Agilent 490 Micro Gas Chromatograph

Configuring a Stream Selector Valve with the Agilent 490 Micro GC

This document describes how to connect Valco stream selector valves with microelectronic actuators (SSV) to the Agilent 490 Micro Gas Chromatograph (Micro GC).

Figure 1 The Agilent 490 Micro Gas Chromatograph

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Valve Connection to the Agilent 490 Micro GC

The Micro GC drivers for both EZChrom and OpenLAB CDS (EZChrom and ChemStation editions) include functionality for direct connection of one or more SSVs to the Micro GC. EZChrom 3.3.x supports a maximum of two (2) valves, and OpenLAB CDS EZChrom and OpenLAB CDS ChemStation support up to three (3). The valves connect to COM Port 2 on the main board of the Micro GC. Examples for mounting the SSV are displayed in Figure 2 and Figure 3.

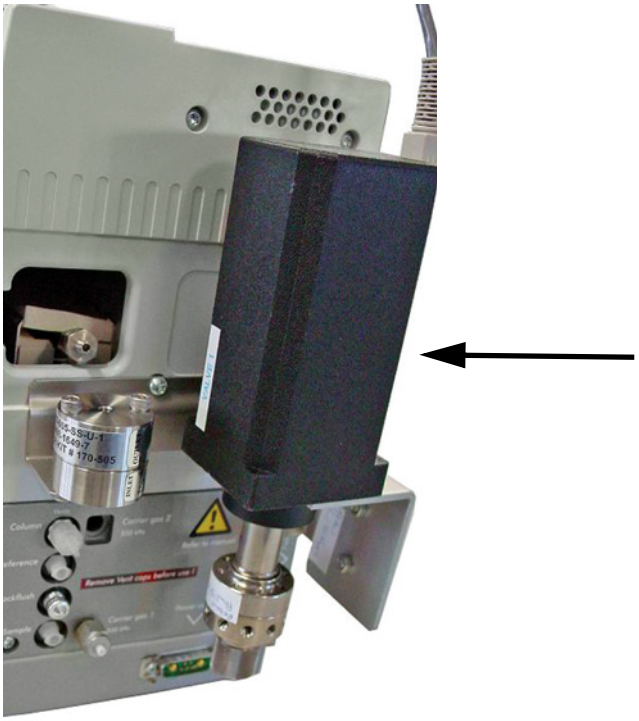


Figure 2 The SSV mounted on the rear of the Micro GC

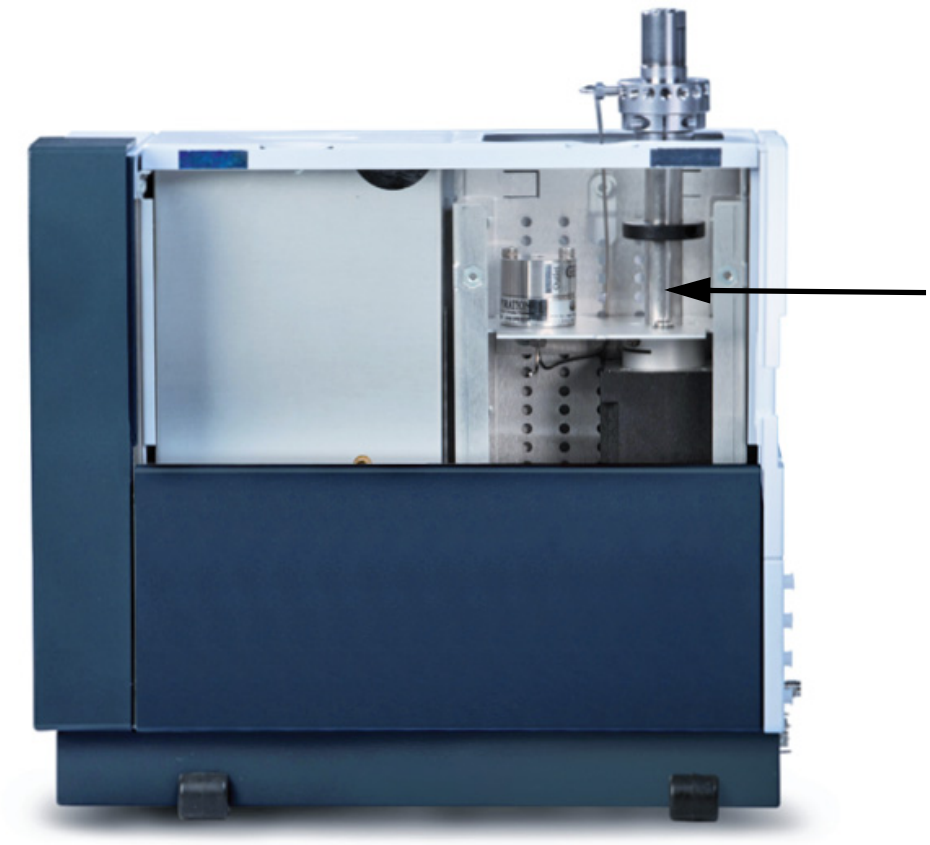


Figure 3 The SSV mounted on the integrated accessory bracket

Stream selector valve identification

By default, the SSV shipped by Agilent Technologies has no identity (**ID=none**). If just one SSV is controlled by the Micro GC driver, a valve identity is not required. Skip to "EZChrom 3.3.x Configuration" on page 7 or "OpenLAB CDS Configuration" on page 13. In order to control multiple SSVs, you must set a valve identity for the different valves as described below.

Set the valve identity using a tool installed with each data system:

- For EZChrom 3.3.x, use tool **ValveSetup.exe**, found in the EZChrom folder, normally **C:\EZChromElite**. This tool allows you to set the valve ID to **none**, **1** and **2**.
- For OpenLAB CDS, use tool **VICI_Valve_configurator.exe,** found in the installation folder, normally **C:\Program Files (x86)\Agilent Technologies\EZChrom\Agilent490MicroGC**. This tool enables you to set the valve IDs to **1**, **2** and **3**.

Both tools (**ValveSetup.exe** and **VICI_Valve_configurator.exe**) require the direct connection of a valve to a free COM Port on the computer to communicate and set IDs. Further instructions for both tools are given in the Micro GC driver help file.

Different valve setup scenarios (with single and multiple valves) are described in the following sections:

- “Scenario 1: Single valve connected to the Micro GC" on page 4.
- “Scenario 2: Two valves cascaded and connected to a single sample inlet" on page 5.
- “Scenario 3: Two valves connected to two different sample inlets" on page 6.

