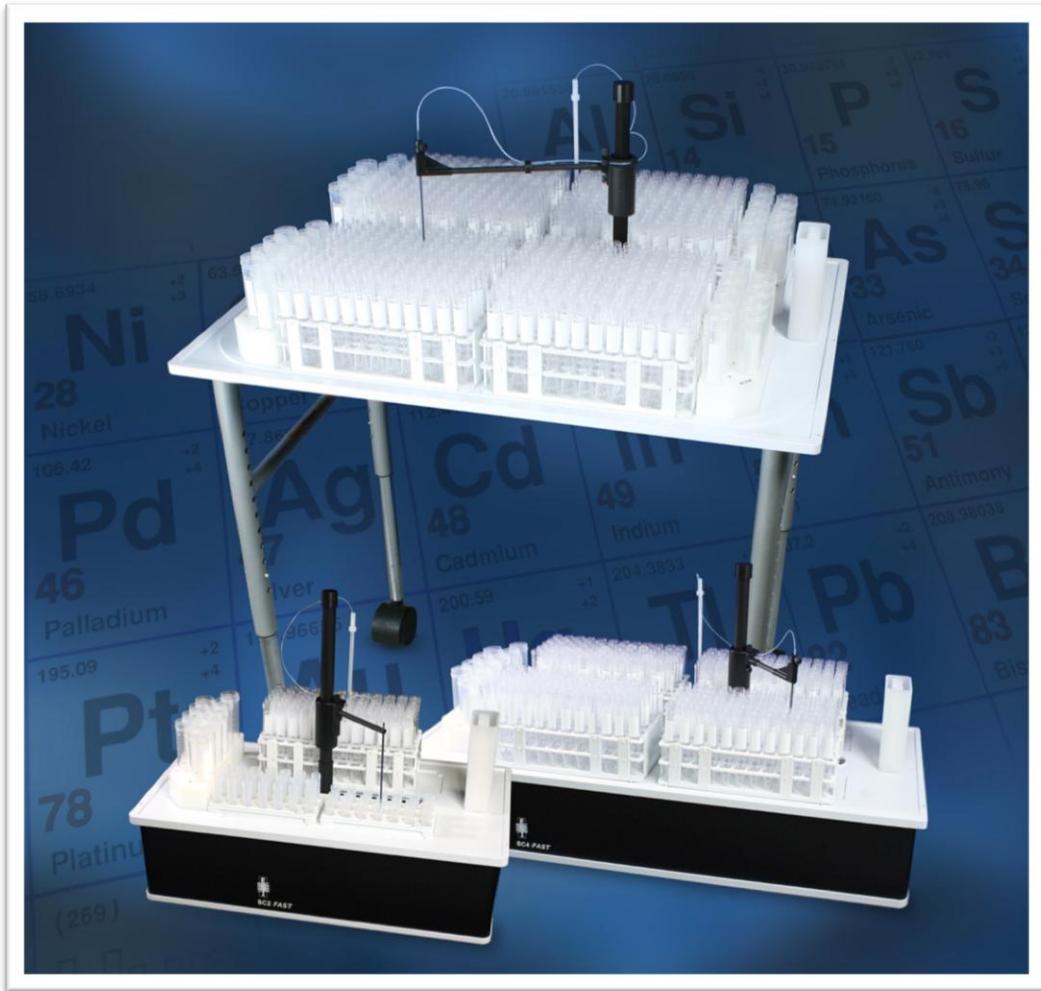


ELEMENTAL SCIENTIFIC



ESI SC

Installation and Software Guide

ESI SC

Version 2.8

Installation and Software Guide

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Introduction

The SC-Series of autosamplers are clean, high-speed sample changers capable of holding a wide variety of sample racks and vials in a flexible layout for ICP-AES and ICP-MS systems. The sample changers range from the SC-2, which can accommodate up to two industry standard autosampler racks or 4 micro racks on the same platform, to the SC-14, capable of holding up to 14 standard autosampler racks. A Windows compatible program allows different operators to save and recall their personal settings, including variable x-y-z motion controls that allow for both high speed analyses and slow probe retraction with viscous samples.

The modular sample platform accommodates different rack sizes and patterns while providing the flexibility to run samples of various volumes within a single run to maximize throughput. A “manual” sampling position for non-traditional containers and urgent samples is included, as well as standards locations. The linear and polar motion of the sampling arm allows for simultaneous movement in the X-Y coordinates providing rapid sample changeover of approximately 3 seconds. The auto-zero-location feature before each rinse ensures no missed vials, and the encoder option ensures the location of the sample arm is always known, even when accidentally obstructed.

Blank contamination at the rinse station is minimized through the use of a gravity-fed or pressurized rinsing system, utilizing two metal-free valves to control the dual flowing rinse solutions. The first rinse station may contain a solution which rapidly removes the previous sample from adhering to the sample introduction system, e.g. a strong acid or surfactant solution. The second rinse station normally could contain a clean solution to reduce the instrument blank.

The SC-Series of autosampler may also be configured to utilize an external peristaltic pump or internal diaphragm pump to deliver the rinse solution to one or both rinse stations.

The use of a rigid carbon fiber supported Teflon™ encapsulated sample probe allows for the elimination of a probe guide, removing a major source of cross-contamination from sample to sample.

Productivity is increased primarily by the innovative rack layout, probe design, and intelligent operating system. The motor assemblies are mounted underneath the sample tray to prevent contamination of the samples while ensuring quick and accurate sampling. The onboard microprocessor and other electrical components are sealed to prevent corrosion from acid vapors and spills.

An all-fluoropolymer flow path construction ensures both acid and solvent resistance. An optional enclosure is available to reduce contamination from external sources.

Description

The ESI SC system can be integrated with most common instruments through the use of the SC emulation. The emulation will allow the user the ability to employ use of the FAST system to increase throughput, or to simply use the SC as a “clean” autosampler.

Requirements

Operating Systems: Windows XP (SP2), Windows Vista, Windows7

Computer Disk Space: 50MB

Computer Memory: 512MB minimum depending on OS and host instrument software.

Serial Ports: One additional serial port (USB or DB9), required for most applications. Two ports are required if a GPIB interface is required (e.g. PE Elan).

Space Requirements:

SC-μDX:	33cm x 22cm x 39cm (LxWxH).
SC-2DX:	54cm x 28cm x 46cm (LxWxH).
SC-4DX:	76cm x 28cm x 46cm (LxWxH).
SC-E2DX:	79cm x 54cm x 49cm (LxWxH) approximately.
SC-E4DX:	79cm x 79cm x 49cm (LxWxH) approximately.
SC-8DX:	80cm x 55cm x 122cm (LxWxH). 80cm x 55cm x 137cm (LxWxH) with enclosure and legs extended.
SC-14DX:	114cm x 57cm x 122cm (LxWxH). 114cm x 57cm x 137cm (LxWxH) with enclosure and legs extended.

Power Cord Set Requirements: The power cord supplied with the SC-Autosampler meets the requirements of the country where you purchased the system. Always use approved power cords to prevent injury or electric shock.

Rinse Requirements: Gravity fed supply requires a shelf capable of holding 2 x 2 L containers (4Kg when full) located approx. 15cm above the sample changer. Pressurized supply requires a supply of an inert gas (N₂ or Ar) at 2 – 4psi.

Required Tools: The following tools will be required to install the SC-E2 autosampler.

- 2mm hex driver
- 4mm hex driver
- 5mm hex driver
- Cross head / Phillips screwdriver

Supported Configurations: Your ICP should be in proper working order before installing the SC-Autosampler. See the section; [Hardware Installation](#) for a complete listing.

How It Works

The ESI SC system works actively to control the SC hardware and respond to the host instrument. Refer to illustrations Figure 1, Figure 2, and Figure 3 that identify the ESI SC software as the mediator between the Instrument Control Software, (host) and the SC hardware. The SC hardware may include the FAST controller. Please refer to section [Hardware Installation](#) for a description of the supported instrument and autosampler configurations.

Additionally, the SC system may provide the user with some additional flexibility depending on the host software and autosampler used. These additional features may include:

- The ability to mix rack types where previously the host & autosampler configuration was limited to a fixed layout of rack types. For instance, a limited selection of tray files may have required that all racks be of the same type; all 21-position racks or all 60-position racks.
- Custom Racks.
- I/O control through the use of the FAST method features.

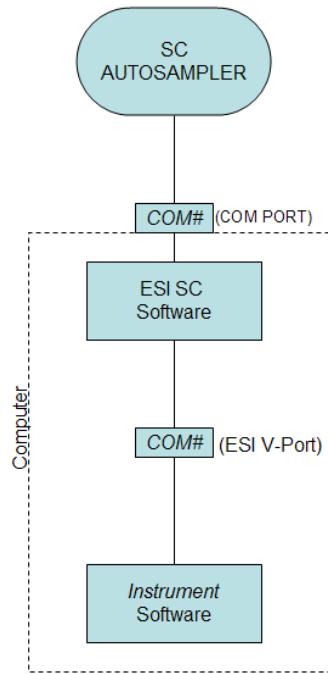


Figure 1: Basic Control Diagram, Type A.

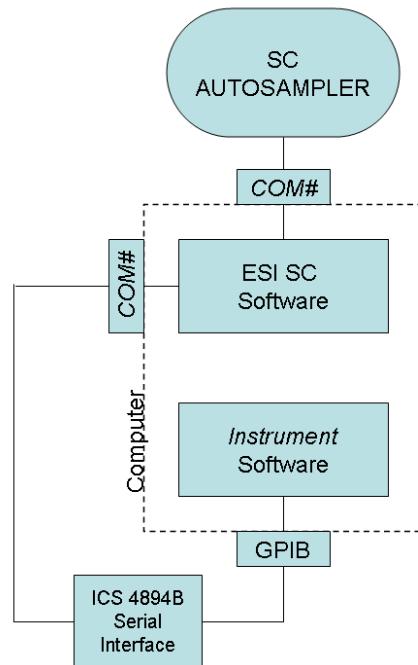


Figure 2: Control Diagram, Type B.

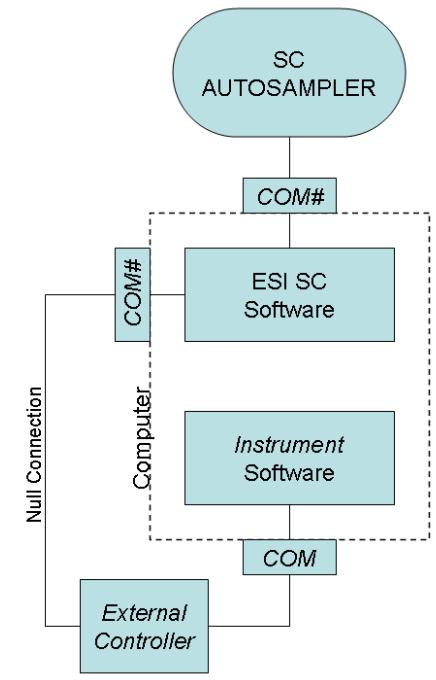


Figure 3: Control Diagram, Type C.

Getting Started

Software Installation

Install the ESI SC software using the CD provided with the system. This should be done while logged in with Administrator Privileges. The Installer will automatically start and provide instructions during the installation. If the Installer does not begin automatically, open Windows Explorer, navigate to the CD and double-click on the file Setup.exe to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.

Communication & Software Configuration

Please locate the required hardware installation steps as required by your system. Please note that your host software, which controls the instrument, may have more than one type of connection option.

Agilent ChemStation and SC Autosampler

Software Installation:

- 1) Log on to the Agilent's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Determine the type of connection to be used. If the ISIS component is present, the second connection option will be required. See Figure 5.

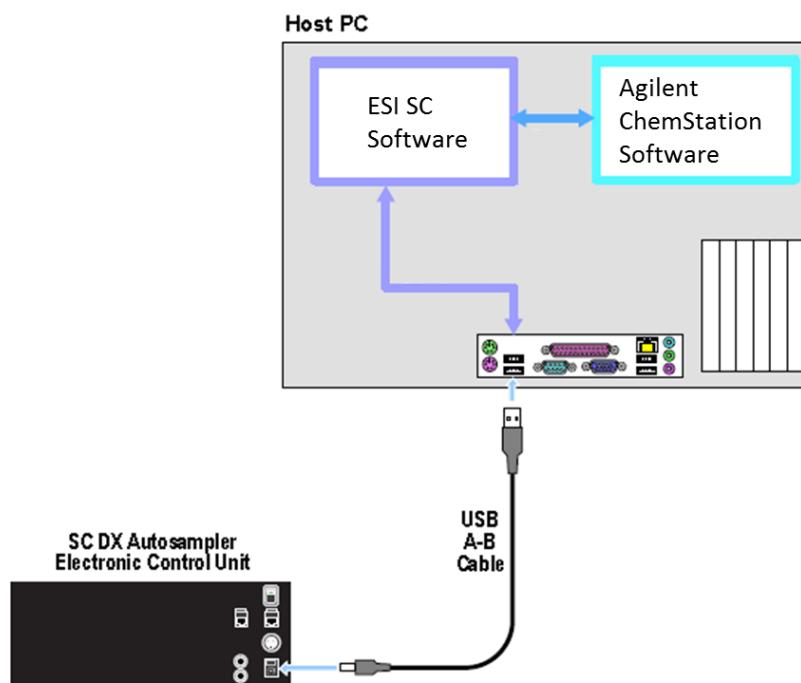


Figure 4: Connection option for ChemStation & ESI SC with SC autosampler

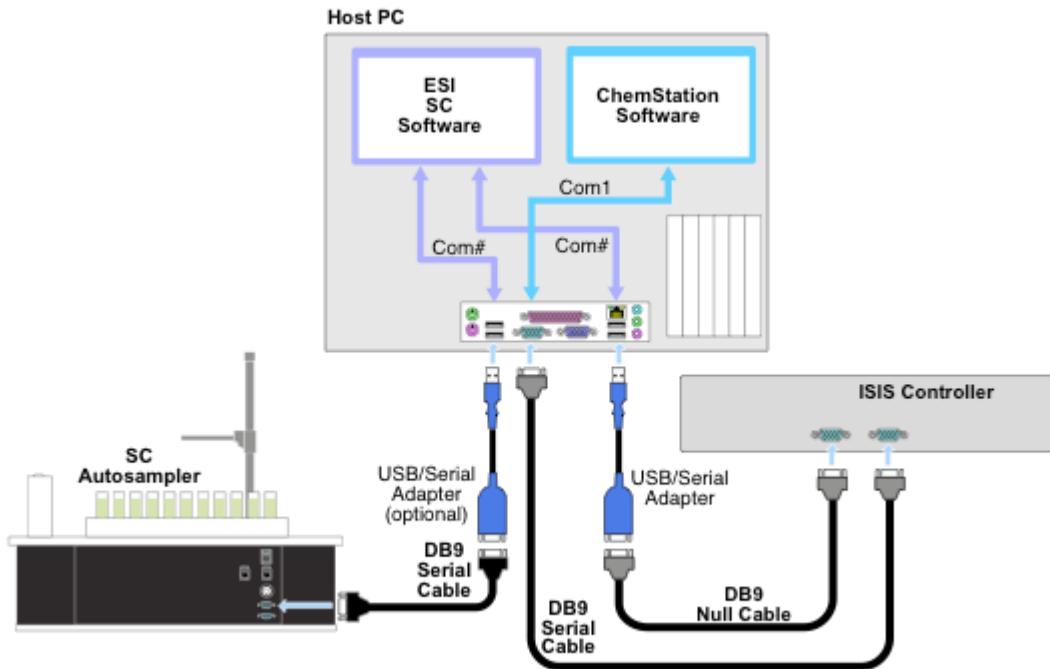


Figure 5: Connection option for ChemStation w/ISIS & ESI SC with SC autosampler.

Type A: The first diagram Figure 4, shows a system that does not include the ISIS. One USB port is used along with a virtual port created in the ESI SC software.

Type C: The second diagram Figure 5, shows a system that includes the ISIS controller. One RS-232 port is used by the ESI SC software to redirect the communication back to the host computer and control the SC Autosampler.

3) Next, using **Start>>Control Panel>>System>>Hardware>>Device Manager>>Ports.**

Type A: Locate the COM port this is currently used to control the autosampler, typically this is COM1, and rename to COM9.



To rename a COM port number, right-click on the device then **Properties>>Port Settings>>Advanced**.

Type C: Select the COM ports that will be used to communicate between the ISIS, ESI SC software and the SC Autosampler. In the example diagram in step 2, COM8 and COM9 are used. Verify that the settings are 9600 baud, 8 bits, parity none, 1 stop bit, and no flow control. Note that the COM port used to connect the ISIS to the computer should not be modified and that at least three physical RS-232 ports should be visible in the Device Manager.

4) Connect auxiliary cables.

Type A: n/a

"Type C": Connect COM1 on the ISIS to an available RS-232 port on the computer using a Null adapter and RS-232 cable.



If a DB-9 port is not available on the computer, a USB-Serial Adapter (SC-0905) may be used. It is recommended that the same type of adapters be used throughout the system to minimize driver conflicts. The Hardware Wizard will automatically install the required drivers but they may also be found in the "\Program Files\ESI\ESI SC\SupportFiles" directory.

- 5) Connect 24 VDC power to the SC Autosampler. Connect the RS-232 cable from the physical COM port on the computer to the SC Autosampler control module at COM1.
- 6) Turn on the SC Autosampler.

Autosampler Configuration:

- 7) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the ChemStation software must not be running.
- 8) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation. Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Agilent HP 4500/7500**.
- 9) Configuration File: Click the **Save File** button.
- 10) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.

"Type A": Verify that **Instrument Communication** is set to "RS-232-Virtual". Define the *Instrument COM Port* as **COM1**.

"Type C": Verify that **Instrument Communication** is set to "RS-232-Physical". The *Instrument COM Port* should typically be set to something other than COM1 or COM9 and this device number must be visible in the top window section, "Physical COM Ports". This connection is connected to the ISIS via the Null adapter.

Next, click **SAVE>>OK>>OK**.

- 11) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 12) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 13) On the main ESI SC window, verify the rack and rinse parameters.

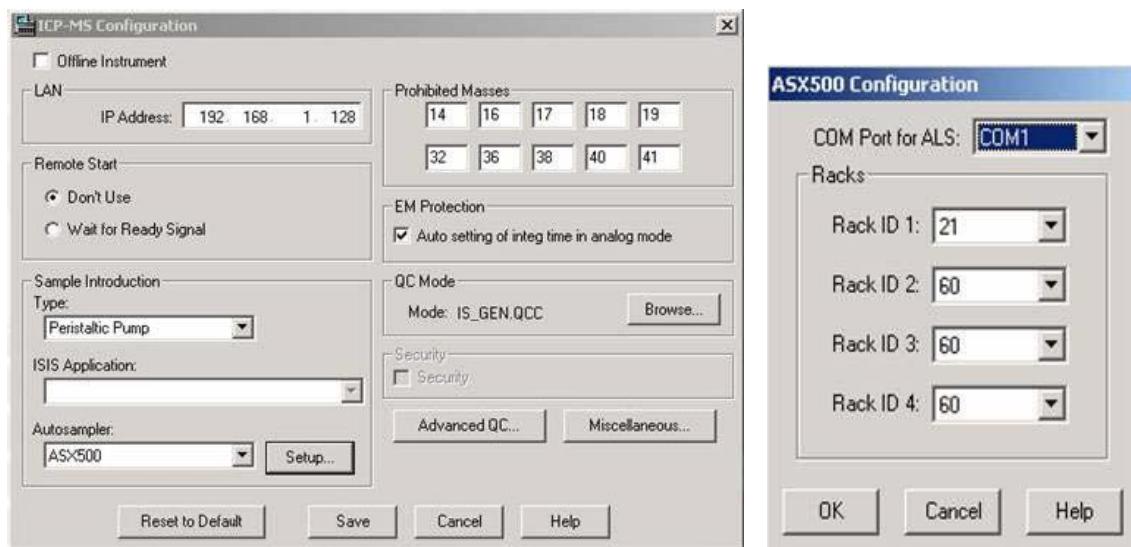
- a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
- b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
- c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

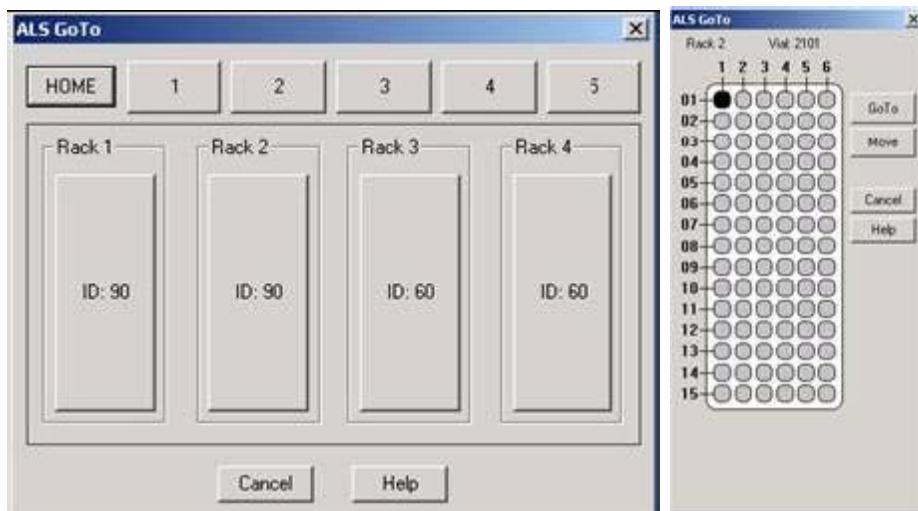
- 14) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 15) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 16) Exit the Calibration window.

Host Software Configuration:

- 17) Configure ChemStation by using the configuration program ICPCFG.exe. Select the ASX-500 as the autosampler, and then specify the rack layout by selecting **Setup**.



- 18) Verify control of the SC autosampler by using the **ALS GoTo** menu.



Agilent MP Expert and SC Autosampler

Software Installation:

- 1) Log on to the MP Expert's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation.
- 2) Connect 24 V DC power to the SC Autosampler. Connect the USB cable between the computer and the SC Autosampler control unit. Turn on the SC Autosampler. See Figure 10.

