



Rinse Pump Troubleshooting – Qtegra

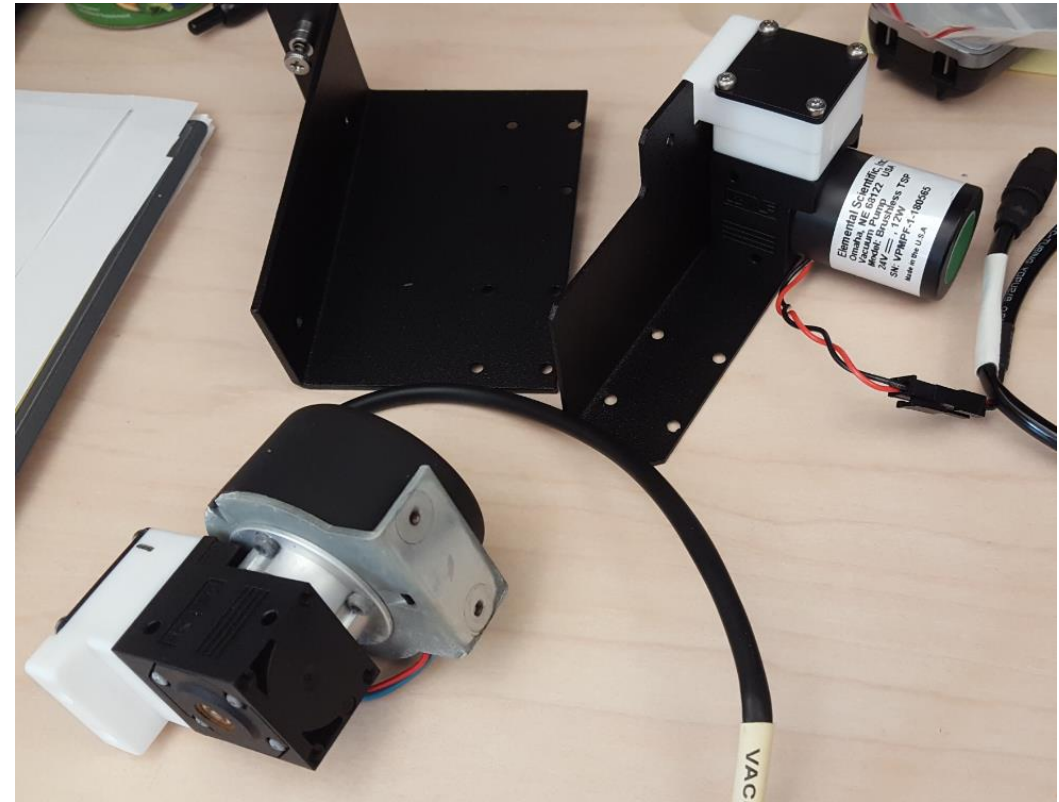
By Aaron Musfeldt

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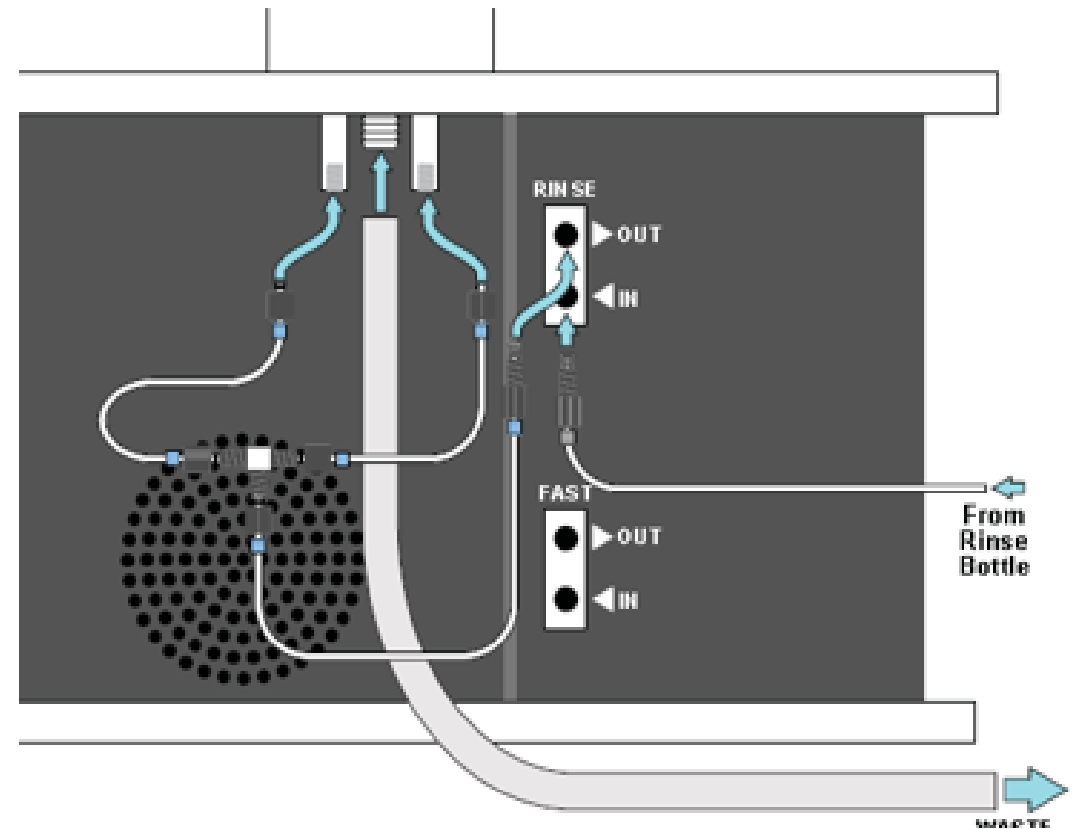
General Information