Scenario 1: Single valve connected to the Micro GC

Connect the SSV to COM Port 2 on the main board of the Micro GC using an interface cable (part number CP89103, Interface cable for EMT/EMH). The maximum stream number in EZChrom and OpenLAB is equal to the number of streams available. For example, a 6 port SSV provides six streams (Figure 4).

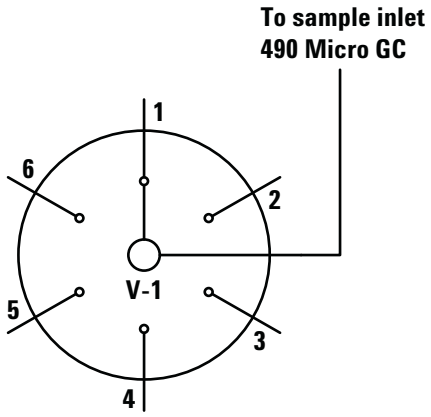


Figure 4 Single valve connected to a sample inlet

Scenario 2: Two valves cascaded and connected to a single sample inlet

Connect two SSVs to a multi drop cable (part number CP955654, cable for 2 microelectronic actuator valves) using two interface cables (part number CP89103, Interface cable for EMT/EMH). Connect the multi drop cable to COM Port 2 on the main board of the Micro GC.

If using three SSVs (OpenLAB Micro GC driver only), connect two multi drop cables (part number CP955654, cable for two micro electronic actuator valves) in series to COM Port 2 on the main board of the Micro GC.

Plumb the outlet of valve 1 to inlet position 1 of valve 2 (Figure 5). Position 1 serves as a “pass-through” for any upstream valve. When setting up EZChrom or OpenLAB, the total number of streams = (number of streams for the first valve) + (number of streams for the second valve - 1) + (number of streams for the third valve - 1). In the case of two 6-port valves, the total number of streams (**Maximum streams**) is 6 + (6 - 1) = 11.

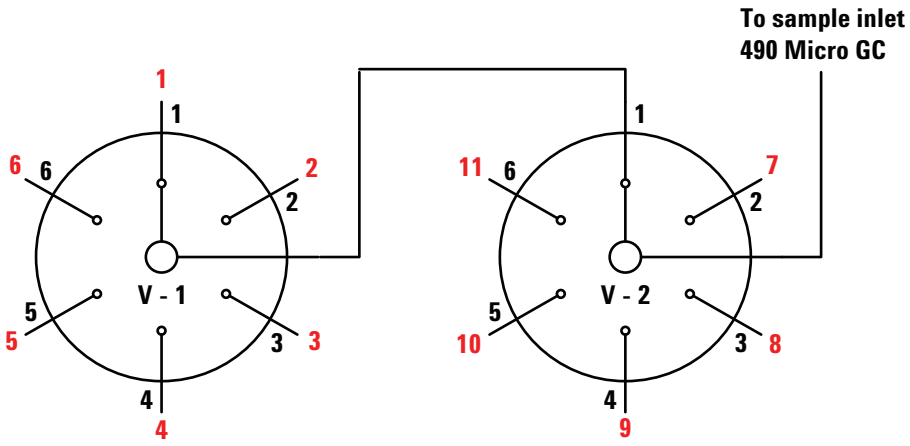


Figure 5 Two valves cascaded and connected to a single sample inlet

In Figure 5, the black numbers show the position number for each valve, and the red numbers are the stream numbers as they should be configured in EZChrom or OpenLAB (explained in “EZChrom 3.3.x Configuration" on page 7 and “OpenLAB CDS Configuration" on page 13).

If stream 1 to 6 is chosen with a single run or during a sequence, set valve 2 to position 1 (pass-through) to complete the flow path to the sample inlet. For stream 7 to 11, select the desired position (2 to 6) on valve 2. For stream 7 to 11 (on valve 2) it is not important which stream is selected on valve 1.

Scenario 3: Two valves connected to two different sample inlets

Connect two SSVs to a multi drop cable (part number CP955654, cable for 2 microelectronic actuator valves) using an interface cable (part number CP89103, interface cable for EMT/EMH). Connect the multi drop cable to COM Port 2 on the main board of the Micro GC.

Connect the outlet of the first valve to sample inlet 1 on the Micro GC, and plumb the outlet of the second valve to a separate sample inlet (Figure 6). When setting up EZChrom or OpenLAB, the total number of streams is equal to the number of streams for one valve.

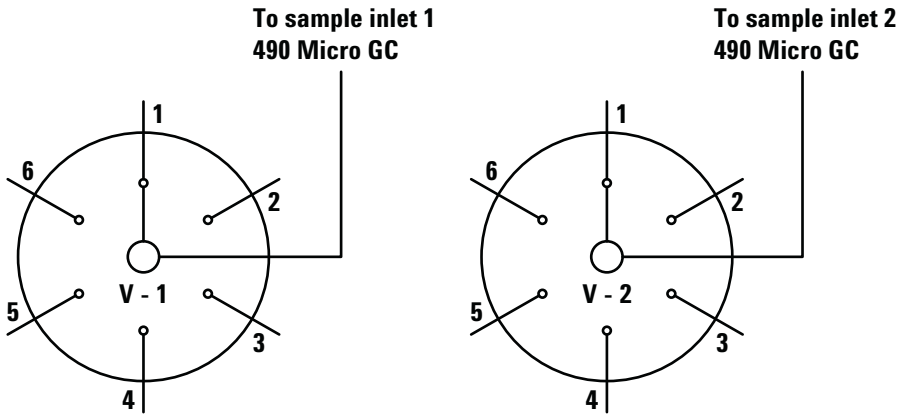


Figure 6 Two valves connected to two different sample inlets

EZChrom 3.3.x Configuration

To communicate with the valves, use the **Auto sampling** feature on the **Automation** tab in the instrument configuration window:

1 Set the **Auto sampling** value to **VICI Com2** (Figure 7).

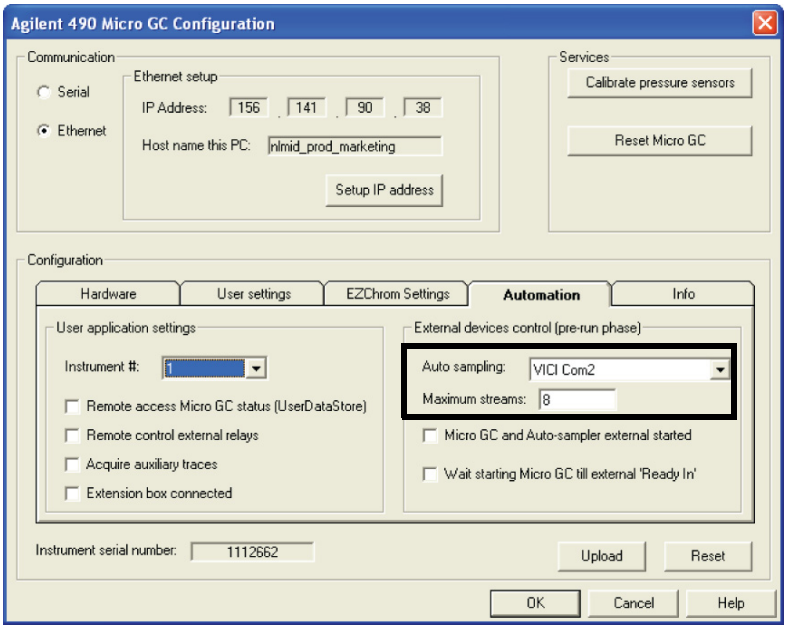


Figure 7 Selecting **VICI Com2** in the **Autosampling** field

2 Set the **Maximum streams** to the number of streams in the setup. See:

- "Scenario 1: Single valve connected to the Micro GC" on page 4.
- "Scenario 2: Two valves cascaded and connected to a single sample inlet" on page 5.
- "Scenario 3: Two valves connected to two different sample inlets" on page 6.

3 In Instrument Setup, set the trigger type in the **Trigger Tab** to **External**. See Figure 8.

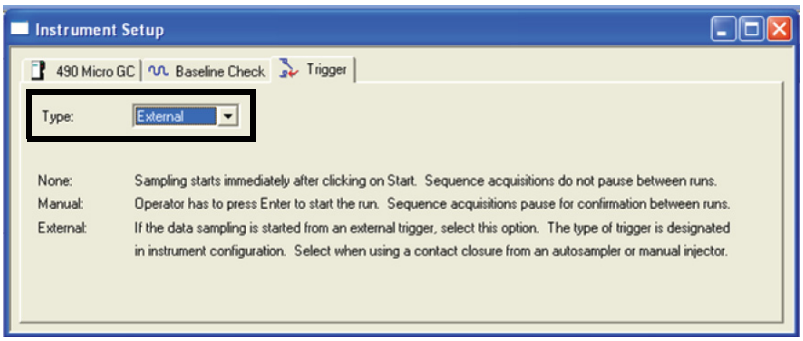


Figure 8 Selecting **External** as the trigger type

4 Depending on your valve configuration scenario, fill out the **Stream position** table in the method accordingly. Examples are shown in the following sections:

- "Scenario 1: Single valve connected to the Micro GC" on page 10.
- "Scenario 2: Two valves cascaded and connected to a single sample inlet" on page 11.
- "Scenario 3: Two valves connected to two different sample inlets" on page 12.

The communication format in the EZChrom 3.3.x driver for the SSV is **yGOxx<CR>**.

Y	valve ID; no value if SSV ID=none, 0 for ID=0, 1 for ID=1
GO	command to go to certain stream xx
xx	stream number; 01 for stream 1
<CR>	carriage return; command to end instruction to valve

See Figure 9. The fields in the stream name column are text fields and can be added to match the customer's sample names. If desired, select **Transmit after injection** to switch to a stream of choice after an injection on the Micro GC is performed to start flushing that stream to the Micro GC inlet.

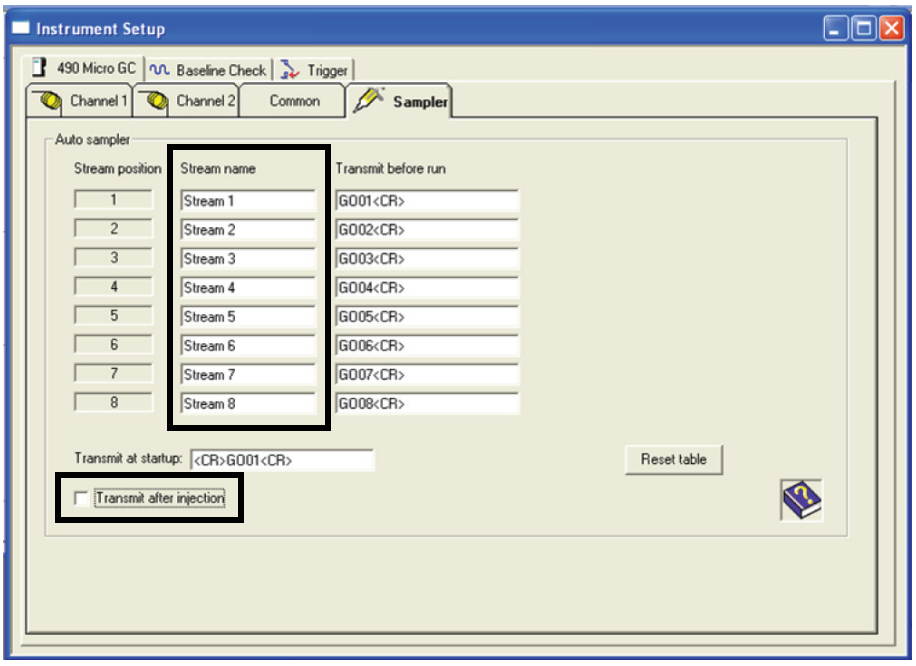


Figure 9 Autosampler stream name definitions

Use the autosampler **Vial** number in the **Single Run Acquisition** or **Sequence Run** screen to select the appropriate sample stream (Figure 10). Use the **Injection volume** field to define the flush time (in seconds). This time starts after the stream has been set at the beginning of the run.