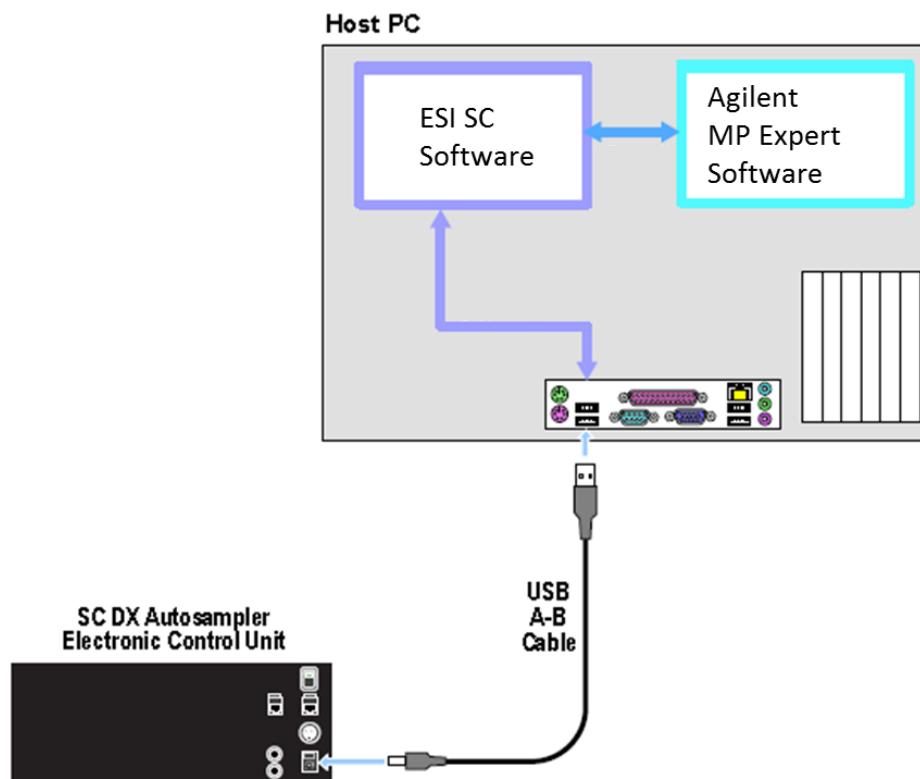


Figure 6: Connections for SC with MP Expert.

Autosampler Configuration:

- 3) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 4) At the instance of the first run of the ESI SC, the program will automatically determine the correct communications setup. These will be displayed in the status bars at the bottom of the ESI SC main window.



To manually configure, in ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "Virtual COM Port". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. The determined ports can now be saved. Please note that the SC Autosampler must be powered on. The MP Expert software must not be running.

- 5) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 6) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 7) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings:** **Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 8) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 9) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**.
- 10) Exit the Calibration window.

Host Software Configuration:



During installation of ESI SC there are .xml files installed to the default MP Expert directory. If an alternate installation directory is used the ESI files must be copied to the \Agilent\MP Expert\ directory from: C:\Program Files\ESI\ESI SC\SupportFiles\MPExpertSupportFiles\

- 11) **MP Expert Software:** Open the MP Expert software and set the Autosampler by clicking **File>>Options** and selecting the **General** tab. Next, select the appropriate ESI autosampler you are using.

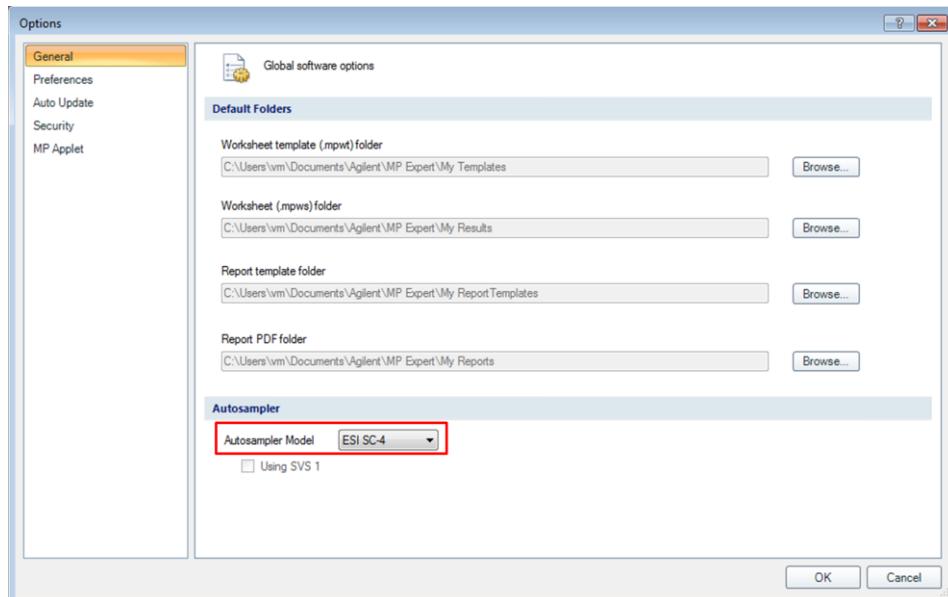


Figure 7: Selecting the ESI SC model to be used.

- 12) To select your racks open your **Worksheet**, and select the **Autosampler** tab. Right-click the rack to be changed and select **Rack Type** then select the rack you are using, this should match your selection in ESI SC.

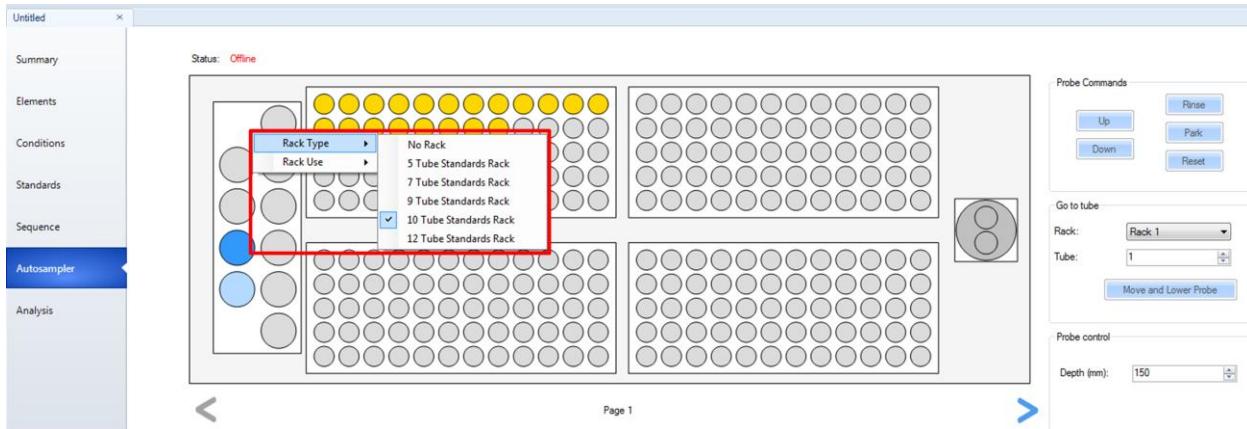


Figure 8: Changing rack configuration in MP Expert.

After any reconfiguration of the rack types in the ESI SC software, changing the racks in the MP Expert software will also be required.

13) MP Expert Software: Verify movement control by first clicking the position and then clicking ‘Move and Lower Probe’

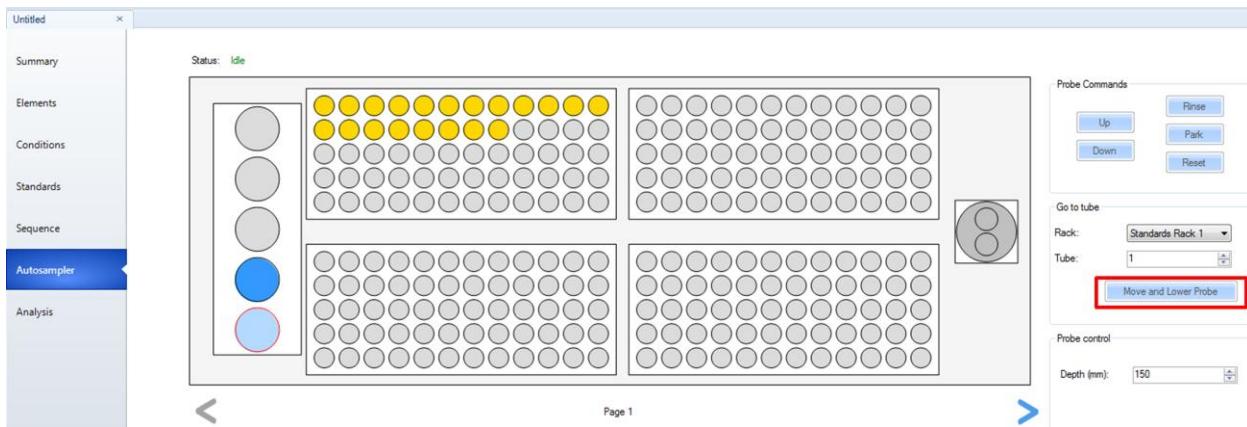


Figure 9: Manual movement from MP Expert.

Agilent MassHunter and SC Autosampler

Software Installation:

- 1) Log on to the MassHunter's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect 24 V DC power to the SC Autosampler. Connect the USB cable between the computer and the SC Autosampler control module. Turn on the SC Autosampler. See Figure 10.

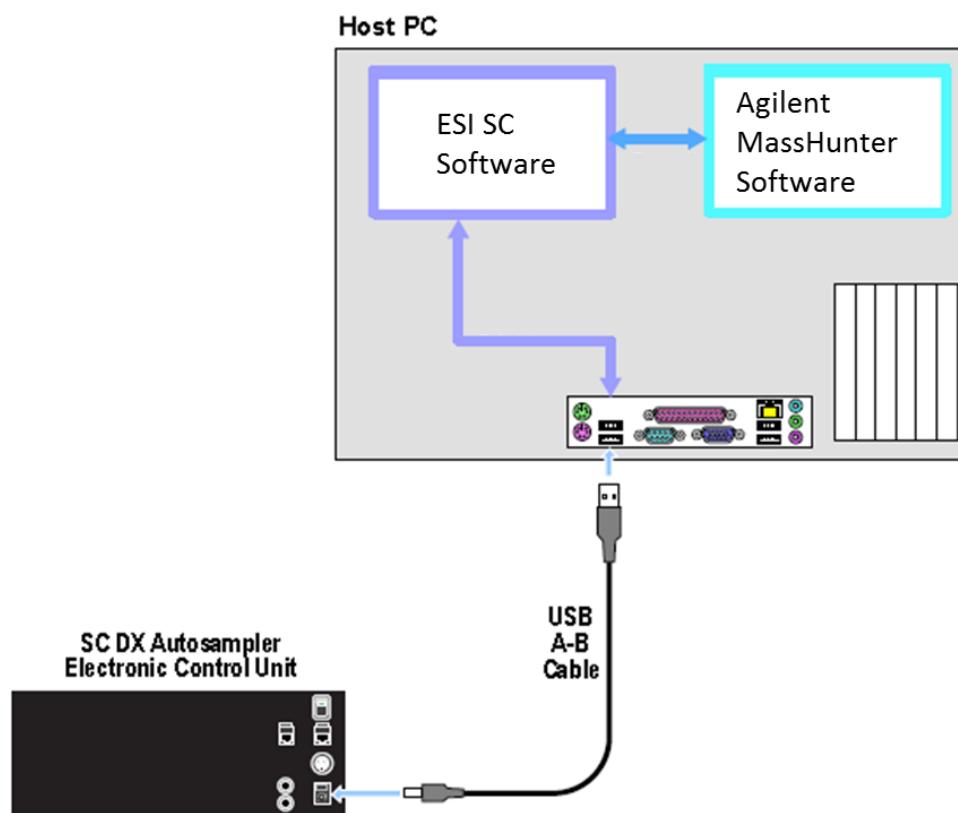


Figure 10: Connections for SC with MassHunter.

Autosampler Configuration:

- 3) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 4) At the instance of the first run of the ESI SC, the program will automatically determine the correct communications setup. These will be displayed in the status bars at the bottom of the ESI SC main window.



To manually configure, in ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "Virtual COM Port". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. The determined ports can now be saved. Please note that the SC Autosampler must be powered on. The MassHunter software must not be running.

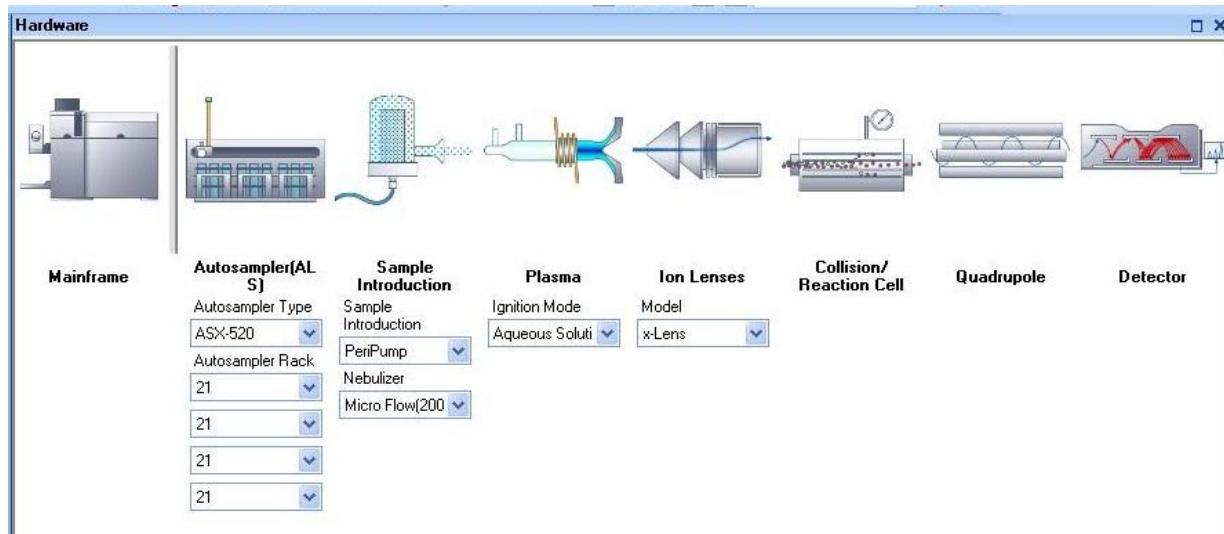
- 5) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 6) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 7) On the main ESI SC window, verify the rack and rinse parameters.
 - d. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - e. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - f. **Rinse Settings:** **Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 8) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 9) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 10) Exit the Calibration window.

Host Software Configuration:

- 11) **MassHunter Software:** Open the MassHunter software and configure Hardware by clicking **Mainframe>Communication...** and selecting “**Use ALS**”. Next, select the appropriate autosampler ‘**ASX-520**’.



- 12) Select your racks to match what was selected in the ESI SC software.
- 13) Select the COM port by clicking the **Autosampler (ALS)** and select ‘**Set Communication...**’ the value selected must match the “Instrument COM Port” selected in the ESI SC Software. COM1 is default but may require modification if used by existing devices on computer.



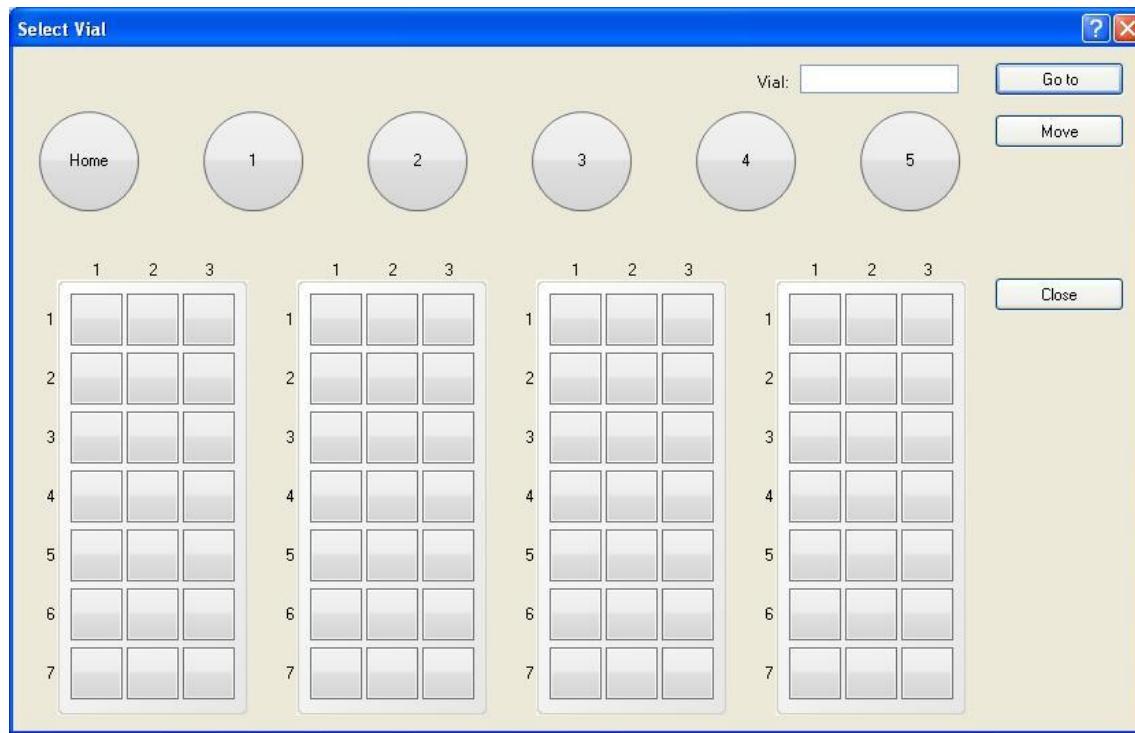
- 14) Finally, press the “**ALS Initialize**” button in the MassHunter software.



After any reconfiguration of the rack types in the ESI SC software, changing the racks in the MassHunter software will also be required.



- 15) **MassHunter Software:** Verify movement control by using the '**Select ALS Vial#**'. Motion should be observed when a vial position is selected and the "**Go to**" button is clicked.



>If connection problems are encountered during operation, run with the following modification to see if the problem is resolved.

Place MassHunter software in high priority: This can be done by using a batch file and creating a shortcut placed on the desktop to start MassHunter. The file C:\Program Files\ESI\ESI SC\Autostart\MassHunter autostart.bat, can should be edited (right-click>>edit) if the current path "C:\Program Files\Agilent\ICPMH\Bin\" is not correct. The path identified twice in the file, should reflect where the application "IcpInstControl.exe" is located.

Bruker Quantum and SC Autosampler

Software Installation:

- 1) Log on to the Bruker Quantum's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. See Figure 11. Connect 24 VDC power to the SC Autosampler.

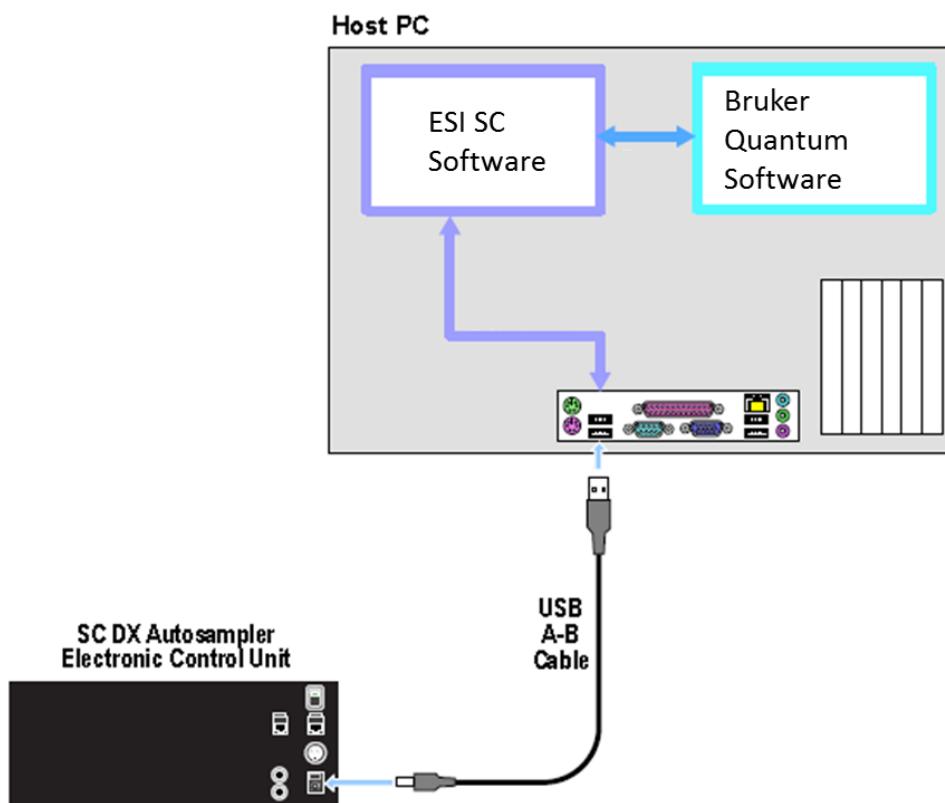


Figure 11: Connection options for Bruker Quantum and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

Autosampler Configuration:

- 4) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the Bruker Quantum software must not be running.
- 5) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Bruker Quantum**.
 - c. Autosampler Type: To enable the ASX-500 emulation, **Configure>>Autosampler** and change "Autosampler Type" as required.
- 6) Configuration File: Click the **Save File** button.
- 7) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the **SC COM Port** value.
Define the *Instrument COM Port* as **COM6**. This will match the COM port chosen in the ESI Autosampler window of the Bruker software.
Next, click **SAVE>>OK>>OK**.