- This guide has information relating to ESI rinse pumps and troubleshooting steps for specific symptoms regarding the pumps.
- If you are having issues with a rinse pump, you will first need to determine whether your autosampler uses a single rinse or dual rinse system.



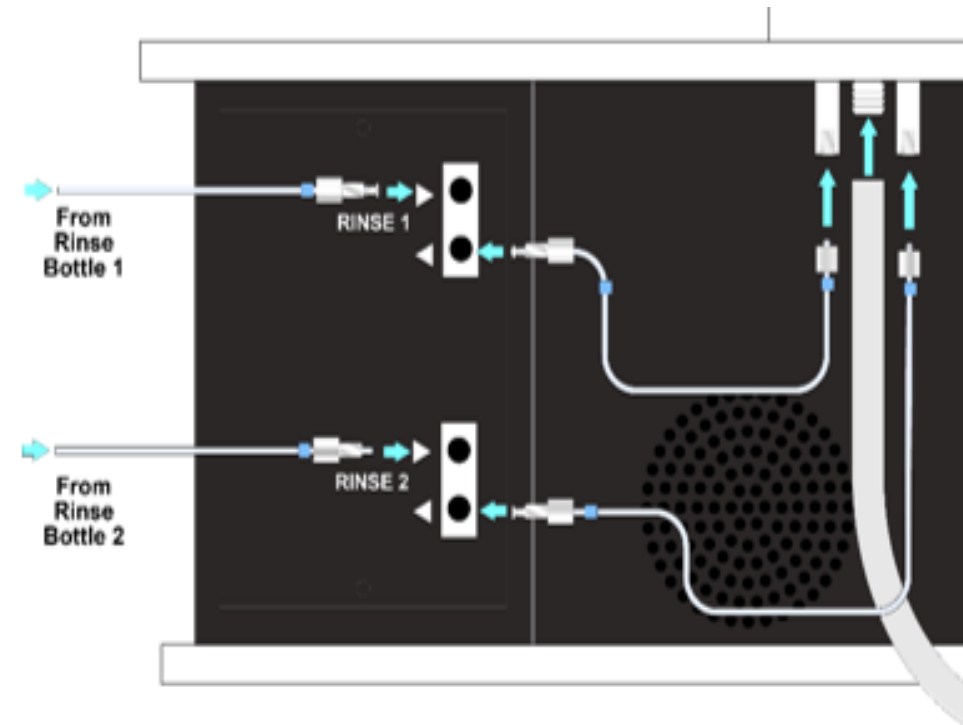
Single Rinse Pump Autosampler

- The single rinse autosampler uses one pump that has a tee that branches into both rinse wells.