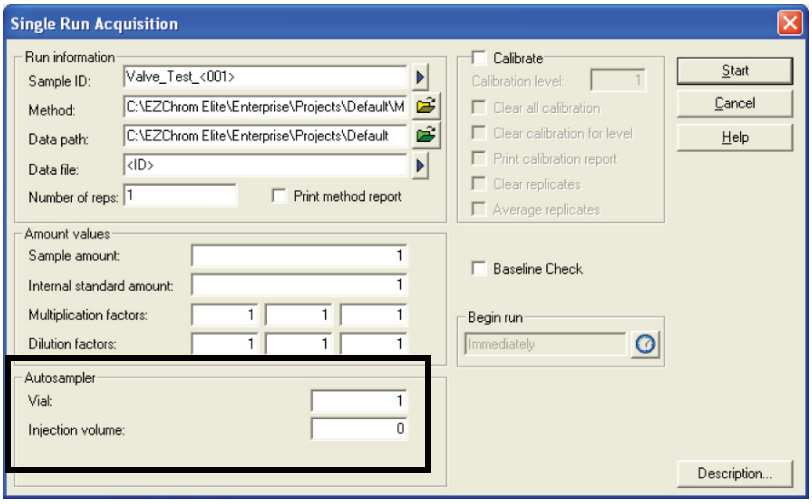


Figure 10 Selecting the appropriate sample stream

The status of the method-defined stream number is displayed in a separate screen in EZChrom (Figure 11).

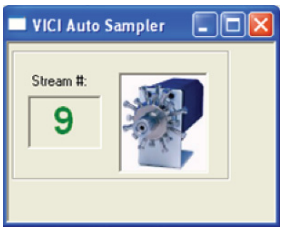


Figure 11 EZChrom stream number status UI

Scenario 1: Single valve connected to the Micro GC

In this example, an 8-port SSV is used and coupled as described in "Scenario 1: Single valve connected to the Micro GC" on page 4. The total number of streams (**Maximum streams**) is set to 8 in the instrument configuration.

The stream table, part of the instrument method, is filled out as shown in Figure 12. Each stream on the valve is linked to a position number of the valve using command **GOxx<CR>** where **xx** is the stream number; for example 01 for stream 1.

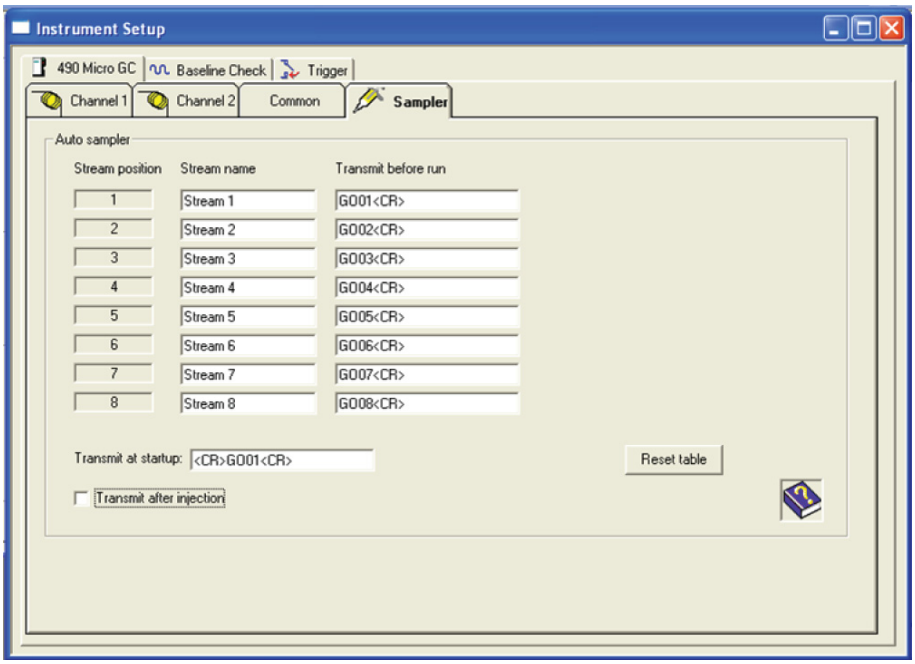


Figure 12 Stream table for single valve connected to a Micro GC

Scenario 2: Two valves cascaded and connected to a single sample inlet

For an example of this setup, two 6-port SSVs were used and coupled as described in "Scenario 2: Two valves cascaded and connected to a single sample inlet" on page 5. The total number of streams (**Maximum streams**) is set to 11 in the instrument configuration.

Note the commands listed in **Transmit before run** in Figure 13.

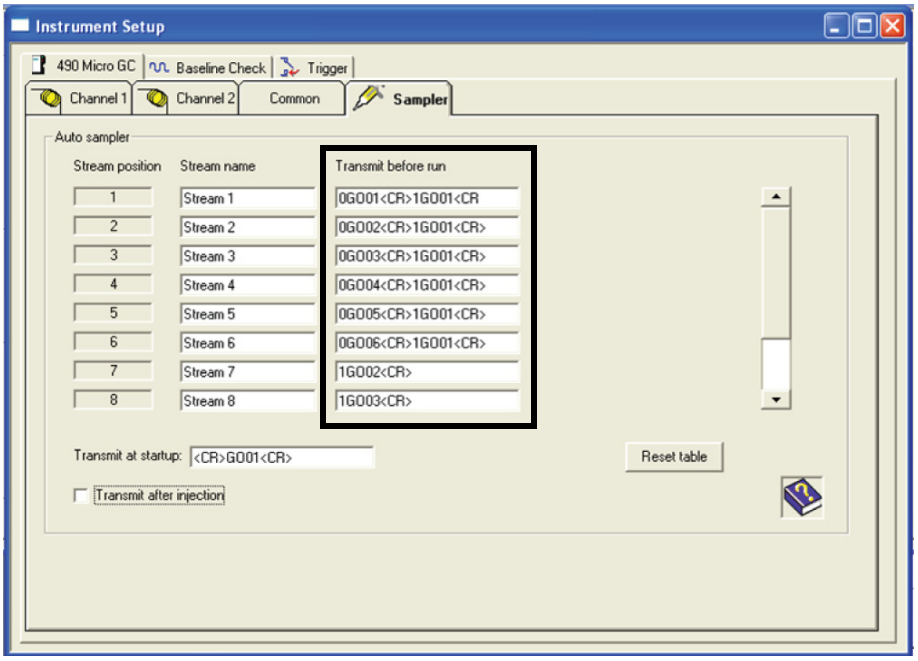


Figure 13 Stream table for two valves cascaded and connected to a single sample inlet

If stream 1 to 6 is chosen with a single run or during a sequence, the corresponding position 1 to 6 from valve 1 is activated. At the same time, valve 2 is set to position 1 to complete the flow path to the sample inlet of the Micro GC. If using stream 7 to 11, the associated position (2 to 6) on valve 2 is set. For streams 7 to 11, it is not important which stream is selected on valve 1.