- 8) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 9) Click the "**Initialize**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 10) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the

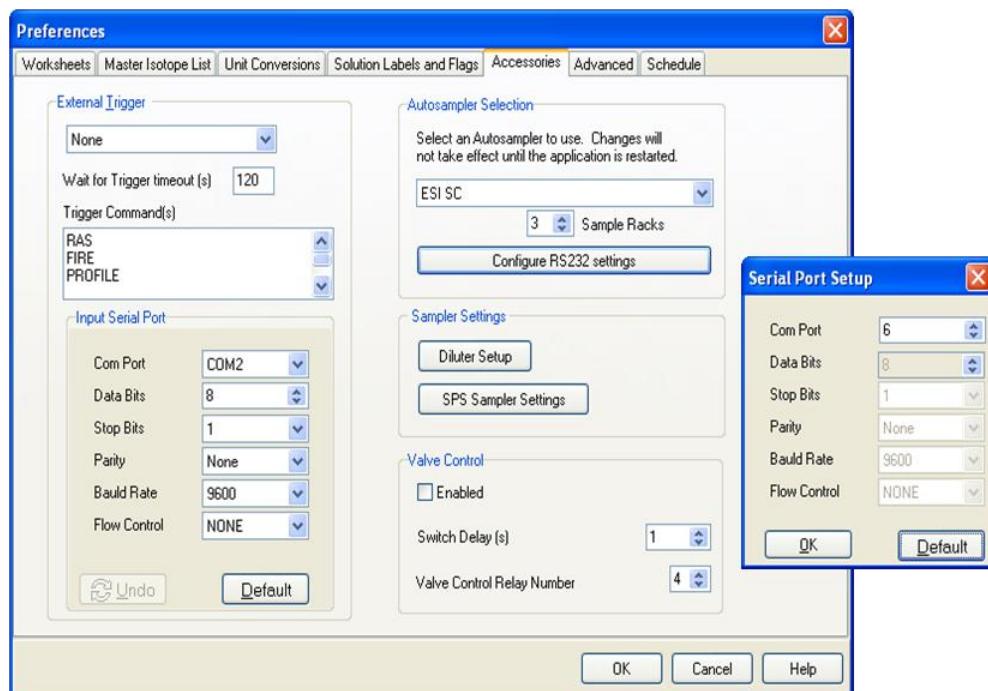
SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 11) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 12) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 13) Exit the Calibration window.

Host Software Configuration:

- 14) Configure Bruker Quantum to use ESI as the autosampler and configure the RS-232 settings to indicate that COM6 is chosen. This will be the same as the Instrument port in the ESI SC software defined in step 8).



- 15) Configure the Bruker for the number of racks used on your ESI autosampler. The specified sample racks should match the corresponding rack in the ESI SC software.
- 16) Verify control using **Bruker Quantum>>Window>>Autosampler Control**.

FIALab and SC Autosampler

Software Installation:

- 1) Log on to the FIALab host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) One USB port will be used along with a virtual port created in the ESI SC software. See Figure 12.

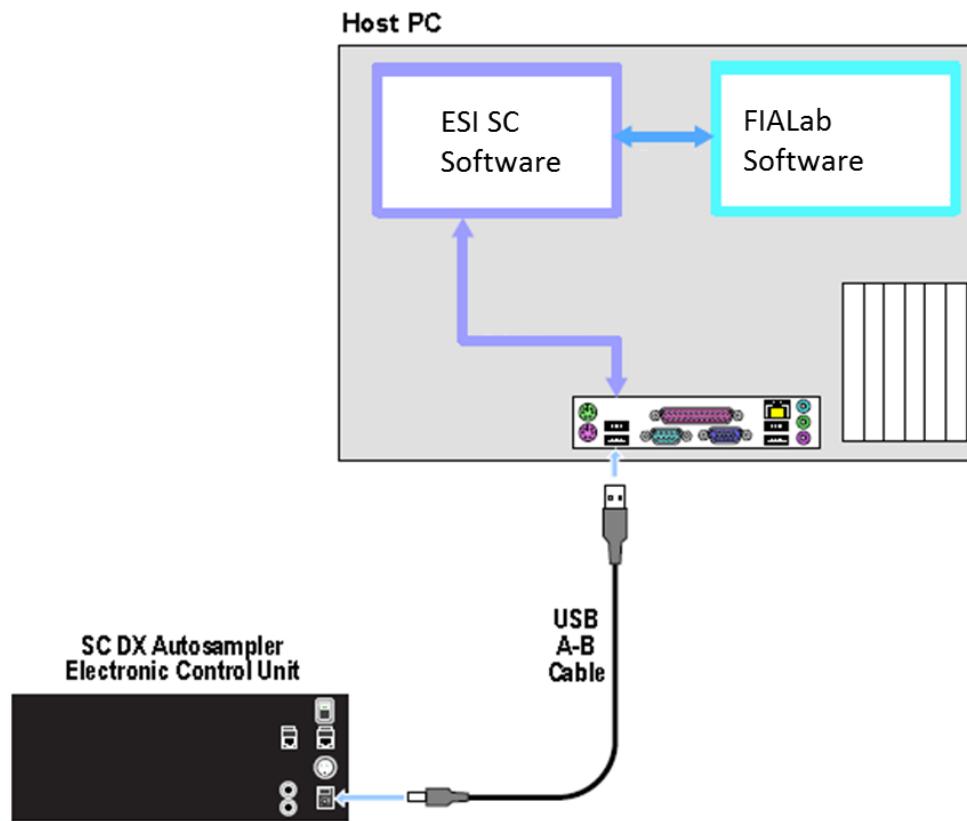


Figure 12: Connection options for FIALab and ESI SC with SC autosampler.

- 3) Connect 24 VDC power to the SC Autosampler. Connect the RS-232 cable from the physical COM port on the computer to the SC Autosampler control module at COM1.
- 4) Turn on the SC Autosampler.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the FIALab software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. **Autosampler Model:** Use the drop down to select the autosampler model.
 - b. **Instrument/Autosampler Emulation.** Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **FIALab**.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Verify that **Instrument Communication** is set to "RS-232". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.

The *Instrument COM Port* should typically be set to something other than COM1 or COM2 and this device number must not be visible in the top window section, "Physical COM Ports". In the example from Figure 12, COM3 is chosen. Next, click **SAVE>>OK>>OK**.

- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Position probe to height of table top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.

14) Exit the Calibration window.

Host software Configuration:

15) Locate and open the FIALab software and make the following configuration changes in the Autosampler window. In this example COM3 was chosen in the “Autosampler Configuration” section.



Figure 13: Serial Port settings in FIALab.

16) Using the FIALab software, select the ESI SC autosampler and **Logon** using the Autosampler window. Next, verify that control of the SC Autosampler has been established by moving the SC as shown in the examples below.



Figure 14: Examples of instructions to move probe.

GV Isoprobe and SC Autosampler

Software Installation:

- 1) Log on to the GV's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. See Figure 15. Connect 24 VDC power to the SC Autosampler.

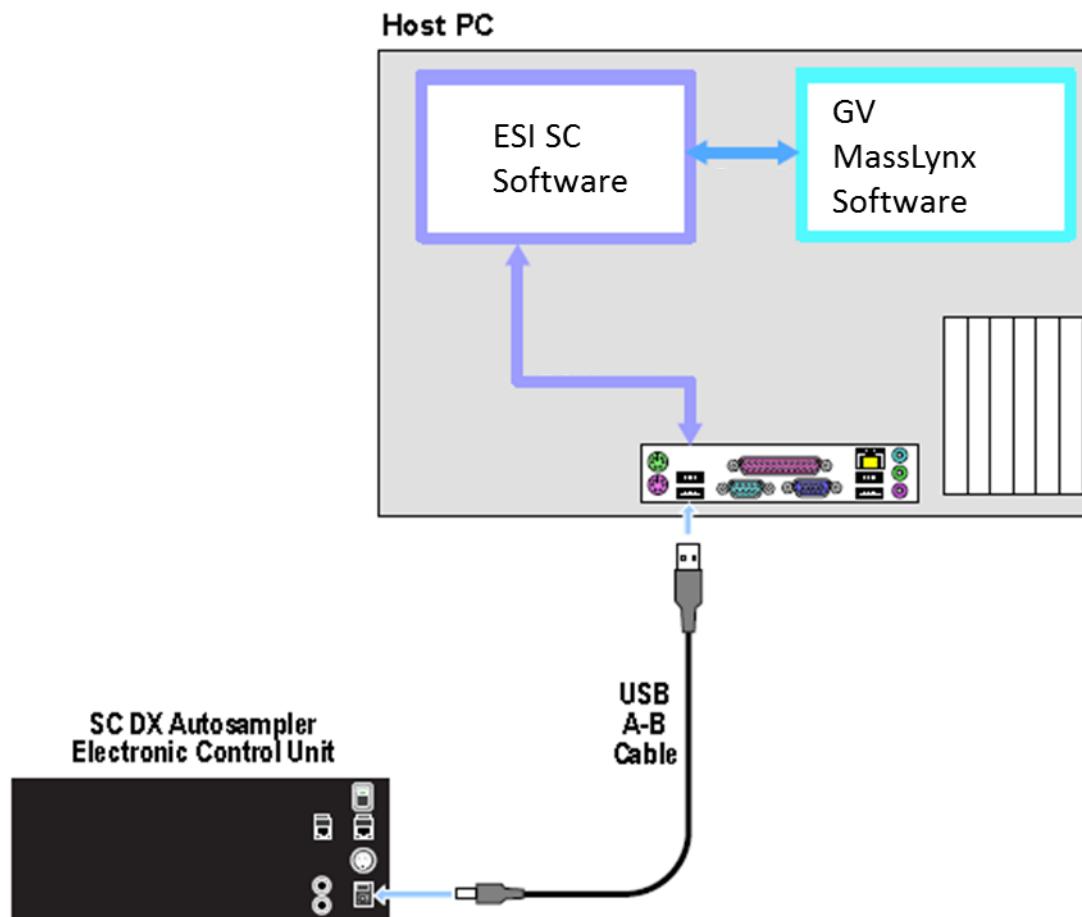


Figure 15: Connection options for GV and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

System Settings:

- 4) Next, using **Start>>Control Panel>>System>>Hardware>>Device Manager>>Ports**. Locate the COM port this is currently used to control the autosampler, typically this is COM1, and rename to COM9.
- To change a COM port number, right-click on the device then **Properties>>Port Settings>>Advanced**.

Autosampler Configuration:

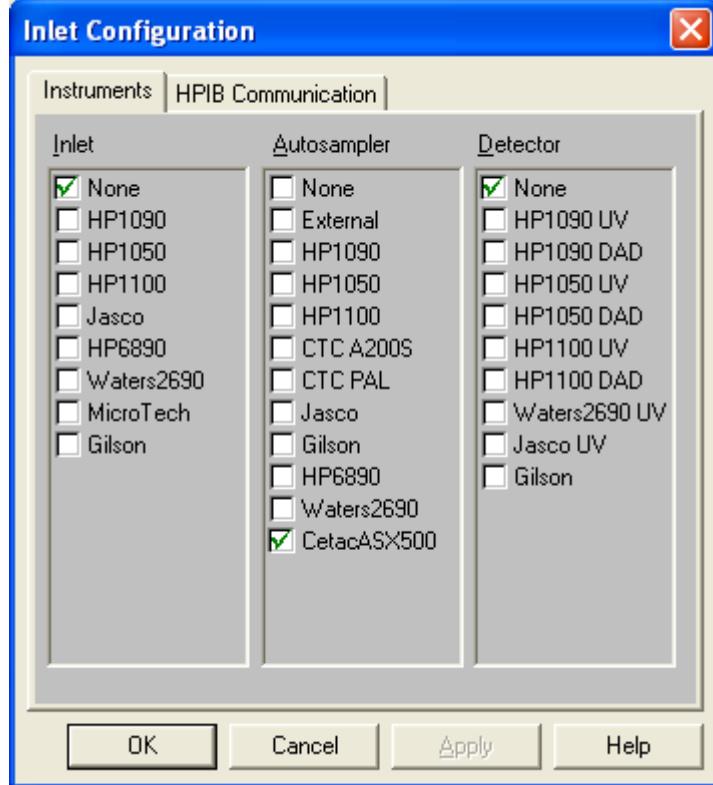
- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the GV software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **GV/Micromass**.
 - c. Autosampler Type: Enable the ASX-500 emulation, **Configure>>Autosampler** and change "Autosampler Type".
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the **SC COM Port** value.
Define the *Instrument COM Port* as **COM1**.
Next, click **SAVE>>OK>>OK**.
- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type. It should be noted that if the SPS3 emulation is used, the Varian configuration may override the manually selected racks in the ESI SC software and automatically reset them to match the GV.
- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) Configure the GV to use the CetacASX500 as the autosampler by using InletEditor. Select **Tools>>Instrument Configuration>>Instruments**.



- 16) Configure the rack layout using the **InletEditor>>View>>CetacASX500 Autosampler** window in the GV software. The specified rack types should match the corresponding rack in the ESI SC software.
- 17) Verify control using the **InletEditor>>View>>CetacASX500 Autosampler** window.

ICP Manager and SC Autosampler

Software Installation:

- 1) Log on to the 'ICP Manager' host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Logon to the 'ICP Manager' user account if one is used.
- 3) One USB port will be used along with a virtual port created in the ESI SC software. See Figure 16: Connection options for ICP Manager and ESI SC with SC autosampler.

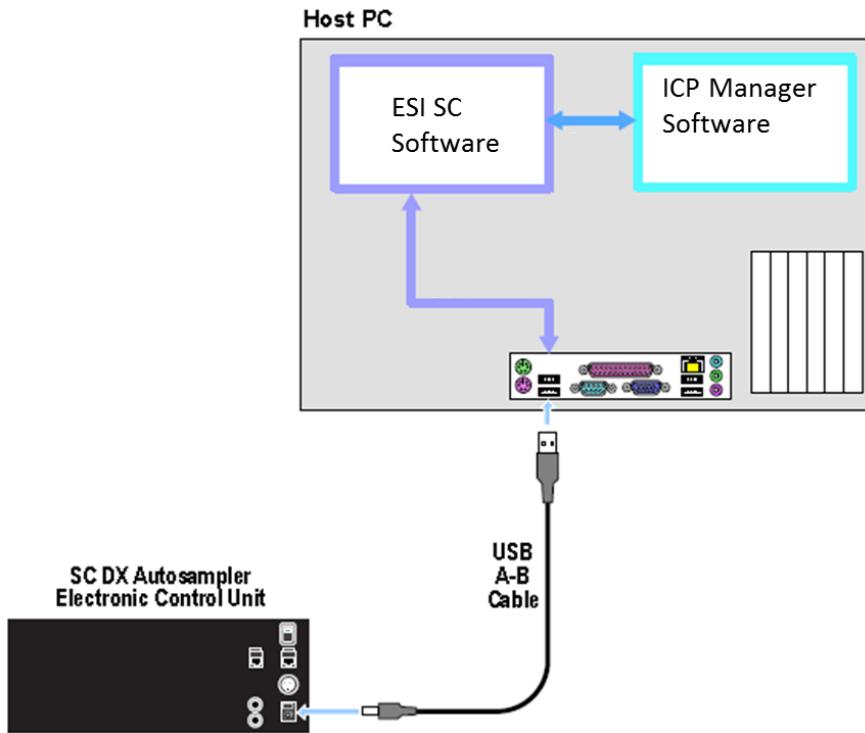


Figure 16: Connection options for ICP Manager and ESI SC with SC autosampler.

- 4) Connect 24 VDC power to the SC Autosampler. Connect the RS-232 cable from the physical COM port on the computer to the SC Autosampler control module at COM1.
- 5) Turn on the SC Autosampler.

System Settings:

- 6) Locate and modify the *icp.ini* file using Notepad.exe. The file is located at the following path. (Modified values are in bold.)

If instrument is 61e: "C:\Program Files\MAA\IM61\database\".

If instrument is ARL 3560 : "C:\Program Files\MAA\ICP Manager\".

[OPTIONS]

```
EXCEL_OLE_ENABLED=1  
ViewRealTimeScans=1  
Sampler=ASX 500
```

- 7) Locate and open the *asx500.ini* file using Notepad.exe. The file is located at the following path. (Modified values are in bold.)

If instrument is 61e: "C:\Program Files\MAA\IM61\database\".

If instrument is ARL 3560 : "C:\Program Files\MAA\ICP Manager\".

[Config]

```
Port =8  
InBufferSize=1024  
OutBufferSize=1024  
Baud=9600  
DataBits=8  
Parity=0  
StopBits=1  
SimulationMode=0  
MinX=0  
MinY=0  
MinZ=0  
MaxX=4100  
MaxY=2700
```

Autosampler Configuration:

- 8) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the ICP Manager software must not be running.
- 9) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Instrument/Autosampler Emulation. Use the drop-down to select the instrument that will control the autosampler. Verify that the "Instrument Type" is **TJA ICP Manager**. The user will then browse for the location of the "Default.try".
If instrument is 61e: "C:\Program Files\MAA\IM61\database\sampler"
If instrument is ARL 3560: "C:\Program Files\MAA\ICPManager\Sampler"
- 10) Configuration File: Click the **Save File** button.
- 11) In the ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "RS-232". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.
The *Instrument COM Port* should typically be set to COM8 and this device number must not be visible in the top window section, "Physical COM Ports".
Next, click **SAVE>>OK**.
- 12) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 13) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 14) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 15) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 16) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 17) Exit the Calibration window.

Host software Configuration:

- 18) Using the ICP Manager software (Method.exe), select **ICP Manager >Windows>Autosampler[ASX 500]**, right-click on the left pane and verify that the **Properties** show the following settings:.

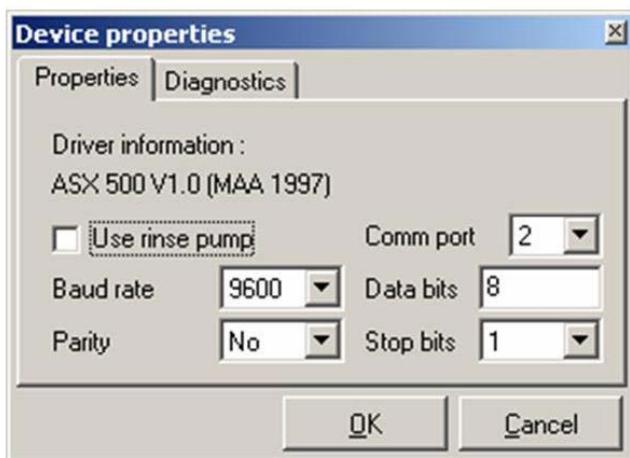


Figure 17: Serial Port settings in ICP Manager.

- 19) Right-Click on the left pane and verify that "Simulate mode" is not checked. Next, right-click on the left pane and choose **Select tray**, and Open the file named *ESI SC.try*. The vial positions should now be loaded on the left pane.
- 20) Verify that control of the SC Autosampler is established. Move SC Autosampler by right-clicking on vial location in the left pane and select **Go to tube**.



If communication is not stable or errors such as; "Unexpected response from ASX 500 autosampler" is encountered, it may be necessary to reduce the priority of the Method.exe program to a level below normal. Please contact ESI for assistance if required.

LECO and SC Autosampler

Software Installation:

- 1) Log on to the LECO's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. Connect 24 VDC power to the SC Autosampler.

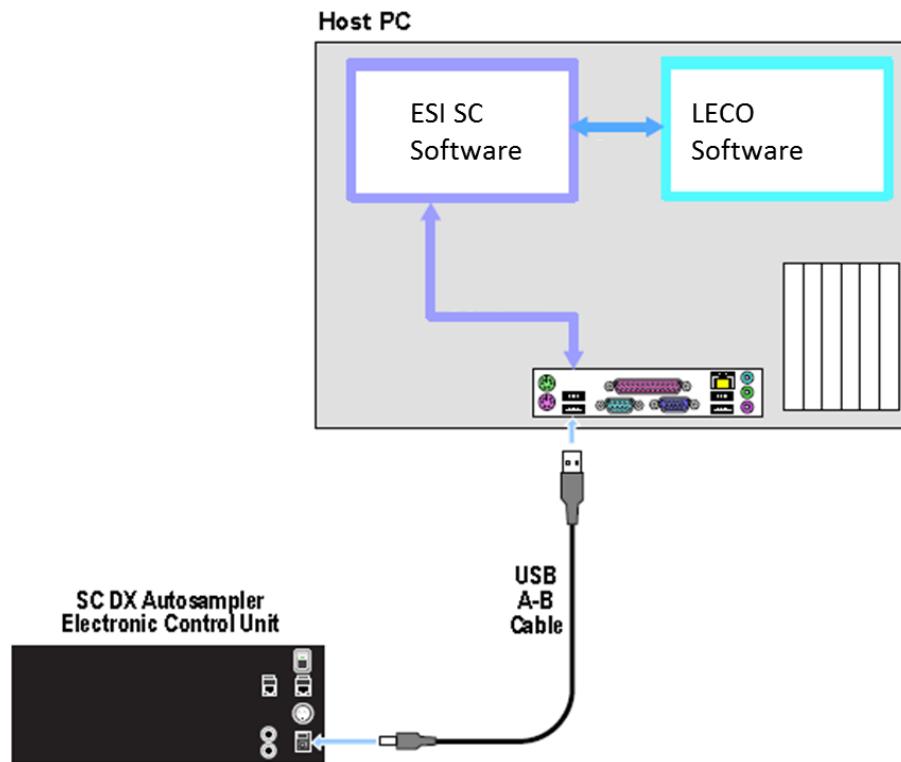


Figure 18: Connection options for LECO and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

System Settings:

- 4) Next, using **Start>>Control Panel>>System>>Hardware>>Device Manager>>Ports**. Locate the COM port this is currently used to control the autosampler, typically this is COM1, and rename to COM9.



To change a COM port number, right-click on the device then **Properties>>Port Settings>>Advanced**.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the LECO software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **LECO**.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.

Define the *Instrument COM Port* as **COM1**. Instrument COM Port must be COM1, COM2, COM3, or COM4 as the autosampler is autodetected by the LECO software.

Next, click **SAVE>>OK>>OK**.

- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 10) Click the “**Initialize Autosampler**” button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list “Autosampler Initialized” and “Instrument COM port Opened”, check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) Before using the **LECO**, the ESI SC software must be running and the autosampler initialized. The LECO software automatically detects whether or not an autosampler is connected and allows rack layout to be configured when an autosampler is detected.
- 16) If the ESI SC software and autosampler are configured correctly, the LECO software will automatically detect the SC autosampler when the LECO software is started and will send the SC autosampler to the HOME position. To verify control of the SC autosampler, select **Window>>Diagnostics** in the LECO software. Choose the appropriate 'Tray Size' that matches the SC autosampler rack layout. Select Tray and Tube number and then press 'Go' button and verify that the SC autosampler moves to the correct position.

Nu Plasma and SC Autosampler

Software Installation:

- 1) Log on to the Nu Plasma's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.

- 2) Connect the USB cable from the computer to the SC Autosampler. Connect the Nu Plasma Autosampler cable from the System Controller to the computer using the Null modem converter supplied. The original cable from Nu Plasma must be used. See Figure 19.