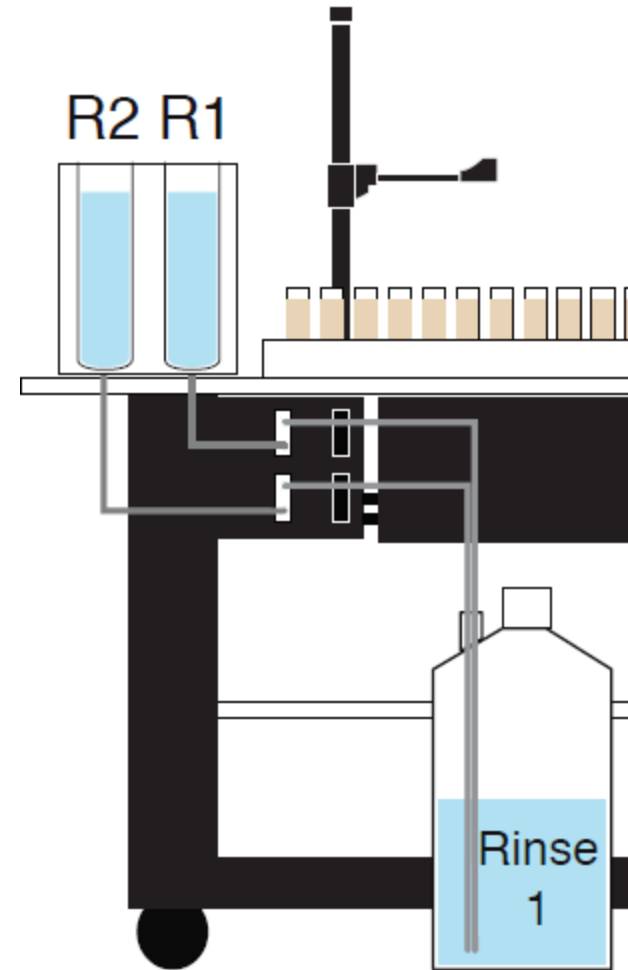
Dual Rinse Pump Autosampler

- The dual rinse autosampler uses two pumps. Each pump feeds its own rinse well.



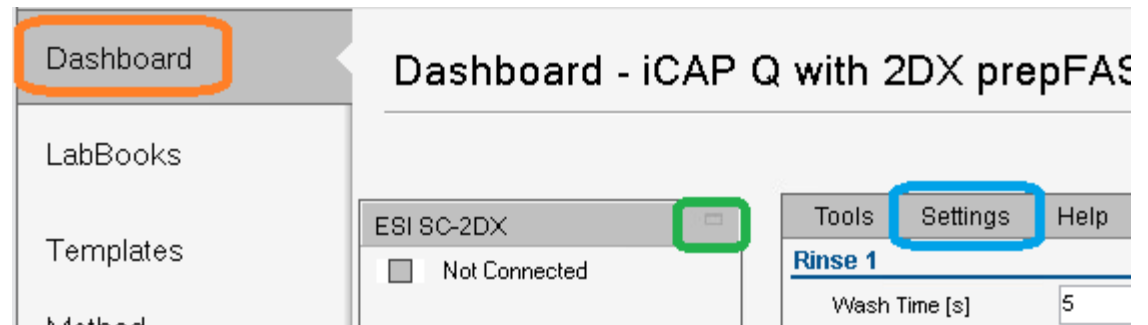
Rinse Pump Flow

- Rinse solution is drawn up from a rinse bottle, through the vacuum pump and then onward to the rinse vials.
- The example to the right is of a dual rinse system.



Rinse Pump Settings

- Qtegra software manages the rinse pump during analysis.
- If there is no FAST method, then the rinse timers are managed in the **Settings** menu.
- You can access these settings within the Dashboard.
 - Click on the ESI Settings button
 - Click on **Setting** and then **Rinse**.
- When the autosampler receives a **Move Rinse** command from Qtegra, the probe will return to the rinse station and dip into both rinse vials. The time that the probe stays in the rinse station is determined by the **Wash Time (s)** value for Rinse 1 and Rinse 2.