Scenario 3: Two valves connected to two different sample inlets

For an example of this setup, two 8-port SSVs were used and plumbed to two separate sample inlets on the Micro GC, as described in "Scenario 3: Two valves connected to two different sample inlets" on page 6. Set the total number of streams (**Maximum streams**) to 8 in the instrument configuration. The valve table in the instrument method should be configured as shown in Figure 14.

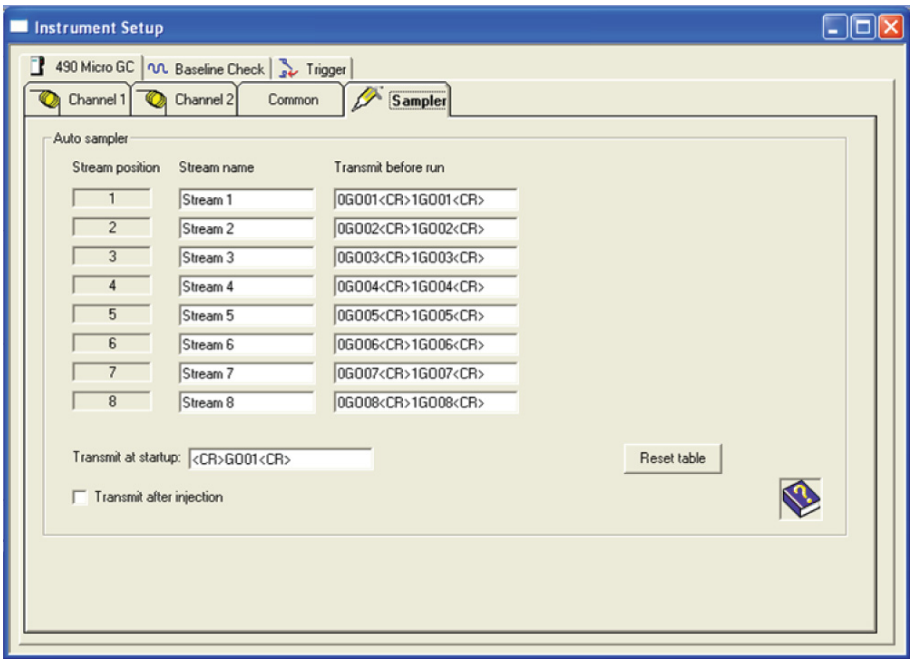


Figure 14 Stream table for two valves connected to two different sample inlets

To inject from stream 1 to 8 during a single run or sequence, enter that stream position number for both valve 1 and valve 2 in the **Transmit before run** field. The two (different) samples connected to each valve are sent to different sample inlets.

OpenLAB CDS Configuration

Note that while this section shows screens for OpenLAB EZChrom Edition, the screens for OpenLAB ChemStation Edition have identical settings and functionality.

To communicate with the valves:

1 Set the **Autosampling** drop-down list on the **Automation** tab in the instrument configuration to **VICI Com2**. When a single valve is connected, the maximum stream number is read from the valve by clicking **Check VICI communication**. When two or three valves are connected, manually set the **VICI Max streams** to the number of streams according to the setup, explained in the sections:

- "Scenario 1: Single valve connected to the Micro GC" on page 10.
- "Scenario 2: Two valves cascaded and connected to a single sample inlet" on page 11.
- "Scenario 3: Two valves connected to two different sample inlets" on page 12.

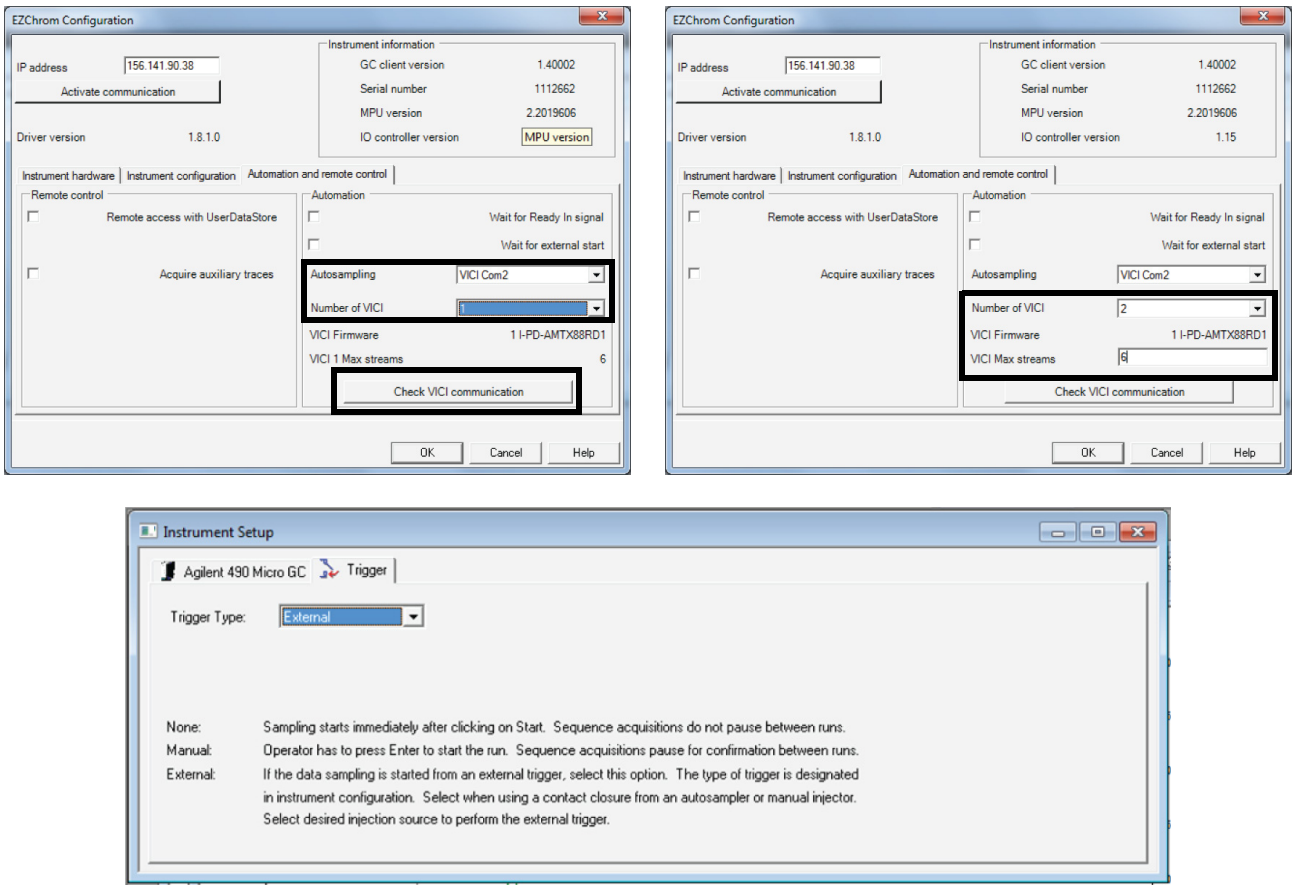


Figure 15 Configuration settings in OpenLAB CDS, EZChrom Edition. ChemStation Edition screens are similar.