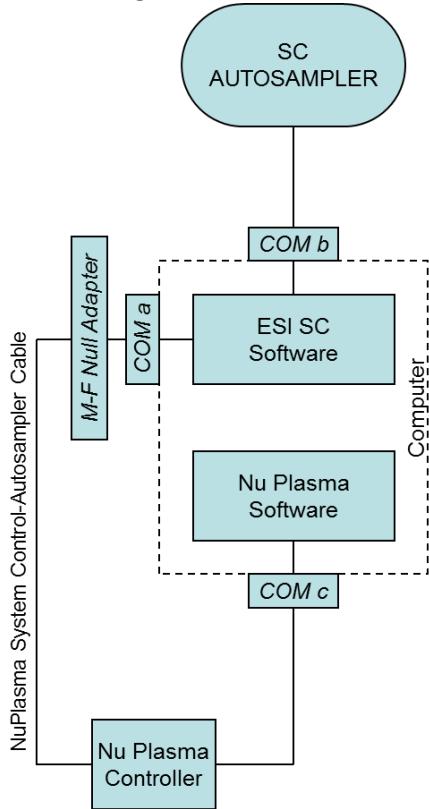


Figure 19: Connection options for Nu Plasma and ESI SC with SC autosampler.



If a DB-9 port is not available on the computer, a USB-Serial Adapter (SC-0905) may be used. It is recommended that the same type of adapters be used throughout the system to minimize driver conflicts. The Hardware Wizard will automatically install the required drivers but they may also be found in the "\Program Files\ESI\ESI SC\SupportFiles" directory.

- 3) Connect 24 VDC power to the SC Autosampler. Turn on the SC Autosampler.

System Settings:

- 4) None required.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the Nu Plasma software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Nu Plasma**. The user will then browse for the location of the "Autosampler Parameters.DAT" and select. Typically, this folder is located in "C:\Nu Plasma\Instrument Settings\", directory.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Perform the following steps.
 - a. Select the Instrument Communication option: "Physical COM Port with controller"
 - b. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.
 - c. Select the *Instrument COM Port* where the "Nu Plasma System Control- Autosampler" is connected.



To view the available ports, select Windows **Control Panel>>System>>Hardware>>Device Settings or Device Manager**. Click on Ports (COM & LPT). The current hardware settings will be displayed, and the user can then determine what values need to be set in the Communications window. The only requirement when choosing COM ports, as in the communication example, is that the only COM numbers 1-4 are available for use between the Nu Plasma and the Nu Controller.

Next, click **SAVE>>OK>>OK**.

- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.



It should be noted that the NuPlasma requires that all of the selected racks be of the same array type. For instance all racks should be configured as 3x7 or all should be configured as 5x12.

- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.

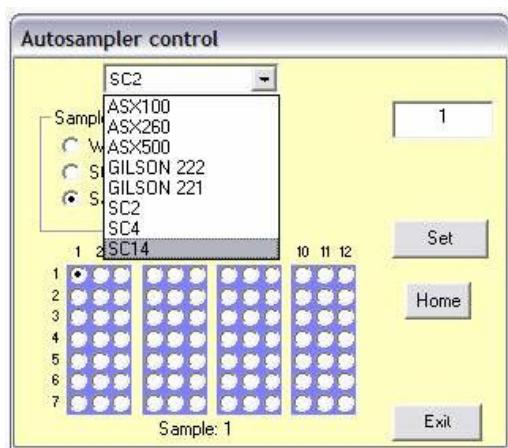
- a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
- b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
- c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) In the Nu Plasma Software, under **Autosampler Control**, choose the appropriate SC Autosampler.



- 16) Using the following Wash Positions in the Nu **Autosampler Control**, the SC will perform the associated actions:

Wash Position 1 will send SC to Rinse Station 1.

Wash Position 2 will send SC to Rinse Station 2.

Wash Position 3 will instruct the SC to perform a wash with both Rinse Stations.

Nu AttoLab and SC Autosampler

Software Installation:

- 1) Log on to the Nu AttoLab's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. See Figure 20.

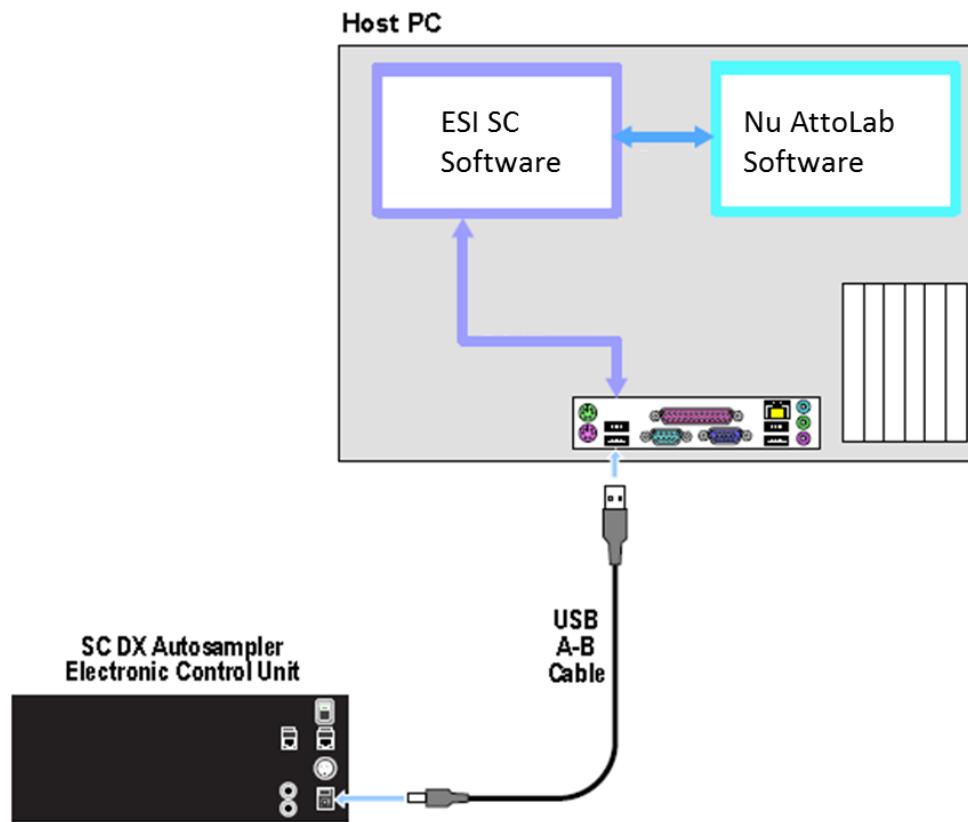


Figure 20: Connection options for Nu AttoLab and ESI SC with SC autosampler.

- 3) Connect 24 VDC power to the SC Autosampler. Turn on the SC Autosampler.

System Settings:

- 4) None required.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the Nu AttoLab software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - c. Autosampler Model: Use the drop down to select the autosampler model.
 - d. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Nu AttoLab**. The user will then browse for the location of the "Autosampler Parameters.DAT" and select. Typically, this folder is located in "C:\Nu AttoLab\Instrument Settings\", directory.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Select the "Instrument Communication" type as (Virtual COM Port without controller). Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.

Define the *Instrument COM Port* as COM4 as shown in example.



To view the available ports, select Windows **Control Panel>>System>>Hardware>>Device Settings or Device Manager**. Click on Ports (COM & LPT). The current hardware settings will be displayed, and the user can then determine what values need to be set in the Communications window. The only requirement when choosing COM ports, as in the communication example, is that the only COM numbers 1-4 are available for use between the Nu AttoLab and the Nu Controller.

Next, click **SAVE>>OK>>OK**.

- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.



It should be noted that the NuAttoLab requires that all of the selected racks be of the same array type. For instance all racks should be configured as 3x7 or all should be configured as 5x12.

- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.

- 11) On the main ESI SC window, verify the rack and rinse parameters.

- d. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.

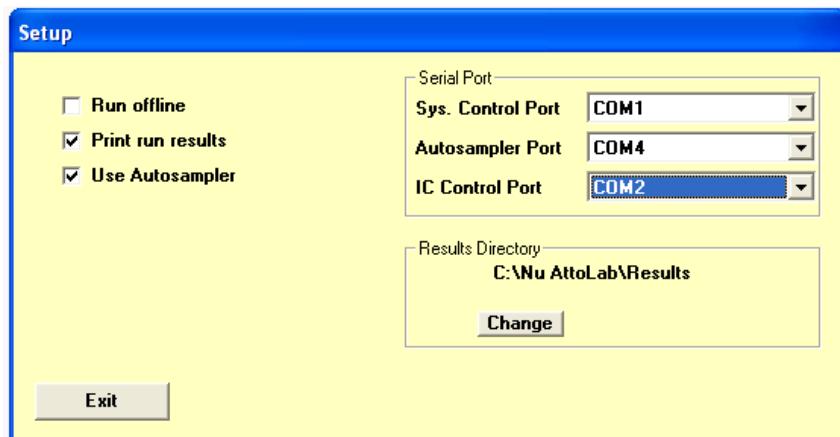
- e. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
- f. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

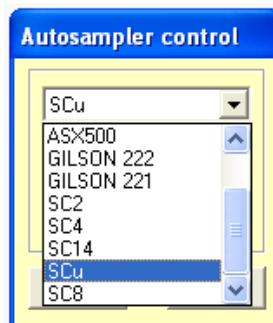
- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) In the Nu AttoLab>>Setup window, configure the correct communication port. In this example, COM4 is used.



- 16) In the Nu AttoLab Software, under **Autosampler Control**, choose the appropriate SC Autosampler.



- 17) Using the Nu **Autosampler Control**, verify control of SC autosampler.

Perkin Elmer Elan and SC Autosampler (via GPIB)

Software Installation:

- 1) Log on to the Elan's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the ICS 4894 to the computer using the provided 25-pin to 9-pin Null Modem Cable. Connect the ICS 4894 to the GPIB communication card or bus. Connect to power source and turn on. It is recommended that USB-Serial RS-232 converters be used. The Hardware Wizard will automatically install the required drivers but they may also be found in the "\Program Files\ESI\ESI SC\SupportFiles" directory. See Figure 21.

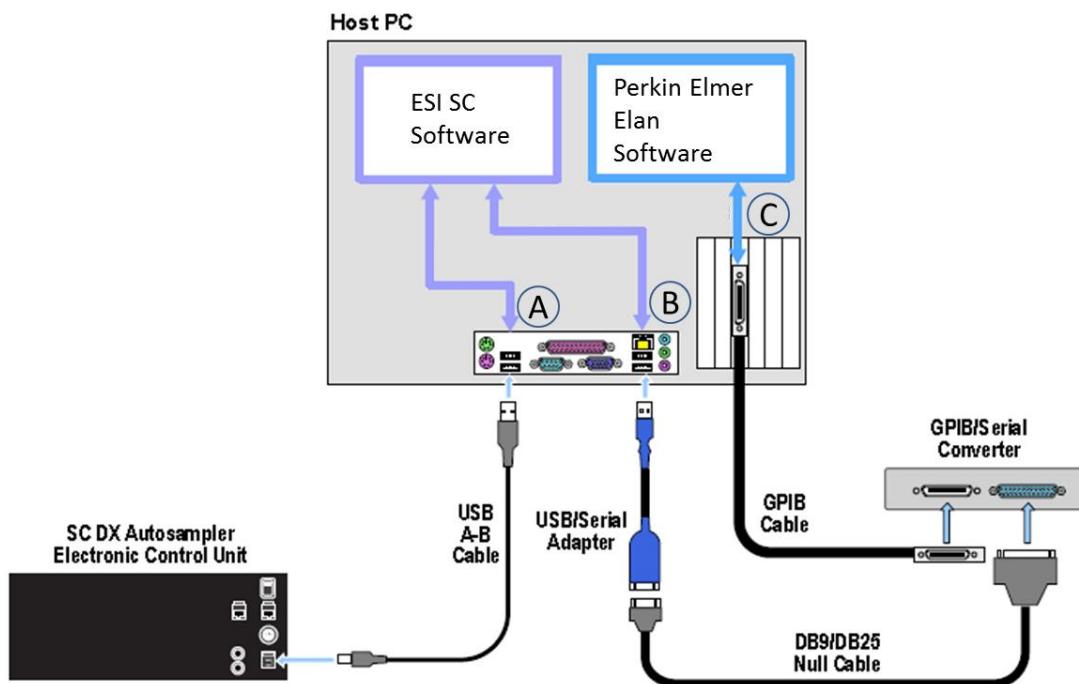


Figure 21: Connections for SC with Elan and using GPIB interface.



Please refer to Technical Note (TN060406) if the GPIB interface is a NI GPIB-232-CV-A.



If a DB-9 port is not available on the computer, a USB-Serial Adapter (SC-0905) may be used. It is recommended that the same type of adapters be used throughout the system to minimize driver conflicts.

- 3) Connect 24 V DC power to the SC Autosampler. Connect the RS-232 cable from the physical COM port on the computer to the SC Autosampler control module at COM1. Turn on the SC Autosampler.

Autosampler Configuration:

- 4) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 5) At the instance of the first run of the ESI SC, the program will automatically determine the correct communications setup. These will be displayed in the status bars at the bottom of the ESI SC main window.



To manually configure, in ESI SC window select **Communication**. Verify that **Instrument Communication** is set to GPIB. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. The determined ports can now be saved. Please note that the SC Autosampler and the GPIB-Serial Interface must both be powered on. The Elan software must not be running.

- 6) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 7) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 8) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 9) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 10) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 11) Exit the Calibration window.

Host Software Configuration:

- 12) Elan Software Version 3.3 or earlier: Open the Elan software and configure by using the **Method>>Sampling>>Select...>>Autosampler Type** window and selecting "AS-93plus." Next, select the appropriate *.try file that will be updated by the SC Software. A shortcut will be available in the "AS-93" folder that will place the correct path name in the **Tray Name** field. (e.g. "c:\program files\esi\esi sc\esi.try").



Figure 22:Autosampler Selection window in Elan.

Elan Software Version 3.4 or later: Open the Elan software and configure by using the **Devices>>Autosampler>>Autosampler Type** window and selecting "AS-93plus." Next, select the appropriate *.try file that will be updated by the SC Software. A shortcut will be available in the "AS-93" folder that will place the correct path name in the **Tray Name** field. (e.g. "c:\program files\esi\esi sc\esi.try").



If the shortcut is not visible, the user may wish to create a shortcut and place it in the user's Elandata directory. For example, the shortcut to the "esi.try" file can be placed in the following location if a user has been defined during the Elan New User Setup: "c:\Elandata_user\Autosampler\AS-93"

13) Finally, press the "**Initialize**" button in the Elan software.



After any reconfiguration of the rack types in the ESI SC software, this initialization in the Elan software will also be required.

14) Elan Software Version 3.3 or earlier: Verify movement control by using the **Method>>Sampling>> Probe...** The "xyz" features should not be used. Tube positions may be used only if the **Tube Number** is populated with values and not "N/A". Unintentionally instructing the Elan to move to an undefined position will require restarting the computer. Motion should be observed when a valid tube position is selected and the "**Goto Tube #**" is clicked.

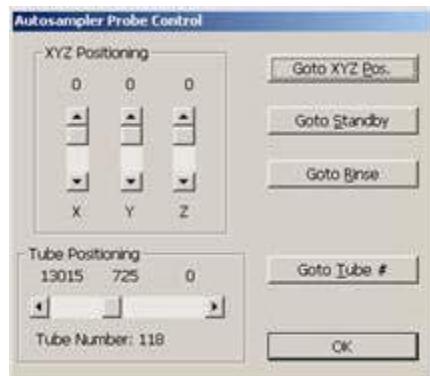


Figure 23: Autosampler Probe Control in Elan.

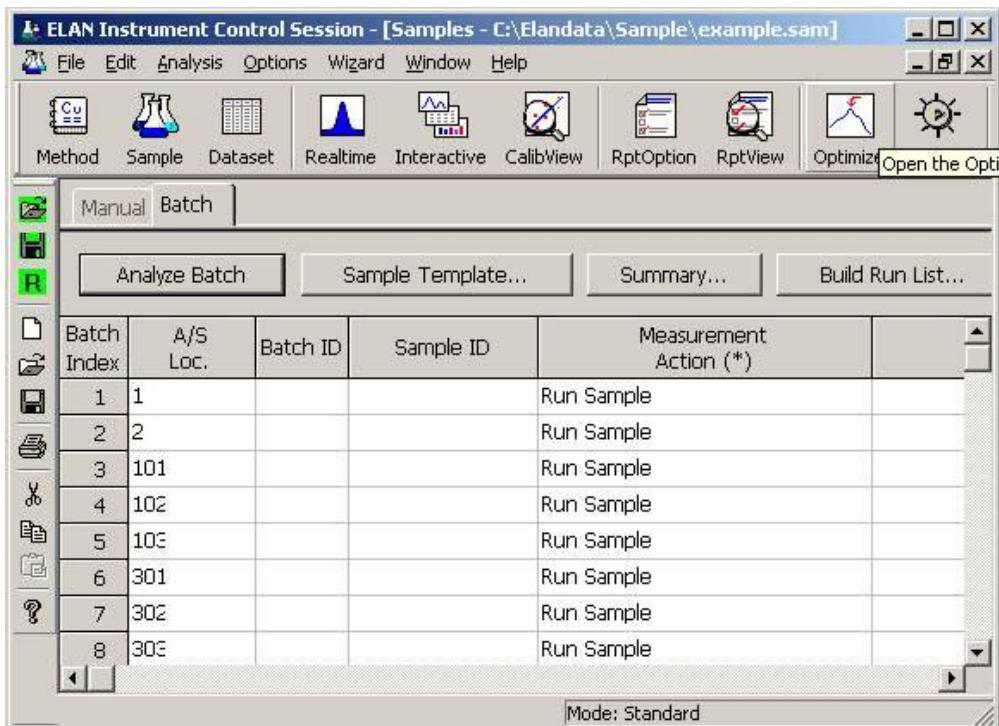
Elan Software Version 3.4 or later: Verify movement control by using the **Devices>>Autosampler>>Probe...** The "xyz" features should not be used. Tube positions may be used only if the **Tube Number** is populated with values and not "N/A". Unintentionally instructing the Elan to move to an undefined position will require restarting the computer. Motion should be observed when a valid tube position is selected and the "**Goto Tube #**" is clicked.

- 15) To designate a position in a method/sequence, all positions are available and may be entered in the following (R)ack and (V)ial format [RRVV].

0121 addresses rack 1, vial position 21

1196 addresses rack 11, vial position 96

0001 addresses standards rack, vial position 1



Perkin Elmer WinLab32 (v 2.2 to 3.3) and SC Autosampler (via GPIB)

Software Installation:

- 1) Log on to the Optima's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Log on to the Optima user account if one is used.
- 3) Connect the ICS 4894 to the computer using the provided 25-pin to 9-pin Null Modem Cable (ES-8199-0113). Connect the ICS 4894 to the GPIB communication card or bus. Connect to power source.
- 4) Connect 24 V DC power to the SC Autosampler. Connect the RS-232 cable from the physical COM port on the computer to the SC Autosampler control module at COM1. See Figure 24.

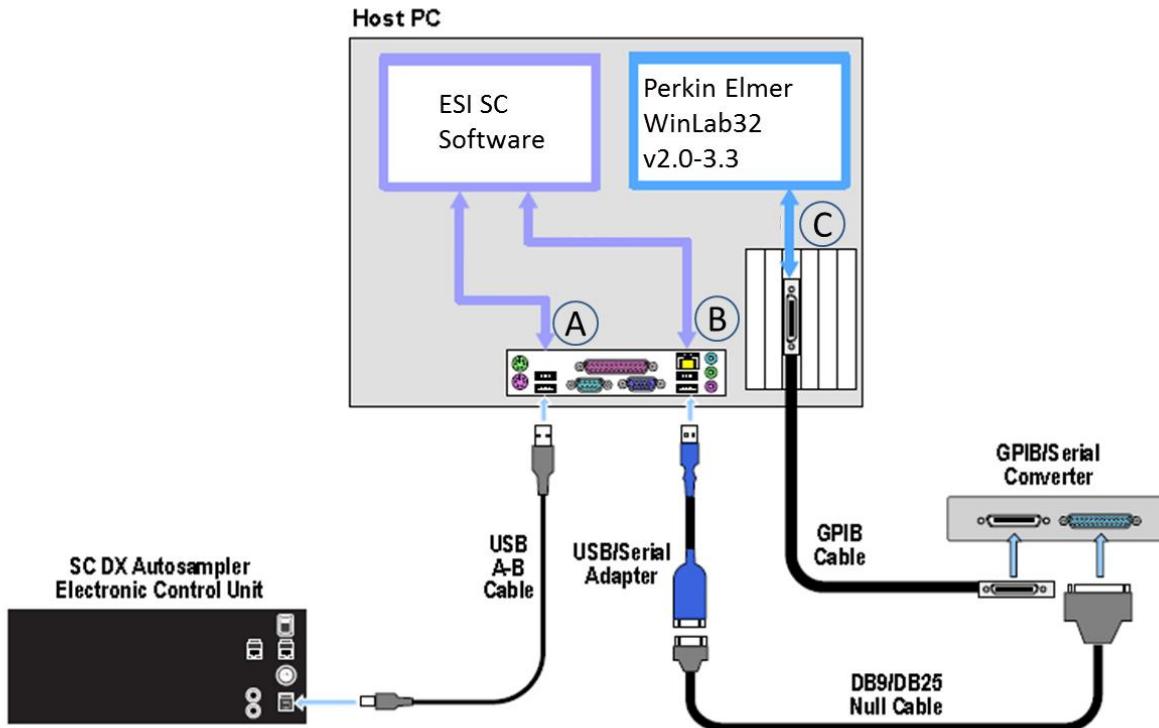


Figure 24: Connections for ESI SC with Optima and SC autosampler.



If a DB-9 port is not available on the computer, a USB-Serial Adapter (SC-0905) may be used. It is recommended that the same type of adapters be used throughout the system to minimize driver conflicts. The Hardware Wizard will automatically install the required drivers but they may also be found in the "\Program Files\ESI\ESI SC\SupportFiles" directory.

- 5) Turn on the SC Autosampler.