Rinse Pump Settings

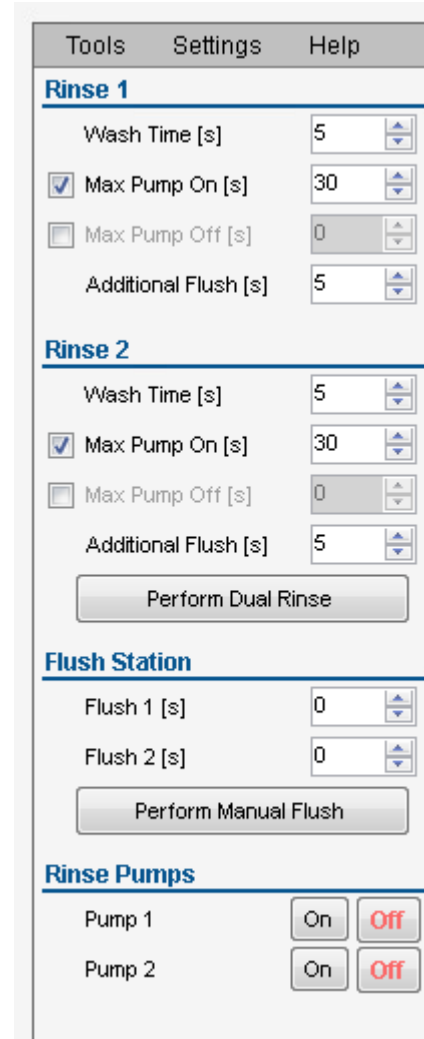
- In this example, the probe will dip into Rinse 1 for 5 seconds and then Rinse 2 for 5 seconds.
- The **Refill Time(s)** determines how long the rinse pump will run to refill the vial.
- If **Max Pump On** is unchecked, the rinse pump will run as long as the probe is in the specified rinse vial. If checked, the timer here determines the maximum amount of time that the rinse pump will run while the probe is in the rinse station.

The screenshot displays the 'Rinse Pump Settings' interface with a menu bar at the top containing 'Tools', 'Settings', and 'Help'. The interface is divided into several sections:

- Rinse 1:** Wash Time [s] is set to 5. Max Pump On [s] is checked and set to 30. Max Pump Off [s] is unchecked and set to 0. Additional Flush [s] is set to 5.
- Rinse 2:** Wash Time [s] is set to 5. Max Pump On [s] is checked and set to 30. Max Pump Off [s] is unchecked and set to 0. Additional Flush [s] is set to 5. A 'Perform Dual Rinse' button is located below these settings.
- Flush Station:** Flush 1 [s] is set to 0. Flush 2 [s] is set to 0. A 'Perform Manual Flush' button is located below these settings.
- Rinse Pumps:** Pump 1 has 'On' and 'Off' buttons. Pump 2 has 'On' and 'Off' buttons.

Rinse Pump Settings

- You can manually perform the autosampler rinse procedure by clicking on **Perform Dual Rinse**.
- You can manually turn each pump on individually by clicking on the **On** button under the **Rinse Pumps** section at the bottom.
- Turn the pump off by clicking the **Off** button.

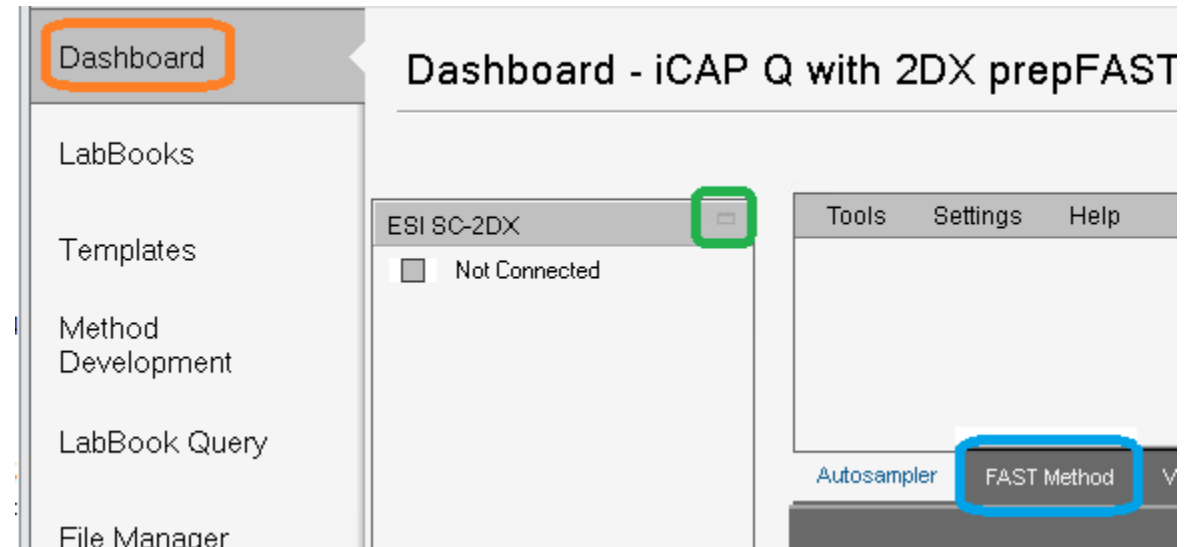


The screenshot shows a software interface for configuring rinse pumps. It features a navigation bar with 'Tools', 'Settings', and 'Help'. The main content is organized into three sections: 'Rinse 1', 'Rinse 2', and 'Flush Station'. Each 'Rinse' section contains four settings: 'Wash Time [s]' (5), 'Max Pump On [s]' (checked, 30), 'Max Pump Off [s]' (unchecked, 0), and 'Additional Flush [s]' (5). Below these settings are buttons for 'Perform Dual Rinse' and 'Perform Manual Flush'. The 'Rinse Pumps' section at the bottom has two rows, one for 'Pump 1' and one for 'Pump 2', each with 'On' and 'Off' buttons. The 'Off' buttons are highlighted in red.