2 For OpenLAB EZChrom, select **External** as the **Trigger Type** in the **Trigger** tab of the instrument setup to inject from the SSV. For OpenLAB ChemStation, the external trigger is automatically handled by the driver.

3 Fill out the **Stream position** table in the method according to the valve scenario. Some examples are shown in the following sections:

- "Scenario 1: Single valve connected to the Micro GC" on page 17.
- "Scenario 2: Three valves cascaded and connected to a single sample inlet" on page 18.
- "Scenario 3: Two valves connected to two different sample inlets" on page 19.

The communication format in OpenLAB driver for the stream selector valves is **GOxx**.

GO	command to go to stream xx
xx	stream number; 01 for stream 1

Each stream selector valve is displayed in a separate column. See Figure 16. For example, a valve with **ID=1** displays in the first column, a valve with **ID=2** displays in the second column, and so forth. The fields in the stream name column are text fields and can be added to match customer's sample names. Enter a command in **Transmit after injection** to switch the valve after the injection on the Micro GC to a stream of choice to start flushing that stream to the Micro GC.

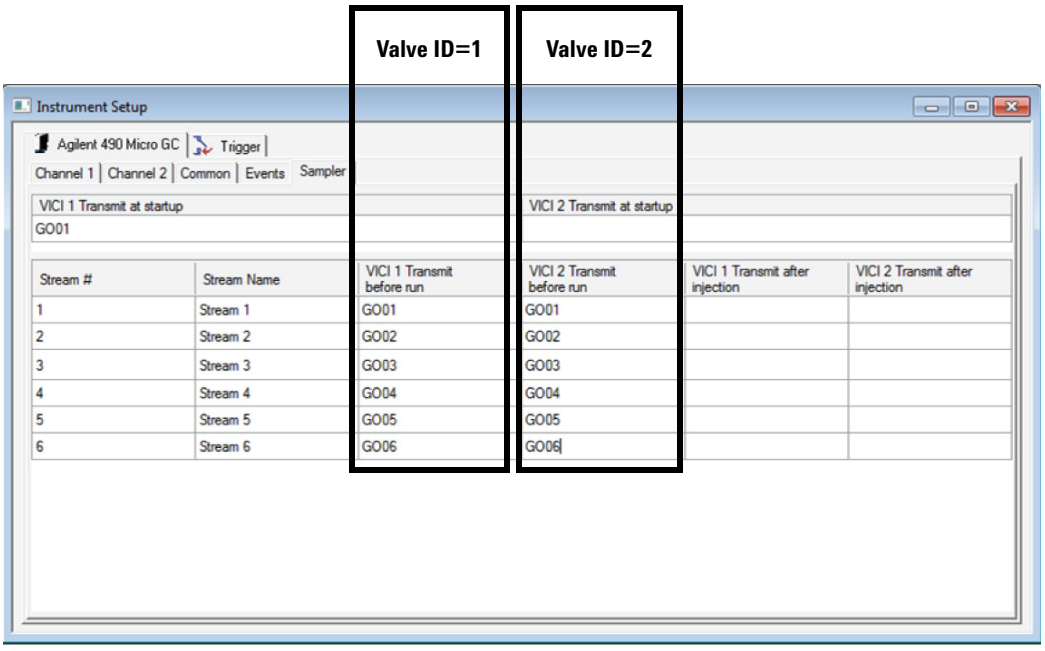


Figure 16 OpenLAB CDS instrument setup

Use the **Autosampler vial** number in the **Single Run** or **Sequence Run** screen to select the appropriate sample stream. Use the **Injection volume** field to define the flush time (in seconds). This time starts after the stream is set at the beginning of the run.

Figure 17 and Figure 18 show examples.

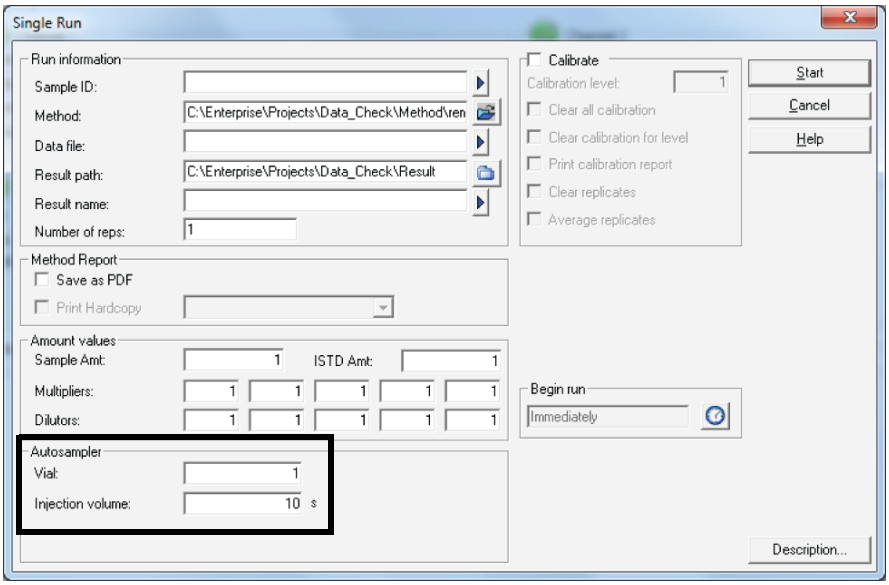
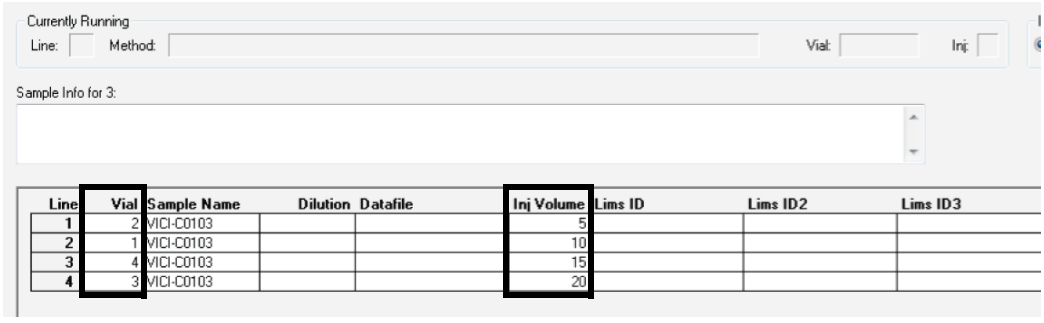