Autosampler Configuration:

- 6) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 7) In the **Configure>>Autosampler** menu, verify that the correct **Instrument/Autosampler** configuration is selected. This may also be verified by looking at the status bar at the bottom of the ESI SC main window.
- 8) In the ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "GPIB". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the SC COM port value. When the GPIB is found the appropriate value will be placed in the Instrument COM Port value. Click **SAVE>>OK>>OK**. Please note that the SC Autosampler and GPIB-RS232 interface must be powered on and the WinLab32 software must not be running.
- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) Verify that WinLab32 is communicating properly with the instrument.
- 16) Close WinLab32 and run “Reconfigure” from the “Perkin Elmer WinLab32” Program Group.
- 17) Proceed to “Select autosampler model” and choose “**AS-93 plus**” and click **Next>**.
- 18) Select the interface as IEEE-488 (GPIB) and click **Next>** and continue through to “WinLab32 Configuration Complete.”
- 19) Start WinLab32 and configure the Optima software by using the **Options>>Autosampler** window and verify the Autosampler Model as “AS-93plus.” Next, select the appropriate **Tray Type** file that will be updated by the ESI SC Software by clicking the **Browse** button, then selecting the "esi tray file". A shortcut will be available in the "AS-93" folder that will place the correct path name. (e.g. “C:\program files\esi\esi sc\esi.As93Tray”). Finally, verify connection by selecting **System>Diagnostics>Autosampler** then **Reconnect>OK**. Movement should be verified by selecting **Analysis>AutoSampler**.
- 20) To designate a position in a method/sequence, all positions are available and may be entered in one of the following **(R)ack** and **(V)ial** formats depending on configuration chosen in the ESI SC software:
 - a. **[RVV]**
121 addresses rack 1, vial position 21
196 addresses rack 1, vial position 96
 - b. **[VVV]**
121 addresses vial position 121
196 addresses vial position 196

Perkin Elmer WinLab32 (v 3.4 to 4.0) and SC Autosampler (via USB)

Software Installation:

- 1) Log on to the Optima's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Log on to the Optima user account if one is used.
- 3) Connect the USB cable from the computer to the SC Autosampler control unit. See Figure 25. Connect 24 V DC power to the SC Autosampler.

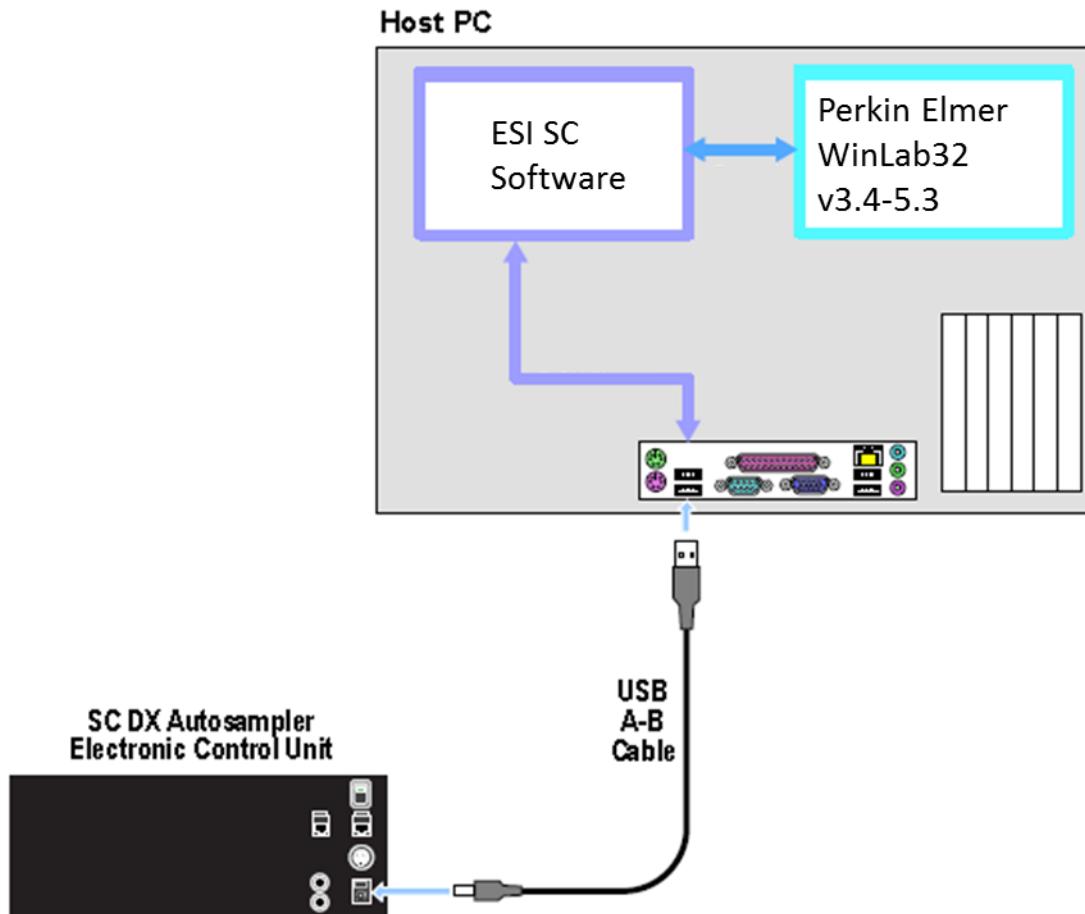


Figure 25: Connections for ESI SC with Optima and SC autosampler.

- 4) Turn on the SC Autosampler.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 6) In the **Configure>>Autosampler** menu, verify that the correct **Instrument/Autosampler** configuration is selected. **Perkin Elmer Optima** and **AS93/ASX 5xx** should be chosen.
- 7) In the ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "Virtual COM Port". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the SC COM port value. Next, define the Instrument COM port as **COM6** and click **SAVE >> OK**. Please note that the SC Autosampler must be powered on and the WinLab32 software must not be running.
- 8) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 10) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 11) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 12) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 13) Exit the Calibration window.

Host Software Configuration:

- 14) Verify that WinLab32 is communicating properly with the instrument.
- 15) Close WinLab32 and run "Reconfigure" from the "Perkin Elmer WinLab32" Program Group.
- 16) Proceed to "Select autosampler model" and choose "**Cetac**" and click **Next>**.

- 17) Select the interface as Serial (RS-232) and click **Next>**
- 18) Select the COM6 port then continue through to “WinLab32 Configuration Complete.”
- 19) Start WinLab32 and configure the Optima software by using the **Options> Autosampler** window and verify the Autosampler Model as “Cetac”. Next, select the appropriate Tray Type file that will be updated by the ESI SC Software by clicking the **Browse** button, then selecting the "esi tray file". Choose the “esi ASX tray file” shortcut available in the default tray folder. Finally, verify connection by selecting **System>Diagnostics>Autosampler** then **Reconnect>OK**. Movement should be verified by selecting **Analysis>AutoSampler**.
- 20) To designate a position in a method/sequence, all positions are available and may be entered in one of the following **(R)ack** and **(V)ial** formats depending on configuration chosen in the ESI SC software:
 - a. **[RVV]**
121 addresses rack 1, vial position 21
196 addresses rack 1, vial position 96
 - b. **[VVV]**
121 addresses vial position 121
196 addresses vial position 196

Perkin Elmer WinLab32 (v 5.0-5.3) and SC Autosampler (via USB)

Software Installation:

- 1) Log on to the Optima's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Log on to the Optima user account if one is used.
- 3) Connect the USB cable from the computer to the SC Autosampler control unit. See Figure 26. Connect 24 V DC power to the SC Autosampler.

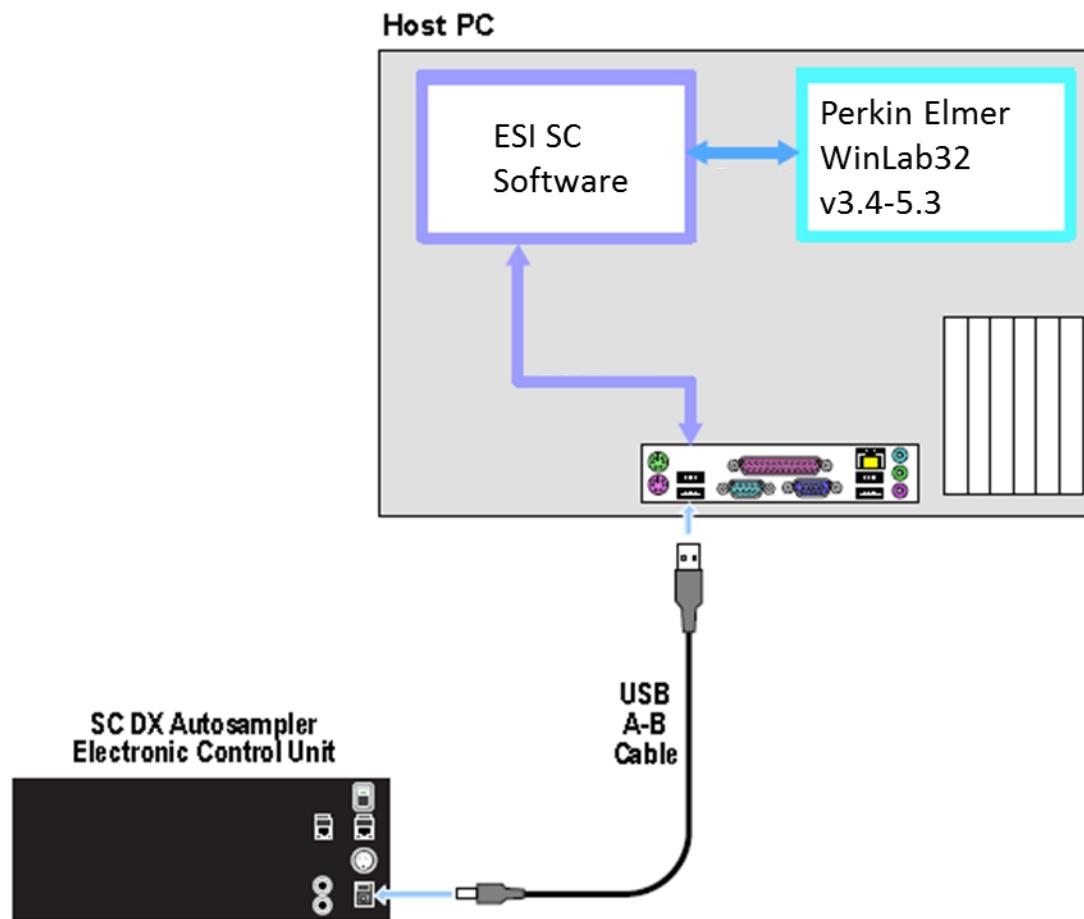


Figure 26: Connections for ESI SC with Optima and SC autosampler.

- 4) Turn on the SC Autosampler.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. (Configuration steps **a.** and **b.** should be done automatically)
 - a. In the **Configure>>Autosampler** menu, verify that the correct **Instrument/Autosampler** configuration is selected. **Perkin Elmer Optima** and **AS93/ASX 5xx** should be chosen.
 - b. In the ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "Virtual COM Port". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the SC COM port value. Next, define the Instrument COM port as **COM6** and click **SAVE >> OK**. Please note that the SC Autosampler must be powered on and the WinLab32 software must not be running.
- 6) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 7) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 8) On the main ESI SC window, verify the rack and rinse parameters.
 - d. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - e. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - f. **Rinse Settings:** **Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 9) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 10) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 11) Exit the Calibration window.

Host Software Configuration:

- 12) Verify that WinLab32 is communicating properly with the instrument.
- 13) Close WinLab32 and run "Reconfigure" from the "Perkin Elmer WinLab32" Program Group.
- 14) Proceed to "Select autosampler model" and choose "**ESI**" and click **Next>**.

Note: If a prepFAST configuration is to be utilized, please select as required.

- 15) Select the COM6 port then continue through to “WinLab32 Configuration Complete.”
- 16) Start WinLab32 and configure the Optima software by using the **Options> Autosampler** window and verify the Autosampler Model as “**ESI**”. Ensure the appropriate Tray Type file is selected that will be updated by the ESI SC Software “**ESI_SC.EsiTray**”. Finally, verify connection by selecting **System>Diagnostics>Autosampler** then **Reconnect>OK**. Movement should be verified by selecting **Analysis>AutoSampler**.
- 17) To designate a position in a method/sequence, all positions are available and may be entered in one of the following **(R)ack** and **(V)ial** formats depending on configuration chosen in the ESI SC software:
 - c. **[RVV]** – (Default)
121 addresses rack 1, vial position 21
196 addresses rack 1, vial position 96
 - d. **[VVV]**
121 addresses vial position 121
196 addresses vial position 196

Perkin Elmer NexION and SC Autosampler

Software Installation:

- 1) Log on to the NexION's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler control unit. See Figure 27. Connect 24 V DC power to the SC Autosampler. Turn on the SC Autosampler.

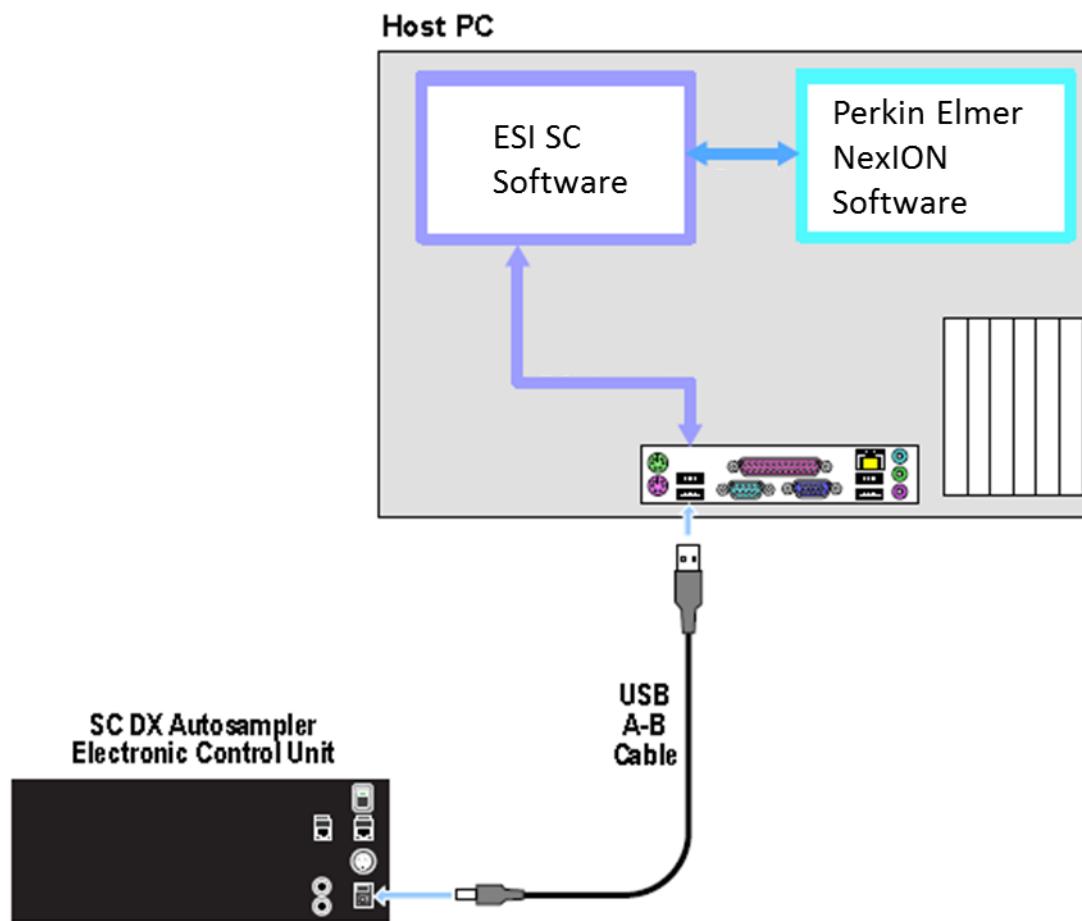


Figure 27: Connections for SC with NexION.

Autosampler Configuration:

- 3) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 4) At the instance of the first run of the ESI SC, the program will automatically determine the correct communications setup. These will be displayed in the status bars at the bottom of the ESI SC main window.



To manually configure, in ESI SC window select **Communication**. Verify that **Instrument Communication** is set to "Virtual COM Port". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. The determined ports can now be saved. Please note that the SC Autosampler must be powered on. The NexION software must not be running.

- 5) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 6) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 7) On the main ESI SC window, verify the rack and rinse parameters.
 - g. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - h. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - i. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 8) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 9) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 10) Exit the Calibration window.

Host Software Configuration:

- 11) **NexION Software:** Open the NexION software and configure by using the **Devices>>Autosampler>>Autosampler Type** window and selecting "AS-93plus." Next, select the appropriate *.try file that will be updated by the SC Software. A shortcut "esi NexION tray file" will be available in the "AS-93" folder that will place the correct path name in the **Tray Name** field.

Example: WindowsXP, "C:\program files\esi\esi sc\esinexion.try"

Example: Windows7, "C:\users\public\esi\esi sc\esinexion.try"



Figure 28:Autosampler Selection window in NexION.



If the shortcut is not visible, the user may wish to create a shortcut and place it in the user's NexIONdata directory. For example, the shortcut to the "esinexion.try" file can be placed in the following location if a user has been defined during the NexION New User Setup: "c:\NexIONdata_user\Autosampler\AS-93"

12) The **Port** value selected must match the "Instrument COM Port" selected in the ESI SC Software. COM4 is default but may require modification if used by existing devices on computer.

13) Finally, press the "**Initialize**" button in the NexION software.



After any reconfiguration of the rack types in the ESI SC software, this initialization in the NexION software will also be required.

14) **NexION Software** : Verify movement control by using the **Devices>>Autosampler>>Probe...** The "xyz" features should not be used. Tube positions may be used only if the **Tube Number** is populated with values and not "N/A". Unintentionally instructing the NexION to move to an undefined position will require restarting the computer. Motion should be observed when a valid tube position is selected and the "**Goto Tube #**" is clicked.

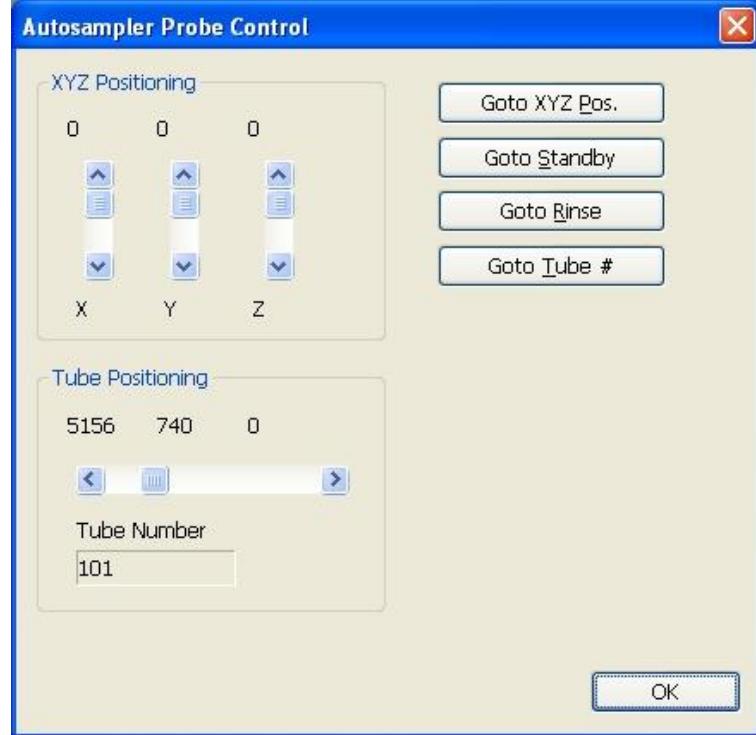


Figure 29: Autosampler Probe Control in NexION.

- 15) To designate a position in a method/sequence, all positions are available and may be entered in the following (R)ack and (V)ial format [RRVV].

0121 addresses rack 1, vial position 21

1196 addresses rack 11, vial position 96

0001 addresses standards rack, vial position 1

Samples - C:\NexIONData\Sample\nexION.sam				
Manual		Batch		
		Analyze Batch	Sample Template...	Summary...
<input type="checkbox"/> Use Manual Sampling (No autosampler)				
Batch Index	A/S Loc.	Batch ID	Sample ID	Measurement Action (*)
1	1			Run Sample
2	2			Run Sample
3	3			Run Sample
4	4			Run Sample
5	101			Run Sample
6	102			Run Sample
7	103			Run Sample
8	104			Run Sample
9	105			Run Sample

SC Emulation and SC Autosampler (via RS-232)

Software Installation:

- 1) Log on to the host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler control unit. See Figure 30. Connect 24 V DC power to the SC Autosampler.

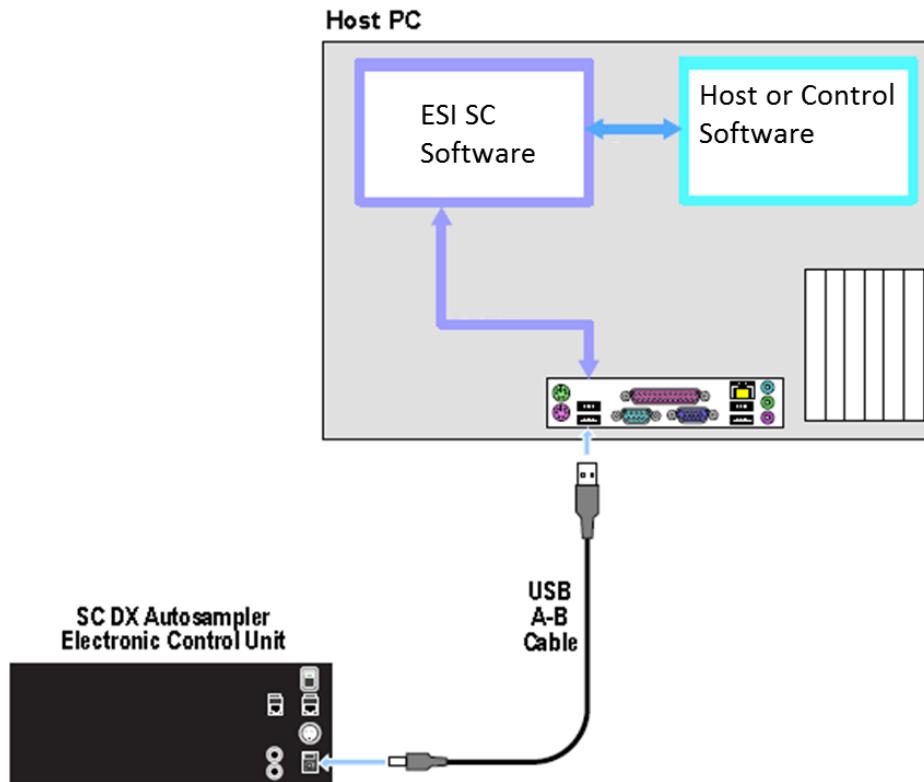


Figure 30: Communication Control Diagram

- 3) Turn on the SC Autosampler.

Autosampler Configuration:

- 4) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group.
- 5) In the **Configure** menu, verify that the **Instrument/Autosampler** configuration is set to SC.
- 6) In the ESI SC window select **Communications>>Configure Communications**. Verify that **Instrument Communication** is set to "RS-232". Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the SC COM port value. Next, define the Instrument COM port as desired and click **SAVE > OK > OK**. Please note that the SC Autosampler must be powered on.
- 7) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 8) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 9) On the main ESI SC window, verify the rack and rinse parameters.
 - g. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - h. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - i. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 10) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of table top.
- 11) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 12) Exit the Calibration window.