Section	Parameter	Value
Rinse 1	Wash Time [s]	5
	Max Pump On [s]	30
	Max Pump Off [s]	0
	Additional Flush [s]	5
Rinse 2	Wash Time [s]	5
	Max Pump On [s]	30
	Max Pump Off [s]	0
	Additional Flush [s]	5
Flush Station	Flush 1 [s]	0
	Flush 2 [s]	0
Rinse Pumps	Pump 1	On / Off
	Pump 2	On / Off

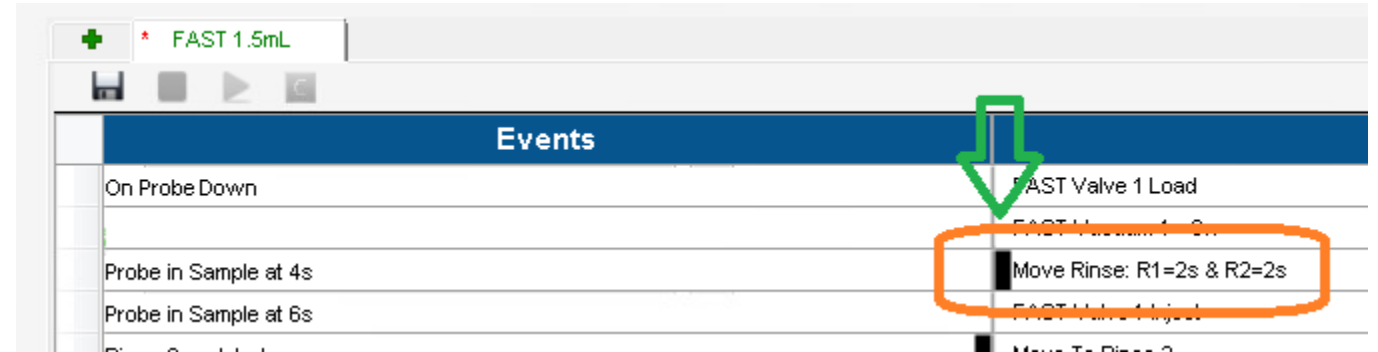
Rinse Pump Settings (FAST Method)

- The tools above can assist you with manually running the rinse pumps.
- If you want to make an adjustment to the time your probe is in each rinse well during a FAST method, you will need to make the change to your method.
- You can access the FAST method by clicking on the **Dashboard** and then the **ESI Settings** button. At the bottom is a tab for the **FAST Method**.



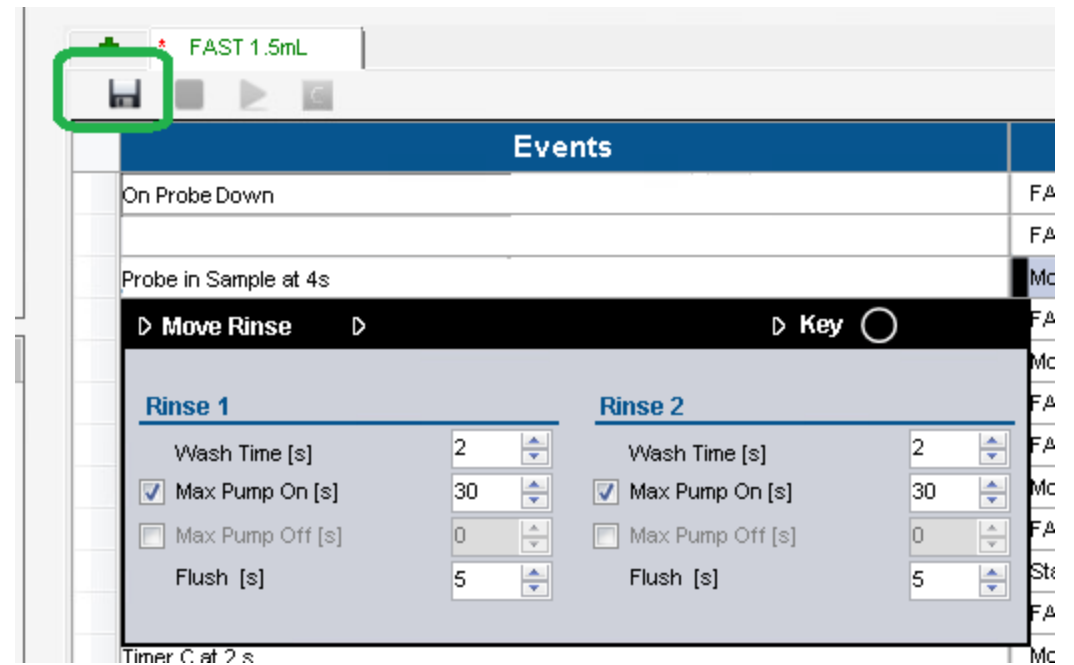
Rinse Pump Settings (FAST Method)