Figure 17 OpenLAB EZChrom single run autosampler settings for a 10-second flush cycle from stream 1

Figure 18 shows an OpenLAB ChemStation Edition sequence that injects from four streams (2, 1, 4, then 3) with different flush times for each run. The sampling time and injection time are handled via the CDS method for the Micro GC.



Line	Vial	Sample Name	Dilution	Datafile	Inj Volume	Lims ID	Lims ID2	Lims ID3
1	2	VICI-C0103			5			
2	1	VICI-C0103			10			
3	4	VICI-C0103			15			
4	3	VICI-C0103			20			

Figure 18 OpenLAB ChemStation Edition sequence settings

The position of each stream selector valve is displayed in the instrument status overview (Figure 19).

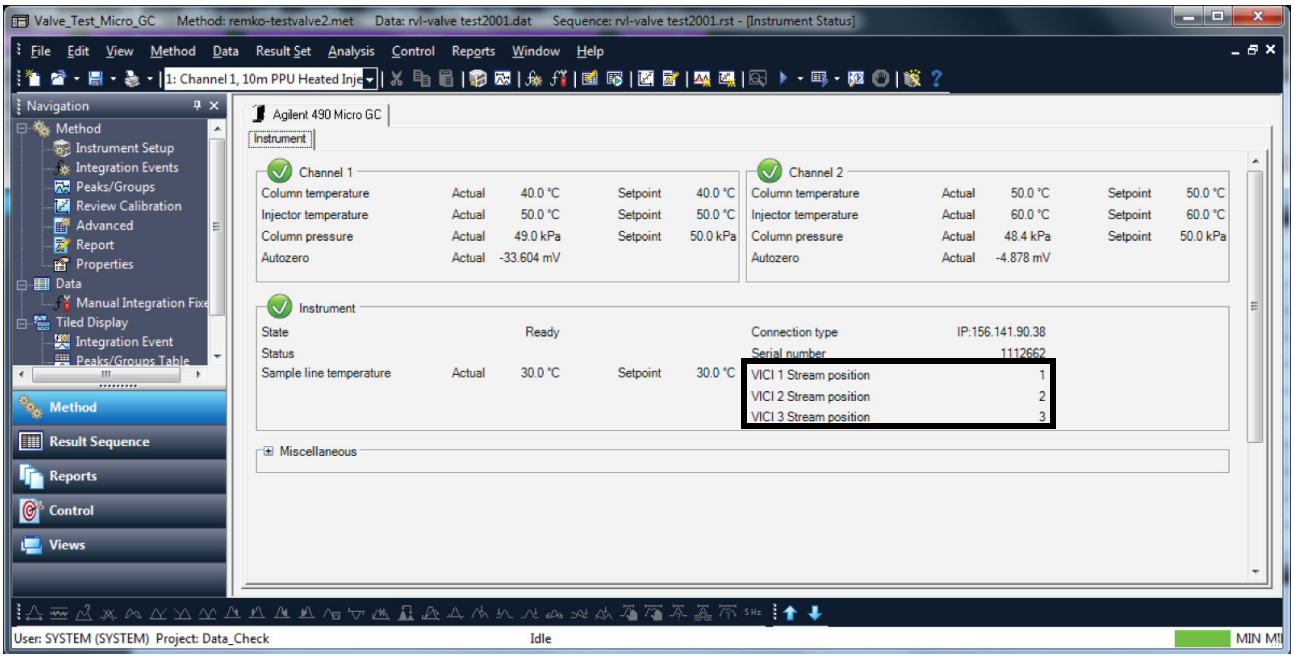


Figure 19 OpenLAB ChemStation Edition method settings

Scenario 1: Single valve connected to the Micro GC

In this example, a 6-port SSV was used and coupled as described in "Scenario 1: Single valve connected to the Micro GC" on page 4.

The total number of streams (**Maximum streams**) is automatically set to 6 in the instrument configuration.

The stream table, part of the instrument method, is filled out as shown in Figure 20 below. Each stream on the valve is linked to a position number of the valve using the **GOxx** command, where **xx** is the stream number; 01 for stream 1 (Figure 20).

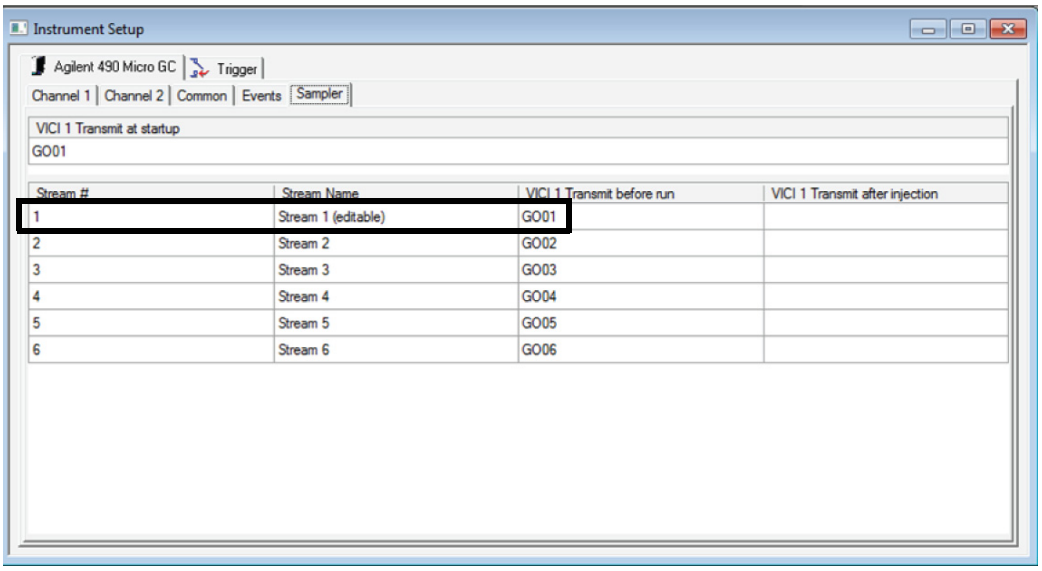


Figure 20 Sampler settings for a single valve connected to the Micro GC

Scenario 2: Three valves cascaded and connected to a single sample inlet

For an example of this setup, three 6-port SSVs were used and coupled as described in "Scenario 2: Two valves cascaded and connected to a single sample inlet" on page 5. Set **Maximum streams** to 6 + (6 - 1) + (6 - 1) = 16.