Host Software Configuration:

- 13) Any program that can send string instructions via a RS-232 COM port can be used to issue commands. The settings of 9600, 8, n, 1 should be used. No hardware handshake.
- 14) The following is a list of allowed instructions. Unless otherwise noted, the response will be "**OK:**". No additional instructions should be sent by host until the correct response is received.

CMD to ESI	Response and/or response string (strings to end with carriage return)
RINSE1	mechanically homes & goes to first rinse. Response: OK:<CR>
RINSE2	goes to second rinse Response: OK:<CR>
HOME	Mechanically homes (sensors), and positions above first rinse. Response: OK:<CR>
HOME,SENSOR	Mechanically homes (sensors), no further movement. Response: OK:<CR>
POS=RR,VVV	moves to rack, vial. Response: OK:<CR>
A1ON	turn on Rinse1 device. Response: OK:<CR>
A1OFF	turn off Rinse1 device. Response: OK:<CR>
A2ON	turn on Rinse2 device. Response: OK:<CR>
A2OFF	turn off Rinse2 device. Response: OK:<CR>
STATUS	Returns (R)eady, (B)usy, and (E)rror.
UP	Moves probe up. Response: OK:<CR>
DOWN=zzz	Moves probe to depth(mm): zzz Response: OK:<CR>
STOW	Moves to “Stow” position. Response: OK:<CR>
PUMP1=rate	Sets rate (uL/min) of PUMP1. For OFF: rate=0, For 1mL/min: rate=1000. Response: OK:<CR>
PUMP1=vol,rate	Pump on at defined rate and off after vol dispense. Units are: uL, ul/min. Response: OK:<CR>
PUMP1=STANDBY	Pump will enter “Standby” mode as defined in IEEPROM. Response: OK:<CR>

Spectro SAV and SC Autosampler

Software Installation:

- 1) Log on to the Spectro SAV's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. Connect 24 VDC power to the SC Autosampler.

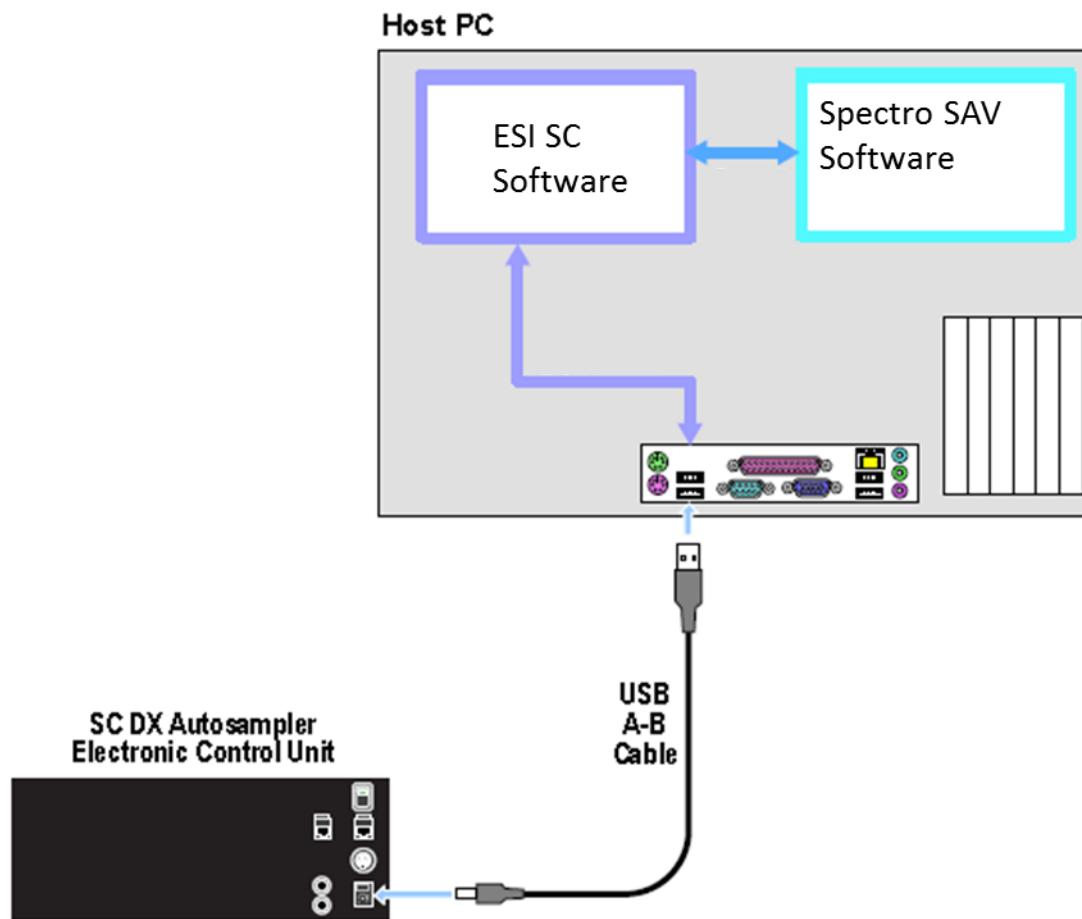


Figure 31: Connection options for Spectro SAV and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

System Settings:

- 4) None required. See note at end of section.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the Spectro SAV software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Spectro SAV**.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.
Define the *Instrument COM Port* as **COM5**.
Next, click **SAVE>>OK>>OK**.
- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) Copy the following file: **\Program Files\ESI\ESI SC\Spectro esi.try** and paste it in the following Spectro folder: **\Spectro Smart Studio\Smart Analyzer Vision\Script**
- 16) Using **Spectro SAV**, configure the rack layout by opening **Device Control Parameters >> Autosampler Tray Definition**. Click the Load button and select the **Spectro esi.try** file. Ensure that this tray layout matches the rack layout that was selected in the ESI software.

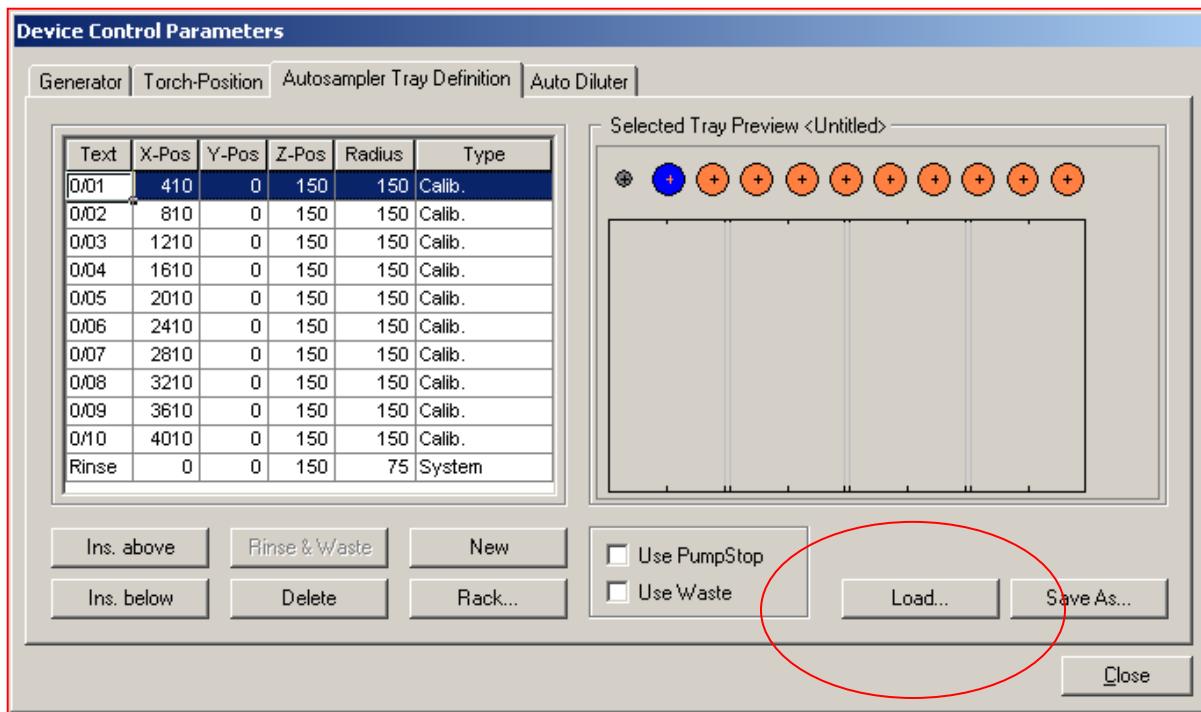


Figure 32: Autosampler Tray Definition Form.

If a change needs to be made in the tray-rack configuration then make the change in the ESI software and repeat steps 15) through16).

In some cases it may be necessary to modify a configuration file if errors are encountered when attempting to move to Rack0 locations. Follow these steps to correct this issue:

1. Locate and open the following file using Smart Analyzer Vision Config Edit: \Spectro Smart Studio\Smart Analyzer Vision\Config\SailInst_Devices.cfg.
2. Search for [AutoSampler]\X-position] and change the **.MaxValue** to **4600**.
3. Then, search for [AutoSampler]\Y-position] and change the **.MaxValue** to **2900**.
4. Click Apply then OK.

Element/Neptune and SC Autosampler

Software Installation:

- 1) Log on to the Element/Neptune's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. See Figure 33. Connect 24 VDC power to the SC Autosampler.

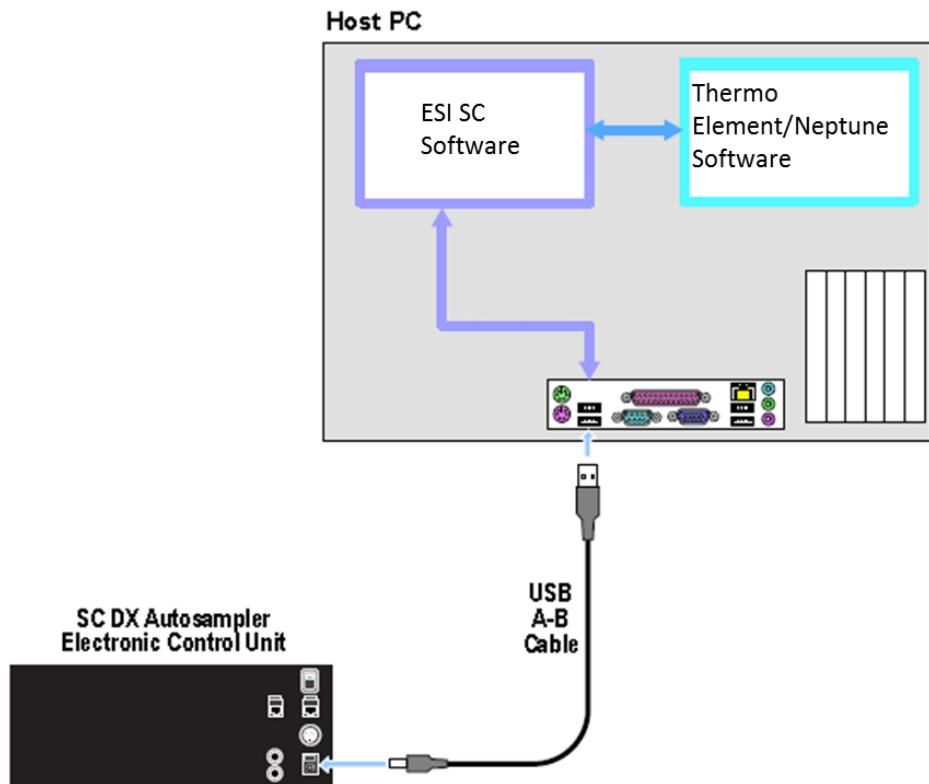


Figure 33: Connection options for Element/Neptune and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

System Settings:

Step 5 will be performed automatically but shown below for informational purposes.

- 4) Next, using **Start>>Control Panel>>System>>Hardware>>Device Manager>>Ports**. Locate the COM port this is currently used to control the autosampler, typically this is COM1, and rename to COM10.



To change a COM port number, right-click on the device then **Properties>>Port Settings>>Advanced**.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the Element/Neptune software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
 - a. Autosampler Model: Use the drop down to select the autosampler model.
 - b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Element/Neptune**.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.

Define the *Instrument COM Port* as **COM1**.

Next, click **SAVE>>OK>>OK**.

- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 10) Click the “**Initialize Autosampler**” button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list “Autosampler Initialized” and “Instrument COM port Opened”, check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >> Calibrate Autosampler >> Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) Using the **Executive** in the Thermo software, configure the rack layout by first selecting the ASX-500 as the autosampler. The specified rack types should match the corresponding rack in the ESI SC software.
 - a. In **Element** then click **Save**, define a new configuration name, and click **OK**
 - b. In **Neptune** then click the **Save Data in Files** button:  , define a new configuration name, and click **OK**
 - i. After saving you must then click the  button to load the new file into your Neptune software.



If custom racks are desired, please refer to technical document (TN160807).

iTEVA/TEVA and SC Autosampler

Software Installation:

- 1) Log on to the iTEVA/TEVA's host computer with Computer Administrator privileges if required. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Log on to the iTEVA/TEVA user account that will be used for daily operation.
- 3) Connect the USB cable from the computer the SC Autosampler. See Figure 34. Connect 24 VDC power to the SC Autosampler.

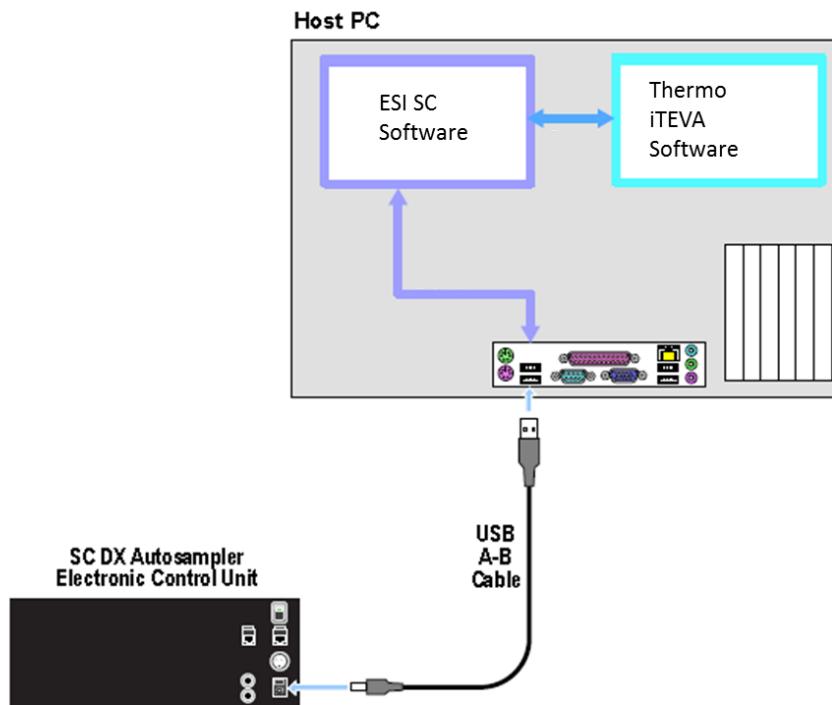


Figure 34: Connection options for iTEVA/TEVA and ESI SC with SC autosampler.

- 4) Turn on the SC Autosampler.

System Settings:

Steps 5-7 will be performed automatically but shown below for informational purposes.

- 5) Next, using **Start>>Control Panel>>System>>Hardware>>Device Manager>>Ports**. Locate the COM port this is currently used to control the autosampler, typically this is COM1, and rename to COM9.



To change a COM port number, right-click on the device then **Properties>>Port Settings>>Advanced**.

- 6) Locate the iTEVA or TEVA install directory depending on the instrument software.

If iTEVA for WindowsXP: Locate the **\Program Files\Thermo\iTeva\SysData**.

If iTEVA for Windows 7: Locate the **\Users\Public\Thermo\iTEVA\Autosamp**.

If TEVA: Locate the **\SysData** folder in TEVA install directory.

Rename existing **AutoSamplerConfigurations.xml**, **AutoSamplerRacks.xml**, and

AutoSamplerConfigurationSets.xml files adding a prefix "orig_".

- 7) Copy support files.

If iTEVA for WindowsXP: Copy all *.xml files located in **\Program Files\ESI\ESI**

SC\SupportFiles\iTEVASupportFiles into the **\Program Files\Thermo\iTeva\SysData** directory.

If iTEVA for Windows 7: Copy all *.xml files located in **\Users\Public\ESI\ESI**

SC\SupportFiles\iTEVASupportFiles into the **\Users\Public\Thermo\iTEVA\Autosamp** directory.

If TEVA: Copy all *.xml files located in **\Program Files\ESI\ESI SC\SupportFiles\TEVASupportFiles** into the **\iTeva\SysData** directory.

- 8) Start the **iTEVA/TEVA Control Center** and configure under **Tools>>Instrument Options>>Autosampler**. Select Cetac ASX-520 or Cetac and COM 4 as the current sampler. Verify that "Auto Sampler Emulation" is not checked and click **OK**.

Autosampler Configuration:

- 9) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the iTEVA/TEVA software must not be running.

Steps 10-12 will be performed automatically but shown below for informational purposes.

- 10) Configure the SC Autosampler by selecting **Configure>> Autosampler**.

- a. Autosampler Model: Use the drop down to select the autosampler model.
- b. Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Thermo TEVA/iTEVA**. The user will then browse for the location of the "AutoSamplerConfigurations.xml" and select. Typically, this folder is located in:
 - iTEVA on Windows XP: "\Program Files\Thermo\iTeva\SysData"
 - iTEVA Windows 7: "\Users\Public\Thermo\iTEVA\SysData"
 - TEVA: located in the TEVA install directory.

- 11) Configuration File: Click the **Save File** button.

- 12) In the ESI SC window select **Communication**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.

Define the *Instrument COM Port* as **COM4**.

Next, click **SAVE>>OK>>OK**.

- 13) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.

- 14) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.

- 15) On the main ESI SC window, verify the rack and rinse parameters.

- a. **Probe Down Height**: Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
- b. **Retraction Speed**: Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
- c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 16) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 17) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 18) Exit the Calibration window.

Host Software Configuration:

- 19) Using **iTEVA/TEVA Control Center>Applications>Analyst>Sequence>Auto-Session>New Autosampler**, the **Cetac by ESI** choice will be available for the SC model to control. Click OK, a graphic representation of the SC Autosampler layout will appear.



- 20) Connect the autosampler using the connect icon . Move SC Autosampler by right-clicking on vial location and selecting "Go to..." to verify that control is established.

PlasmaLab and SC-Autosampler

Software Installation:

- 1) Log on to the instrument host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the SC-Autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable between the SCDX autosampler and an available USB port on the instrument computer. See Figure 35.

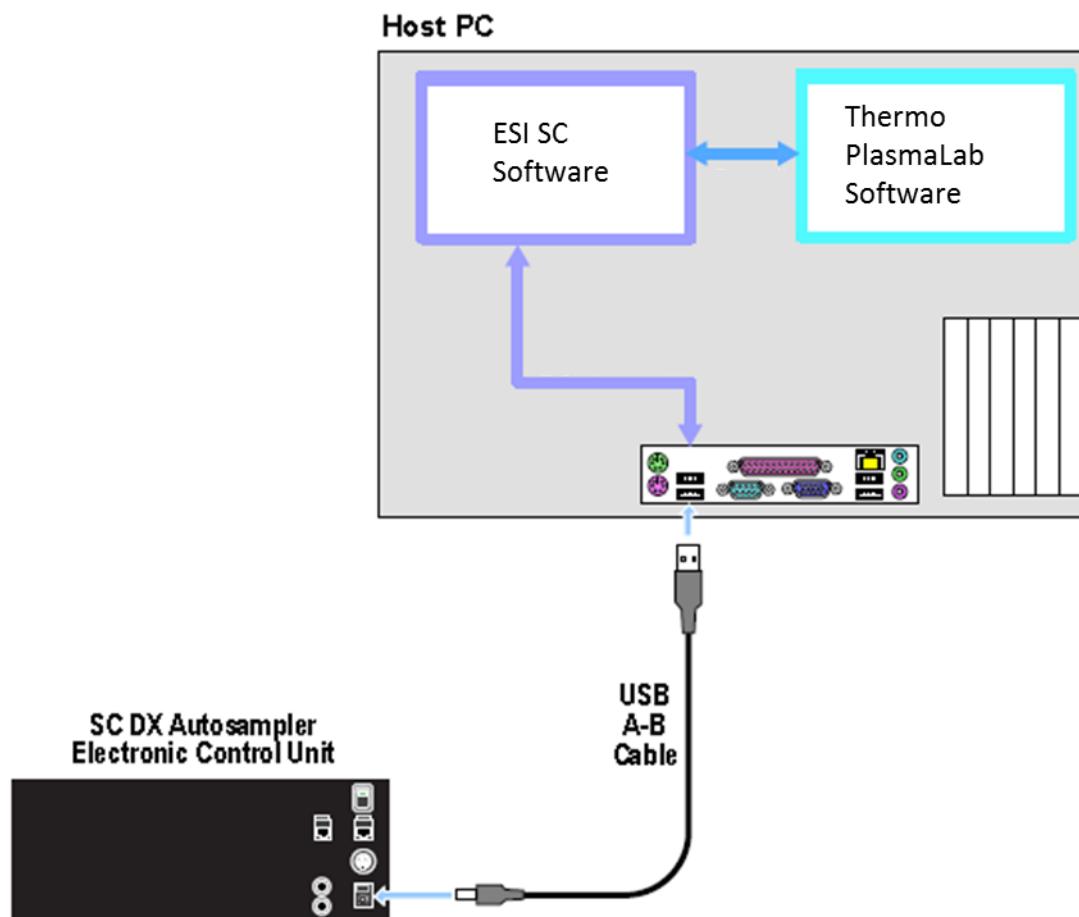


Figure 35: Connection options for PlasmaLab and ESI SC with SC-Autosampler.

- 3) Turn on the SC-Autosampler.

Autosampler Configuration:

- 4) Start the ESI SC Software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC-Autosampler must be powered on and the PlasmaLab software must not be running.
- 5) In the main window, select **Communication** menu option. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC-Autosampler is found the appropriate value will be placed in the *SC COM Port* value.
Define the *Instrument COM Port* as **COM8**.
Next, click **SAVE>>OK**.
- 6) In the main window, click the "**Initialize Autosampler**" button. Refer to the bottom line of the main window to ensure "Autosampler Initialized" and "Instrument COM port Opened" appears. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 7) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 8) In the main window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 9) In the main window, select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Place the probe in holder so the tip is just above the top surface of the autosampler.
- 10) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 11) Exit the Calibration window by clicking **OK**.