- Your FAST method will have a section for rinse settings.
- There will be a small box next to the **Move Rinse** command that you can click on to access the rinse settings.



Rinse Pump Settings (FAST Method)

- You can adjust the **Wash Time** for each rinse well here. This is the time that the probe is in the rinse well.
- You can also adjust the **Max Pump On** timer. This is the timer that determines how long the rinse pump is on.
- Make sure to save your FAST method when done. It's recommended to name is something different in order to preserve the default method.



Troubleshooting - Lower Than Expected Flow



- If rinse flow is lower than expected,
 - Verify that the rinse solution container has sufficient liquid in it and that the tubing inside is not wrapping back up and out of the rinse solution.
 - There are air return filters on the rinse solution container that can get damaged or clogged. This will prevent proper air return which could reduce the flow rates. Remove the rinse cap and test to see if proper flow rate returns.



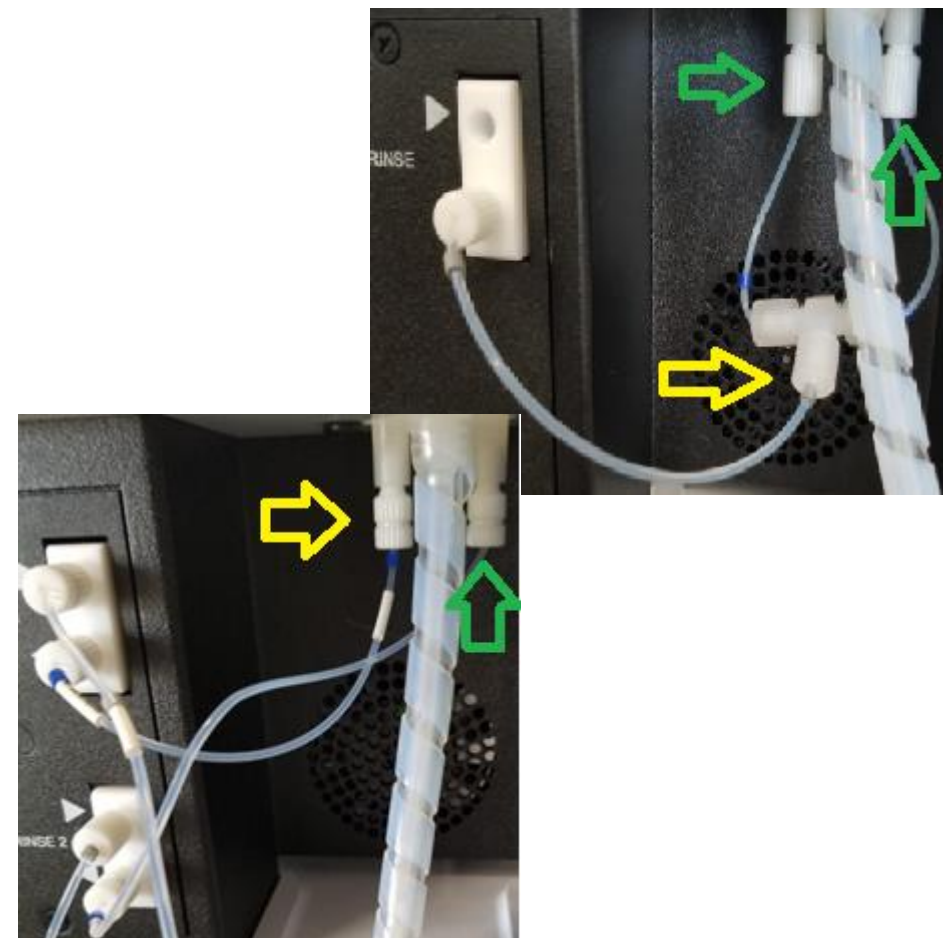
Testing a Rinse Pump

- If low rinse flow is suspected, you can follow these steps to test the pump.
- You will be disconnecting the rinse lines below the rinse station. Before you do this, empty out any rinse solution in the rinse station or take proper precautions to handle the rinse solution as it drains out of the rinse station/line when you disconnect it.



