "Determine the Appropriate Gas Flow" on page 6.
 - » Check that the gas heater temperature is not too high, thereby causing the solvent to boil; see "Determine the Appropriate Gas Heater Temperature" on page 7.

Gas Supply

- » If a gas leak has been detected at the gas inlet (the **N₂** port):
 - » Check that the gas inlet tube is securely attached.
 - » Check that a gas inlet tube with the correct outer diameter is used, i.e. 6 mm. Always use tubing and adapters supplied by Biotage.
- » If the instrument warns for too low gas pressure or the flow rate does not reach the expected set value:
 - » Check that the pressure at the inlet (the N₂ port) meets the minimum pressure requirement specified in TurboVap[®] 96 Dual Installation and Safety, (P/N 418002).
 - » Check that the provided inlet tube is used. A longer tube may cause pressure drop.

Touch Screen

- » If the touch screen is not responding as expected, test its calibration:
 - » Press **More** in the settings view and then **Verify Screen**.
 - » Draw or write on the touch screen to verify its function and calibration.
- » If the touch screen calibration is off, calibrate it:
 - » Press **More** in the settings view and then **Calibrate Screen**.
 - » Follow the instructions on the screen and then test the calibration as described in the bullet above.
- » If the touch screen calibration wizard cannot be accessed due to a faulty calibration, restart the system and repeatedly open and close one of the doors during start-up. This will open the calibration wizard.

Note: The door only needs to be opened approximately 20 mm.

Lift

- » If there is an error message regarding a lift:
 - » Restart the system. Should the error persist, contact Biotage[®] 1-PointSupport™.

Accessories and Spare Parts

Only use genuine Biotage accessories in the system. To order consumables and accessories, see contact information on the last page of this document or visit our website www.biotage.com.

Manifolds and Racks

Part No.	Description	Qty
418110SP	96 Position Manifold, Kit	1
418313SP	48 Position Manifold, Kit	1
418312SP	24 Position Manifold, Kit	1
418319SP	Rack 12 x 32 mm, 24 Positions	1

Misc

Part No.	Description	Qty
418122SP	Nozzle Adapter Gasket	1
418028SP	Fume Shield	1
418278SP	Fume Shield Set Screw	1

Consumables

Part No.	Description	Qty
121-5201	Collection Plate, 350 uL Square	50
121-5202	Collection Plate, 1 mL Square	50
121-5203	Collection Plate, 2 mL Square	50
121-5213	Collection Plate, 2 mL, Round	50
121-5208	Collection Plate, 10 mL 24-Well	25
121-5105	Collection Plate, 290 mL 1-Well	25
121-5210	Collection Plate, 5 mL, 48-Well	20

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Intellectual Property

Patent pending.

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