Host Software Configuration:

- 12) Using **PlasmaLab**, configure the rack layout using the **Instrument>>Configurations>>Configuration Editor** tab in the PlasmaLab software. Select the Cetac 500 from the **Available Accessories & Devices**.

- PlasmaLab 2.x: If this device is not present in PlasmaLab 2.0, run the  Accessory Wizard and add the Cetac 500 or Cetac 500ER. The device should be set to COM8, 9600 and the racks should match the layout of the ESI SC. Please note that if you plan to use more than 4 racks on the SC, the Cetac 500ER must be used. After configuration, click Next and Finish.
- PlasmaLab 1.x: If this device is not present in PlasmaLab 1.0, choose **Instrument>>Accessories** then **Add>>** the Cetac 500 from the **Available Devices**. The device should be set to COM8, 9600 and the racks should match the layout of the ESI SC.

- 13) In PlasmaLab 2.0, place a check on the Autosampler Accessory to be used and click the icon: 

- 14) **Accessory setup and control**, click on the **Connect and initialize autosampler** icon  to verify control of SC-Autosampler.

In PlasmaLab 1.0, select **Instrument>>Accessories**, then **Device Configuration>>Control>>Initialize** to verify control of SC-Autosampler.

-  If configuring a SC-14 autosampler, please refer to (TN120814)—found by clicking **About>>About ESI SC** menu option in the main window or by double clicking on **ESI SC Manual.pdf** located in "\Program Files\ESI\ESI SC\SupportFiles".

****Qtегра

Qtegra and SC-Autosampler

Software Installation:

- 1) Log on to the instrument host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the SC-Autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable between the SCDX autosampler and a USB port on the instrument computer. See Figure 35.

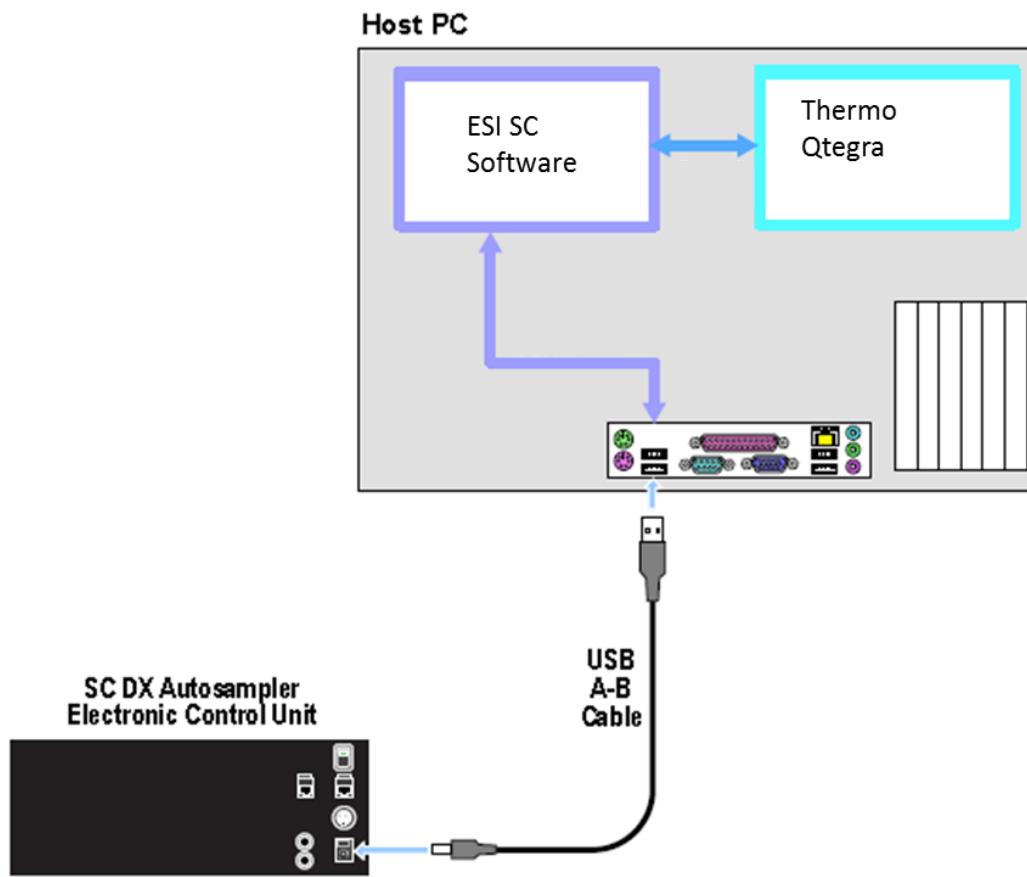


Figure 36: Connection options for Qtegra and ESI SC with SC-Autosampler.

- 3) Turn on the SC-Autosampler.

Autosampler Configuration:

- 4) Start the ESI SC Software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC-Autosampler must be powered on and the Qtegra software must not be running.
- 5) In the main window, select **Configure>>Autosampler** menu option. Under **Instrument Type** select "**Thermo VG (Plasma Lab)**" from the drop-down options. Then be sure to click "**Save File**" to save this configuration.
- 6) In the main window, select **Communication** menu option. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC-Autosampler is found the appropriate value will be placed in the *SC COM Port* value. Define the *Instrument COM Port* as **COM8**.
Next, click **SAVE>>OK**.
- 7) In the main window, click the "**Initialize**" button. Refer to the bottom line of the main window to ensure "Autosampler Initialized" and "Instrument COM port Opened" appears. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 8) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 9) In the main window, verify the rack and rinse parameters.
 - d. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - e. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - f. **Rinse Settings:** **Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of "-1" in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 10) In the main window, select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Place the probe in holder so the tip is just above the top surface of the autosampler.
- 11) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 12) Exit the Calibration window by clicking **OK**.

Host Software Configuration:

- 13) Using Qtegra, open the **Configurator** program, select the **Experiment Configurator** tab, then select your current configuration. Next, drag and drop the **Cetac ASX-520** instrument into your configuration. See Figure 37.

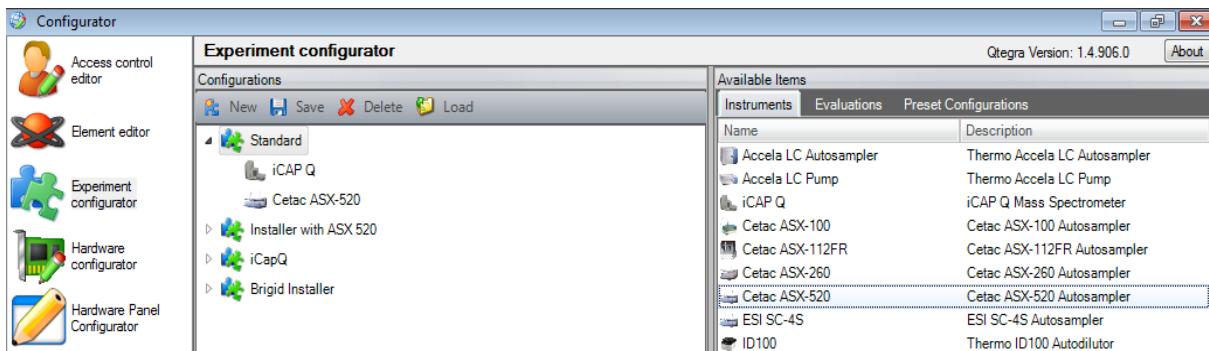


Figure 37: Configurator setup.

- 14) Next, right-click the newly added **Cetac ASX-520** and select **Edit Settings...** here you will configure the default racks to be used, these must match what was selected in ESI SC. Set the **Com Port** to COM8 (matching the “**Instrument COM Port**” in ESI SC). See Figure 38. Click **OK** and then **Save** your new configuration.

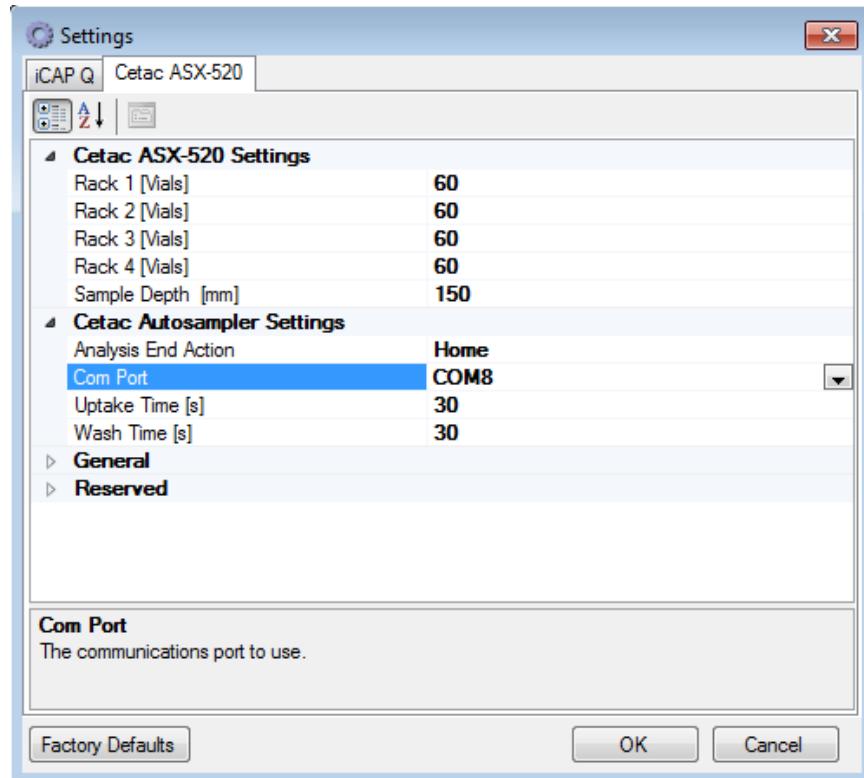


Figure 38: Edit autosampler settings.

- 15) Using Qtegra, open the **Instrument Control** software and select your new **Experiment Configuration** from the drop down list. Next, select the **CetacASX520** hardware tab. Here you can verify the configuration by manually moving to positions, by simply clicking on the vial you desire. See Figure 39.

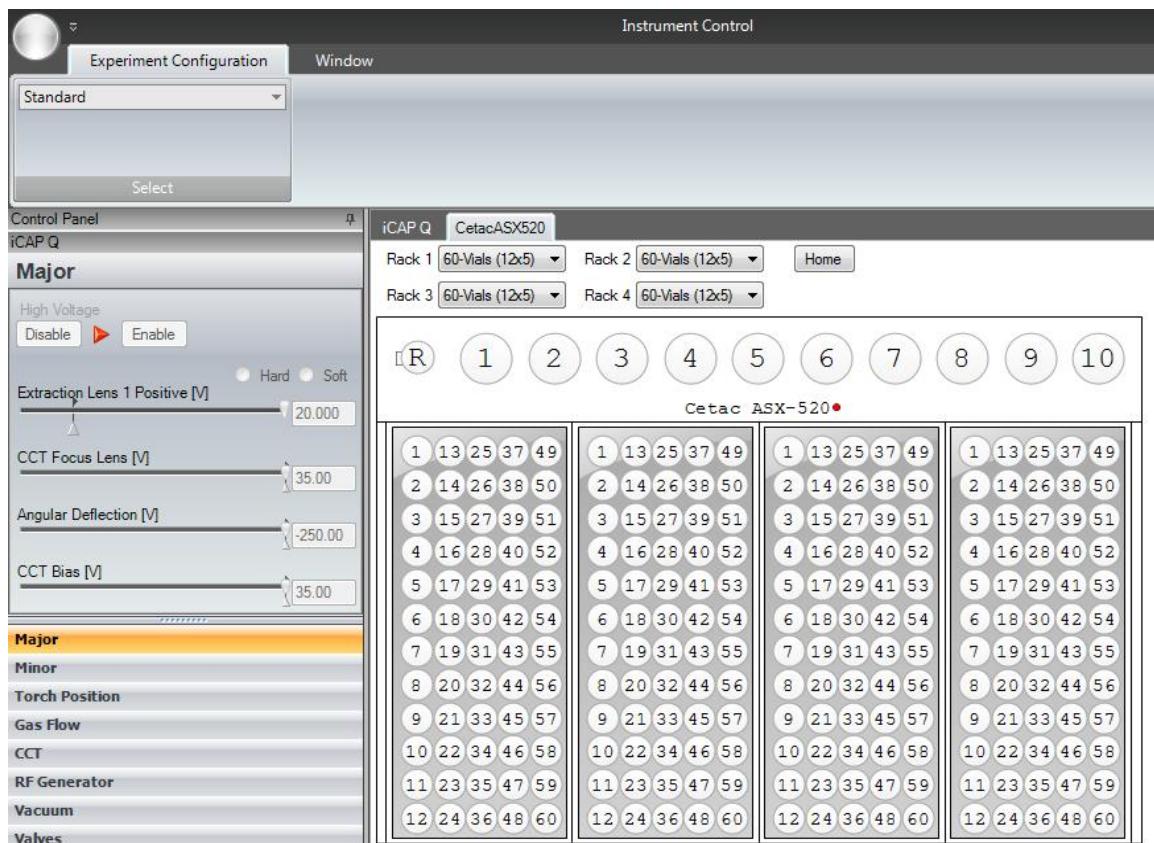


Figure 39: Autosampler control.

ICP Expert I & II and SC Autosampler

Software Installation:

- 1) Log on to the ICP-Expert's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. See Figure 40. Connect 24 VDC power to the SC Autosampler.

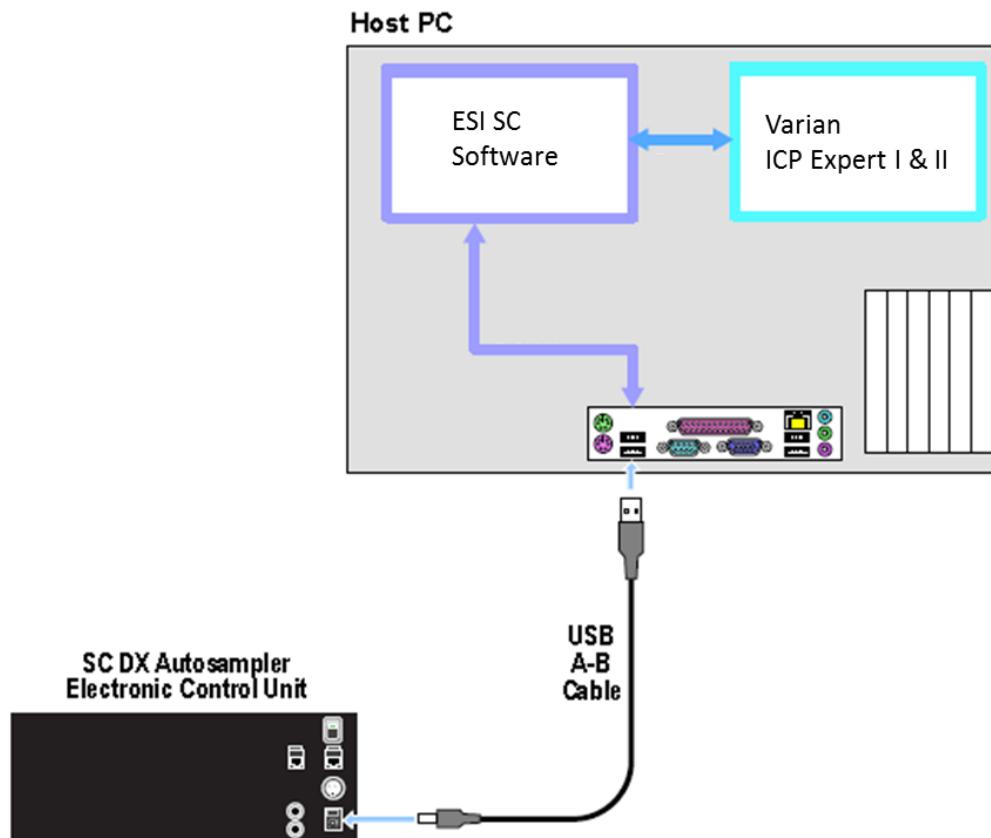


Figure 40: Connection options for ICP-Expert and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

Autosampler Configuration:

- 4) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the ICP-Expert software must not be running.
- 5) In the ESI SC window select **Communication**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.
Next, click **SAVE>>OK**.

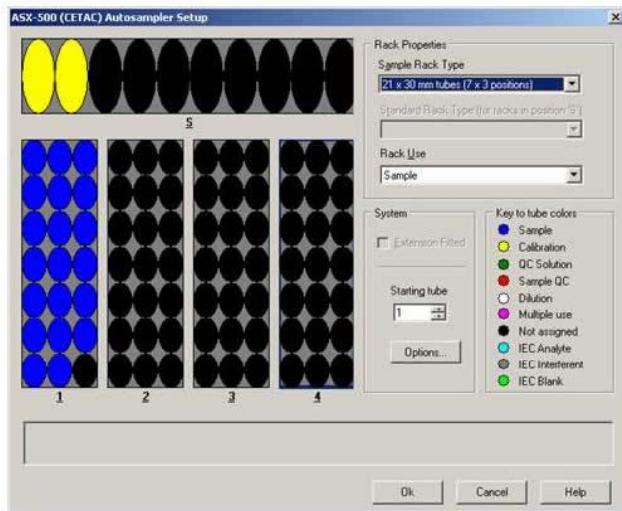
- 6) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type.
- 7) Click the “**Initialize Autosampler**” button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list “Autosampler Initialized” and “Instrument COM port Opened”, check connections and COM port settings and retry.
- 8) On the main ESI SC window, verify the rack and rinse parameters.
 - a. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
 - b. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
 - c. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

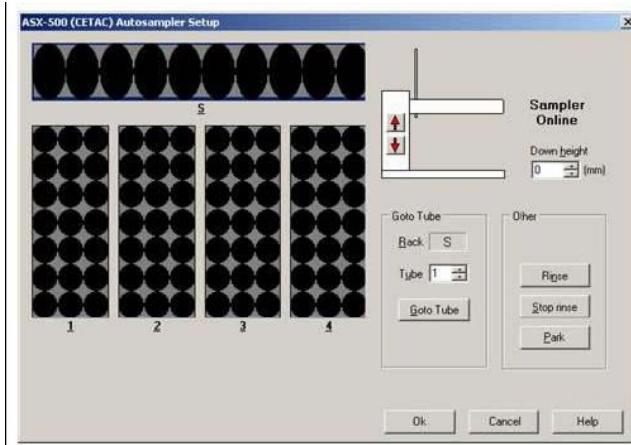
- 9) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 10) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 11) Exit the Calibration window.

Host Software Configuration:

- 12) Configure the ICP-Expert to use the ASX-500 as the autosampler. Select **Options>>Preferences>>Autosampler**. This will be the same as the Instrument port in the ESI SC software. (Note that the Varian ICP Expert can only use COM1 to control the autosampler.)
- 13) Configure the Varian rack layout using the **Sequence>>Autosampler Setup** window in the ICP-Expert software. The specified rack dimension type should match the corresponding rack in the ESI SC software.



14) Verify control using ICP Expert>>Window>>Autosampler.



If communication loss is a problem, please refer to technical document (TN030308).

ICP-MS Expert and SC Autosampler

Software Installation:

- 1) Log on to the ICP-MS Expert's host computer with an account that has Administrator privileges. Install the ESI SC software using the CD provided with the autosampler. The Installer will automatically start and provide instructions during the installation. If the installation does not begin automatically, using Windows Explorer, navigate to the CD and double-click on the file **Setup.exe** to begin installation. Be aware that during the start of the install, periods of apparent inactivity may occur while the installer determines the computer's configuration. Please wait while this process takes place.
- 2) Connect the USB cable from the computer to the SC Autosampler. See Figure 41. Connect 24 VDC power to the SC Autosampler.

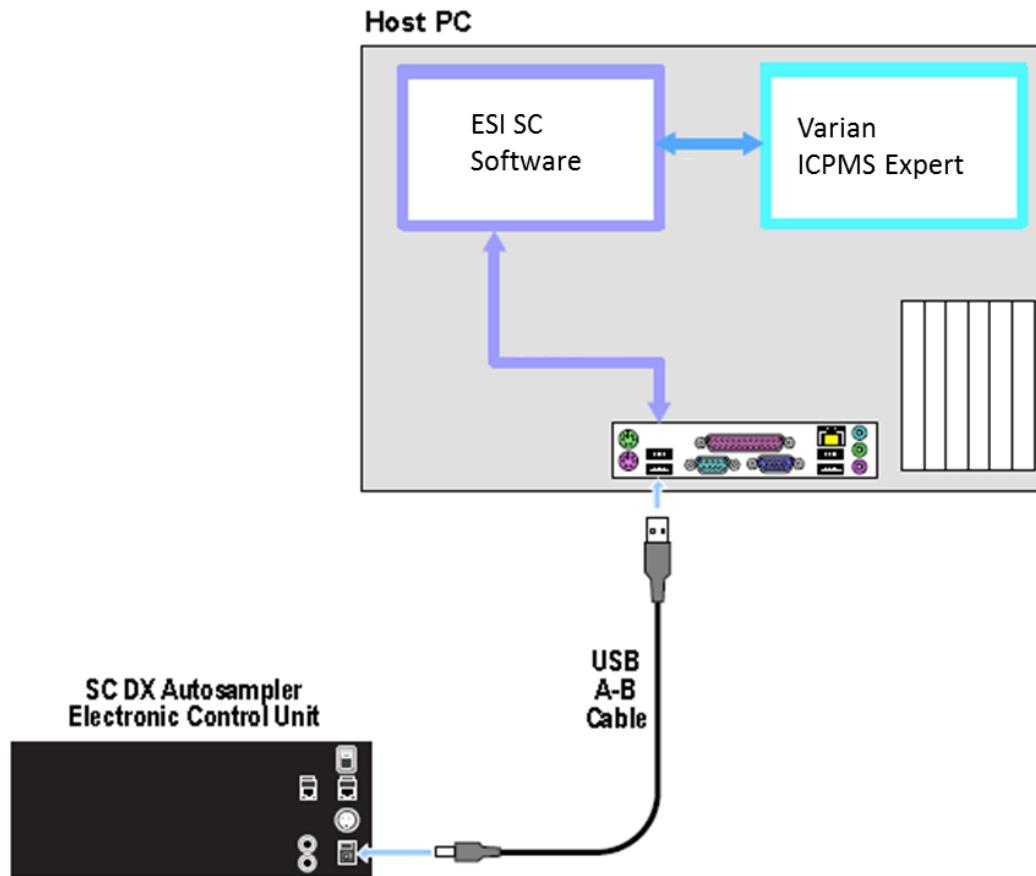


Figure 41: Connection options for ICP-MS Expert and ESI SC with SC autosampler.