Testing a Rinse Pump

- For a single rinse pump autosampler, disconnect the line at the tee that branches off into the rinse station OR disconnect the lines from the rinse vials.
- For a dual rinse pump autosampler, disconnect the line at the rinse station from the questionable rinse pump.



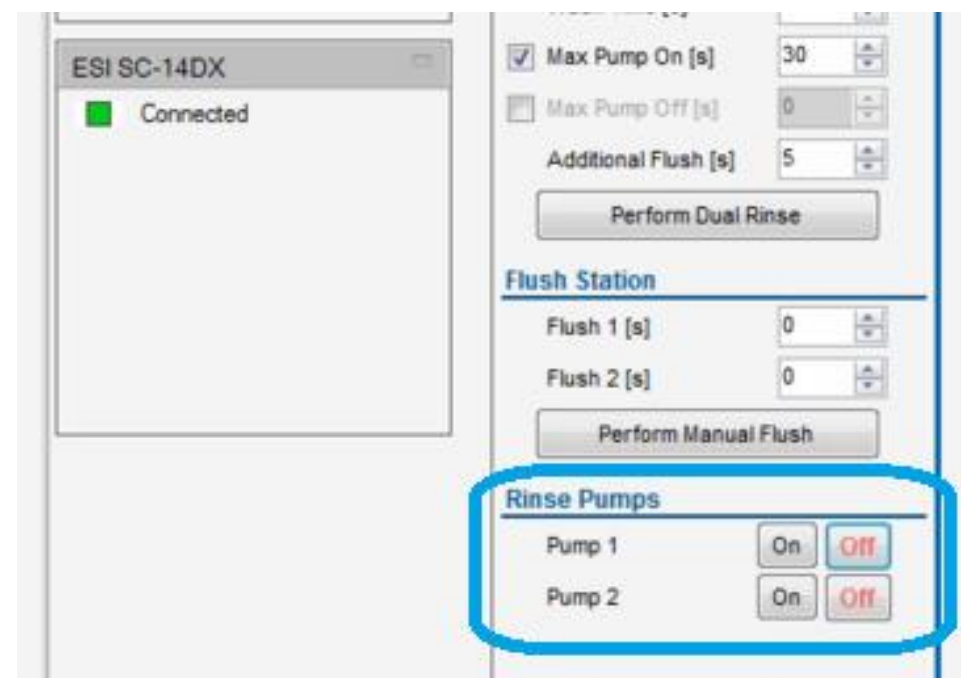
Testing a Rinse Pump

- Place the line or lines in an empty beaker or bottle.
- In the Qtegra software, click on **ESI Settings** button from the **Dashboard**.



Testing a Rinse Pump

- Click on **Settings** and then **Rinse**.
- Here you will see a **Rinse Pumps** section near the bottom.
- There are buttons for both Rinse Pump 1 and Rinse Pump 2 here.