Figure 21 shows the commands needed to inject from each stream.

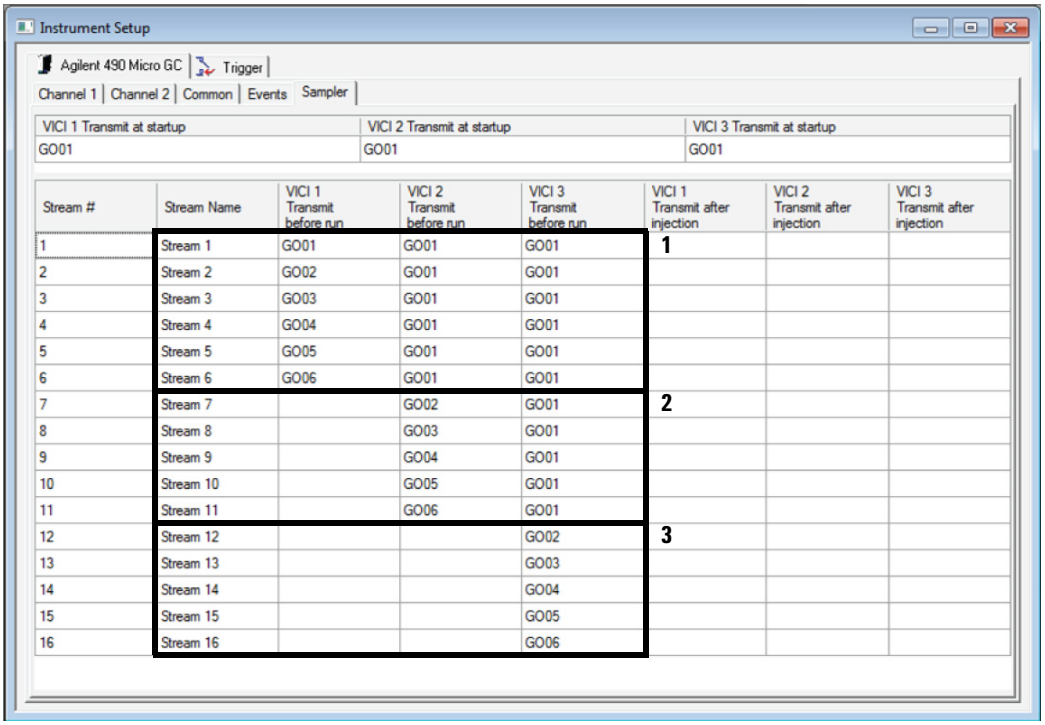


Figure 21 Sampler setup for three valves cascaded and connected to a single sample inlet

If stream 1 to 6 is selected with a single run or during a sequence, activate the corresponding position 1 to 6 from valve 1. At the same time, set valve 2 and valve 3 to position 1 to complete the flow path to the sample inlet. For streams 7 to 11, activate position 2 to 6 on valve 2 and set valve 3 to position 1 to complete the flow path to the sample inlet. For streams 12 to 16, activate the associated position 2 to 6 on valve 3. For streams 12 to 16, it is not important which streams are selected on valve 1 and valve 2.

Scenario 3: Two valves connected to two different sample inlets

For an example of this setup, two 6-port SSVs were used and coupled as described in "Scenario 3: Two valves connected to two different sample inlets" on page 6. (Figure 22). The total number of streams (**Maximum streams**) is set to 6 in the instrument configuration.

Figure 22 shows the commands needed to inject from each stream.

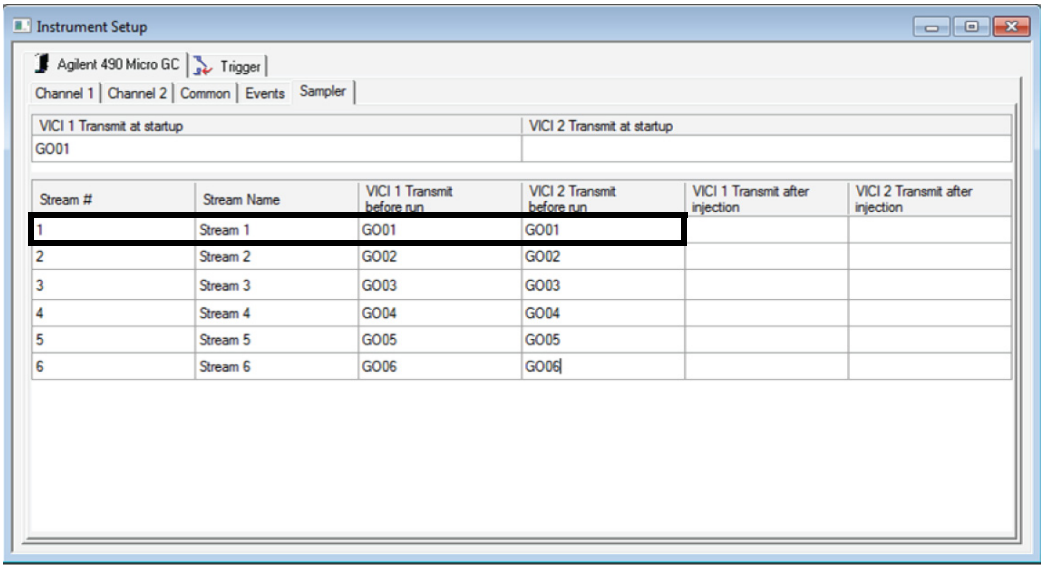


Figure 22 Sampler setup for two valves connected to two different sample inlets

If stream 1 is selected during a single run or sequence, set both valves to position 1. The 2 (different) samples connected to these valves are sent to different sample inlets.

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