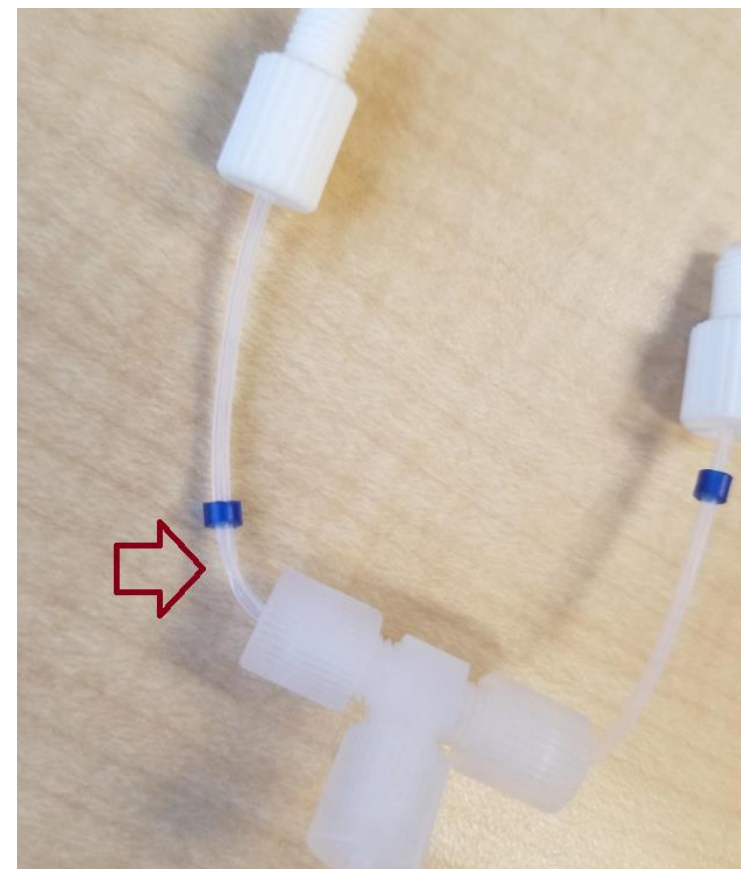
Testing a Rinse Pump

- Toggle the pump that you want to test on and let it run for one minute.
- You should hear the pump make noise. Measure the amount of rinse in the container afterwards.
- You should have a flow rate of at least 30 mL/min. If it's less than this, the pump or lines may need to be replaced.
- Repeating the flow test should provide you with consistent results.



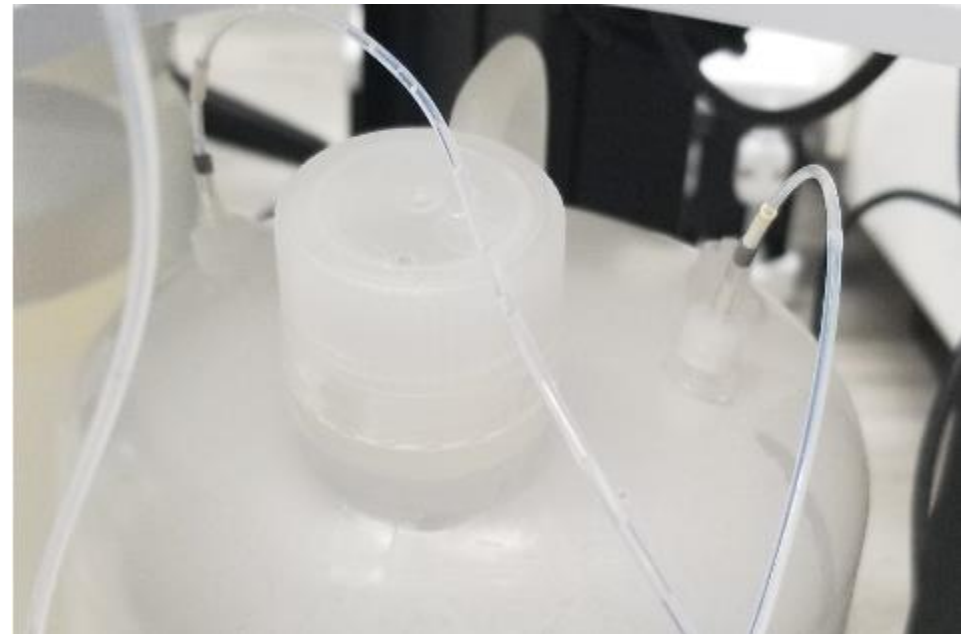
Other Considerations for Low Flow

- Tubing can become damaged or clogged. Here are some tests you can run to test for defective lines.
- Inspect the lines from the pump to the rinse station for any damage or kinks.
- For single rinse pumps, you could place each end of the tubing in separate bottles and run the test from the example in the previous pages. You should see approximately the same volume of rinse solution in each bottle.
- With dual rinse pumps, you can swap lines around for testing purposes to isolate the pump from the lines.



Other Considerations for Low Flow

- Remove the cap on the rinse bottle to rule out a clogged filter on the bottle.
- Inspect the lines from the rinse bottle to the pump(s) to make sure they are not damaged.



Additional Support



- For additional support, you can contact Elemental Scientific by email or phone.
 - support@icpms.com
 - 1.402.991.7800
- Please include (in an email) or have the following information available for phone support.
 - The instrument that the autosampler is connected to.
 - ESI SC software version.
 - Serial number of the autosampler (located on the side with the power/communication cables, i.e. X4DXX-).
 - Parts that you may need (tubing, pumps, bottles, etc.)