- 3) Turn on the SC Autosampler.

System Settings:

Step 5 will be performed automatically but shown below for informational purposes.

- 4) Next, using **Start>>Control Panel>>System>>Hardware>>Device Manager>>Ports**. Locate the COM port this is currently used to control the autosampler, typically this is COM1, and rename to COM9.



To change a COM port number, right-click on the device then **Properties>>Port Settings>>Advanced**.

Autosampler Configuration:

- 5) Launch the ESI SC software. Click on the desktop icon 'ESI SC' or select from **START>>Elemental Scientific** program group. Please note that the SC Autosampler must be powered on and the ICP-MS Expert software must not be running.
- 6) Configure the SC Autosampler by selecting **Configure>>Configure Autosampler**.
- Autosampler Model: Use the drop down to select the autosampler model.
 - Instrument/Autosampler Emulation: Use the drop-down to select the instrument that will control the autosampler. Verify that the instrument chosen is **Varian ICPMS**.
 - Autosampler Type: Please note that the SPS3 emulation can be used for the SC-2 autosampler only, the ASX-500 emulation can be used for all autosamplers. To enable the ASX-500 emulation, **Configure>>Autosampler** and change "Autosampler Type" as required.
- 7) Configuration File: Click the **Save File** button.
- 8) In the ESI SC window select **Communications>>Configure Communications**. Select **AutoConfigure** to permit the ESI Software to automatically determine what COM ports are available. When the SC autosampler is found the appropriate value will be placed in the *SC COM Port* value.
Define the *Instrument COM Port* as **COM1**. This will match the COM port chosen in the Varian SPS3 or ASX-500 Autosampler window of the Varian software.

Next, click **SAVE>>OK>>OK**.

- 9) In the main window, click **Select Tray** to choose the desired rack layout. Click on the graphic for each rack to define rack type. It should be noted that if the SPS3 emulation is used, the Varian configuration may override the manually selected racks in the ESI SC software and automatically reset them to match the ICP-MS Expert.
- 10) Click the "**Initialize Autosampler**" button on the main window of the ESI SC software. Next, refer to the bottom line of the ESI SC Software to identify the current status of the autosampler. If the status does not list "Autosampler Initialized" and "Instrument COM port Opened", check connections and COM port settings and retry.
- 11) On the main ESI SC window, verify the rack and rinse parameters.

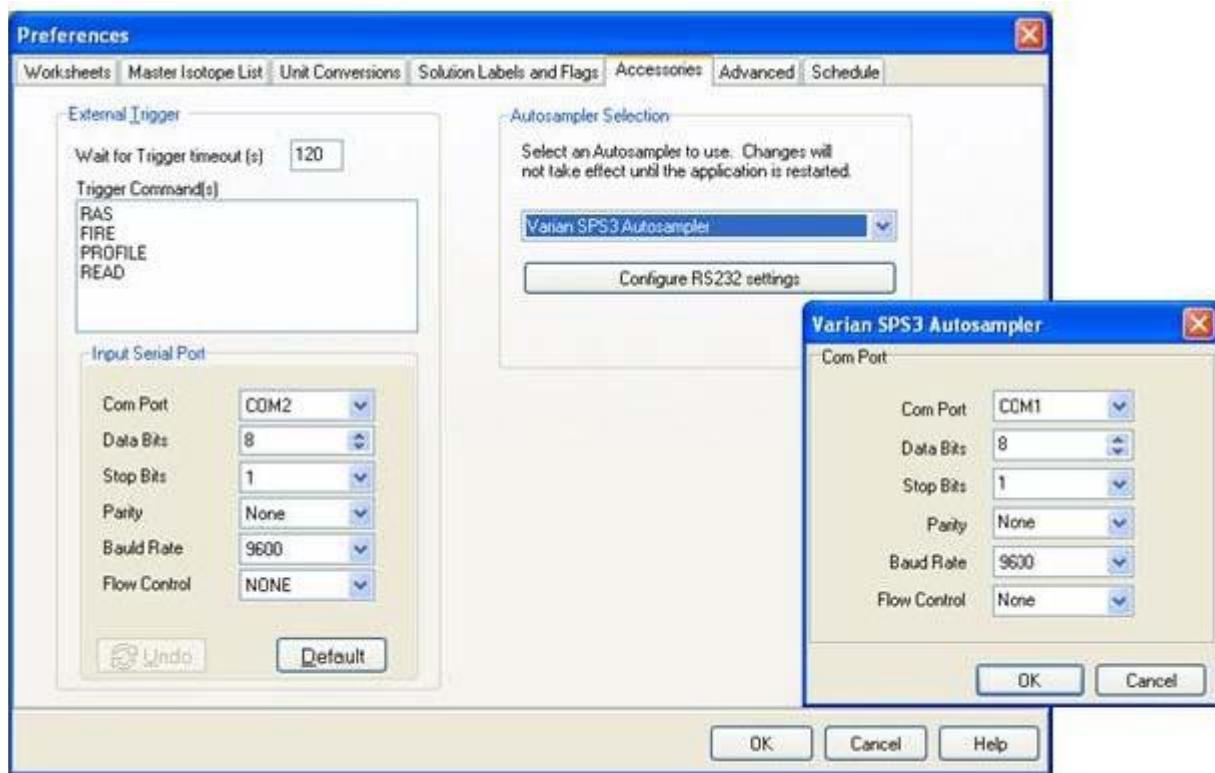
- d. **Probe Down Height:** Accessible by clicking on rack images. Displays distance that probe travels down from the top of z-axis. Values can be specified by rack/station after selecting rack/station graphic.
- e. **Retraction Speed:** Accessible by clicking on rack images. Set: 2 for viscous samples, 3 for normal samples, 4-5 for high speed.
- f. **Rinse Settings: Rinse Time** defines the amount of time that probe will remain in the rinse location. Typically, Rinse 2 time will be set to 0 as the instrument will instruct the SC when to move to the next location. A value of “-1” in either Rinse 1 or 2 will skip that station. **Additional Flush Time** is length of time rinse will continue to flow after the probe has left that station.

Autosampler Calibration:

- 12) Select **Calibrate >>Calibrate Autosampler >>Go To Calibration Point**. Thread the autosampler probe through the arm holder and down through the probe holder. Set depth of probe to height of top.
- 13) Enter the X and Y offset values that were provided with documentation then select **Apply Calibration Offsets**. Next, select **Go To Calibration Point** and adjust if required using the Manually Move Probe buttons and select **Set Calibration**.
- 14) Exit the Calibration window.

Host Software Configuration:

- 15) Configure the ICP-MS Expert to use the SPS3 or ASX-500 as the autosampler matching the selection in step 6). Select **Preferences>>Accessories** and configure the RS-232 settings to indicate that COM1 is chosen. This will be the same as the Instrument port in the ESI SC software defined in step 8).



- 16) Configure the Varian rack layout using the **Sequence>>Sampling Setup** window in the ICP-MS Expert software. The specified rack dimension type should match the corresponding rack in the ESI SC software. If using the SPS3 emulation, configure using the 11-position standards rack. (Note position 11 will not be valid.).
- 17) Verify control using **ICP-MS Expert>>Window>>Autosampler Control**.

Software Overview

The ESI SC software must be running to enable the use of the SC system. Additionally, ESI recommends that the following order for start-up.

Starting order of configuration components:

- 1) Power on autosampler and any SC modules used.
- 2) Start the ESI SC software and verify that the SC system is initialized.
- 3) Start the instrument software.

Main Window

The main window contains following controls which may be used to configure the autosampler racks or enable/disable the FAST method. Additionally, the status bars will present current configuration information. Please refer to Figure 42: Main window of ESI SC software. The autosampler graphic will change to reflect the autosampler configured.

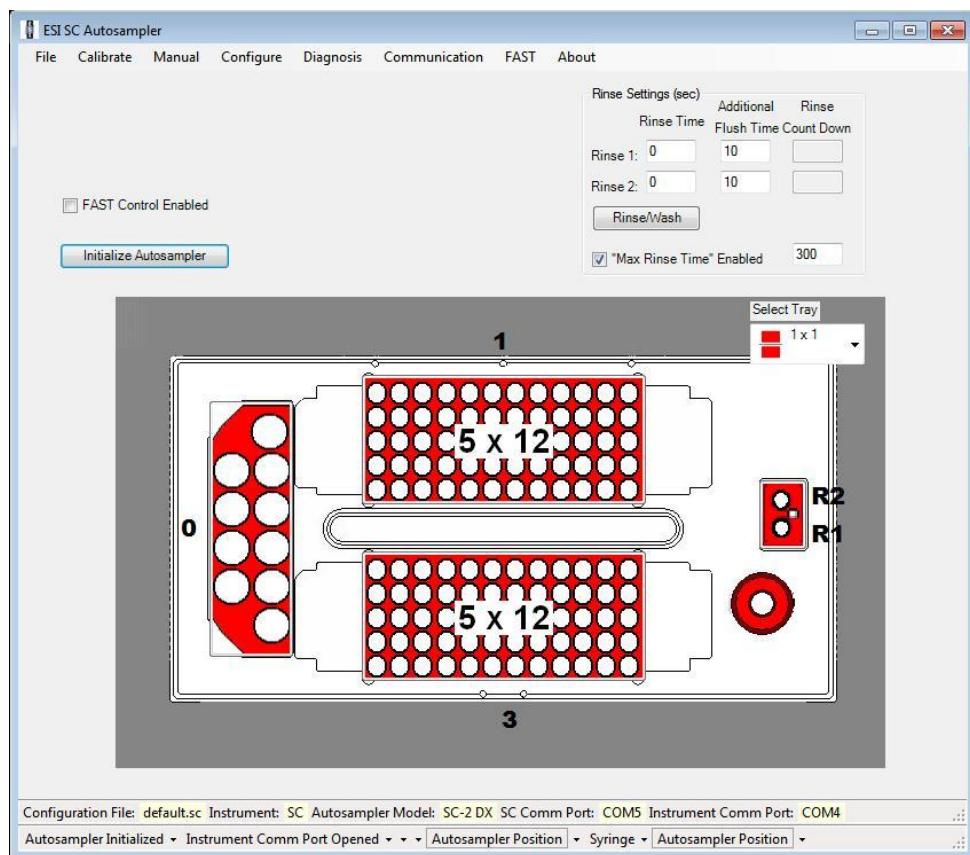


Figure 42: Main window of ESI SC software.

Configuration File: Configuration file currently loaded. All parameter modifications are applied immediately. If multiple configurations are to be used, create under a new name then modify as desired.

Instrument: Host or control instrument type.

Autosampler Model: Identifies the model of ESI SC autosampler.

SC COM Port & Instrument COM Port: Identifies the communication ports used.

FAST Control Enabled: Applies the FAST method as defined in the Configuration File. Refer to FAST menu.

Initialize Autosampler: Establishes communication between the ESI SC software and the SC Autosampler.

Rinse Time: Specifies the amount of time that the probe will spend at the rinse stations, this must not be longer than the rinse time set in the ICP/ICPMS software. A value of “0” in Rinse 1 will dip the sample probe into rinse station 1 (R1) then proceed to rinse station 2 (R2). If a value of “-1” is entered into rinse time, the sample probe will skip that rinse station. If FAST is not used, it is recommended to set Rinse2: Rinse Time to “0” thereby allowing the probe to move to R2 and remain until instructed by host instrument software to move to next sample.

Additional Flush Time: The amount of time the rinse solution will continue to flow after the sample probe leaves the rinse station.

Rinse/Wash: Will produce a probe rinse operation.

Max Rinse Time: If used, will establish a maximum time limit to any rinse flow. The time value can be set to a value that is longer than the time required by the ICP/ICPMS to process each sample. In this manner the flushing of the rinse stations will be controlled by the rinse settings and also shut down at the end of the sample sequence.

Select Tray: Specifies the rack layout.

Rack Configuration

Clicking on the graphic representing each of the racks will permit the user to place a desired rack from a given list as shown in Figure 43. When placing the chosen rack onto the image of the autosampler, options will be available depending on emulation and autosampler. Choices/settings available through the Rack window will include:

- Specification of the Retraction Speed for the rack. This is the speed of the probe as it retracts from the sample. A lower number is selected for viscous samples, while a higher number is used for rapid analysis.
- Specification of probe Down Height (probe depth). Heights can be independently set for the rinse station, standard positions and each rack.



For micro-volume samples, be sure to adjust the z-rail depth appropriately so that the sample probe is able to draw up the required sample: Click on **Manual** menu at top of main window in SC software. Select the rack number and vial number for the desired position and then click on **Move To Position** box. Once the sample probe arrives at the chosen position, click on +Z, or -Z to move the sample probe tip to the proper depth in the well. Once the appropriate height is acquired, click on **Set Probe Down Height**. This new depth setting is applied to the entire rack. If this depth is desired for all racks, check the **Apply To All Racks** box.

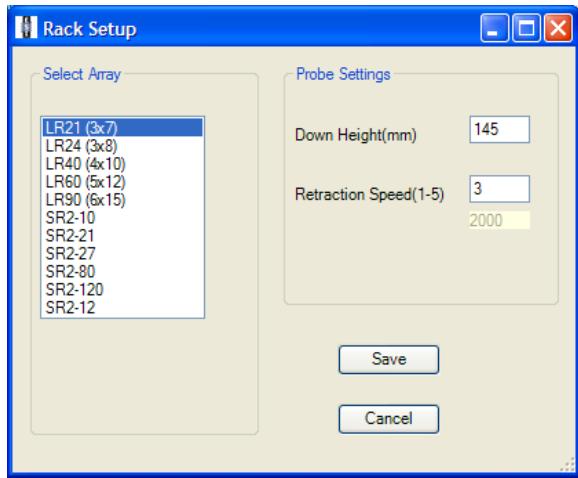


Figure 43: Rack Setup Window and settings.

Menu Items

The main window provides access to the following windows or selections:

File

This menu will allow the user to open or save a configuration file as well as close the application. The configuration files will permit the user or users to save multiple configuration files that contain information regarding rack layout and FAST method settings.

Calibrate

Once initialized, the calibrate menu will be available. It is necessary to calibrate the sampler arm before using the autosampler to ensure that the sample probe will locate the center of the vials. See Figure 44.

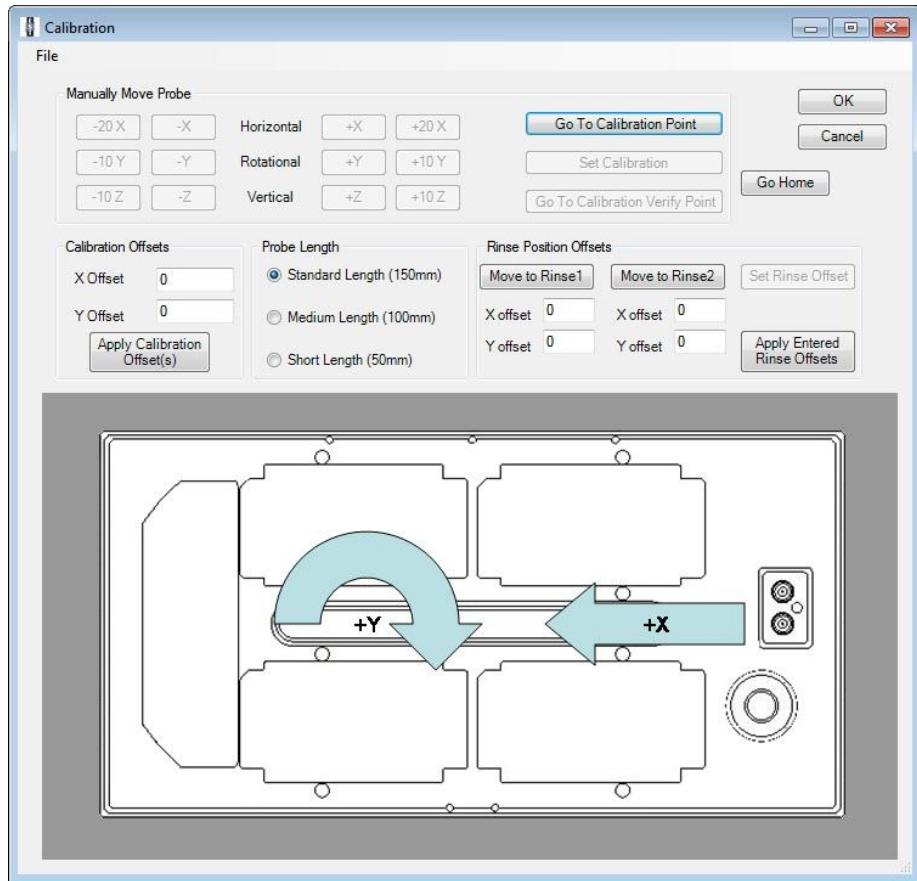


Figure 44: Calibration Window.

Go to Calibration Point: Commands the probe to move to last saved calibration position.

Set Calibration: Saves current probe position as the new calibration point.

Horizontal: The +20X and -20X buttons apply coarse adjustments to the probe location along the x-axis. The +X and -X buttons apply fine adjustments.

Rotational: The +10Y and -10Y buttons apply coarse adjustments to the probe rotational position. The +Y and -Y buttons apply fine adjustments.

Vertical: The +10Z and -10Z buttons apply coarse adjustments. The +Z and -Z buttons apply fine adjustments to the probe z-axis position. (WARNING: the sample probe may be damaged if lowered below the shelf surface.)

Calibration Offsets: Values used by the software to properly position the probe, accounting for mechanical and positional variances. These values are automatically entered by the computer when the Set Calibration button is pressed or the values may be manually entered and applied using the Apply Calibration Offset(s) button.

Probe Length: Establishes the probe length used. Standard length is 150mm.

Rinse Position Offsets: Secondary calibration procedure to ensure that the probe enters the center of the rinse stations.

Manual

The Manual Movement window allows users to manually move the probe to a desired location on the autosampler as well as adjusting the X, Y, and depth position of the sample probe. See Figure 45.

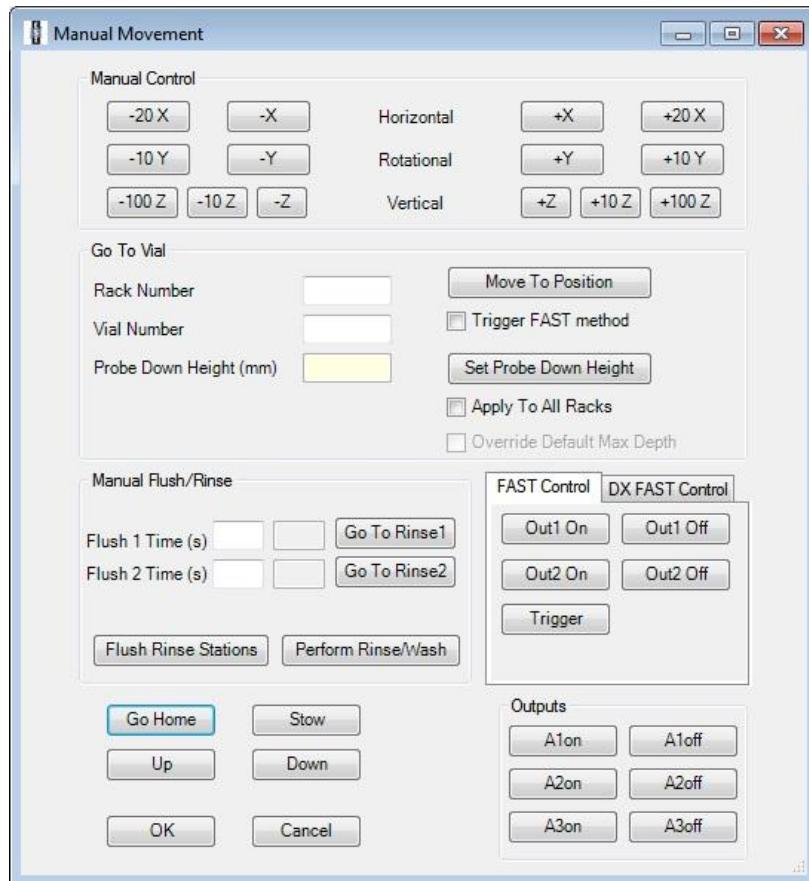


Figure 45: Manual Window.

The controls available through this window include:

Horizontal: The +20X and -20X buttons apply coarse adjustments to the probe location along the x-axis. The +X and -X buttons apply fine adjustments.

Rotational: The +10Y and -10Y buttons apply coarse adjustments to the probe rotational position. The +Y and -Y buttons apply fine adjustments.

Vertical: The +10Z and -10Z buttons apply coarse adjustments. The +Z and -Z buttons apply fine adjustments to the probe z-axis position. (WARNING: the sample probe may be damaged if lowered below the shelf surface.)

Rack Number & Vial Number: Allows a rack & vial location to be accessed by use of the **Move to Position** button.

Probe Down Height (mm): Displays of the current height of the z-axis arm.

Set Probe Down Height: Updates the Probe Down Height (mm) for the specified rack(s). This will apply the current z-axis depth to the rack. Checking the Apply To All Racks, will set this as the depth for all racks used. This setting will be reflected on the main window.

Flush Rinse Stations: Used to flush the rinse stations. Typically used before starting a run, or changing rinse solution. Enter time in seconds in both the Flush 1 and 2 time boxes.

Go To Rinse1 & Go To Rinse2: Moves the sample probe into the rinse stations.

Perform Rinse/Wash: Moves the probe through the configured wash operation.

FAST Controls: Provides access to controls defined in the FAST. Some models will provide additional tabs depending on installed devices.

Go Home: Moves the sample probe to the home position above rinse station.

Stow: Moves the autosampler probe away from all samples.

Up: Raises the probe arm.

Down: Lowers the probe arm.

Outputs: Allows manual control of ECU outputs A1, A2, and A3.

For micro volume samples, be sure to adjust the z-rail depth appropriately so that the sample probe is able to draw up the required sample: Click on Manual tab at top of main window in SC software. Click on rack number and vial number for the desired position and then click on Move To Position box. Once the sample probe arrives at the tube position, click on +Z, +ZZ, +ZZZ to move the sample probe tip to desired depth. Once the appropriate height is acquired, click on Set Probe Down Height. This new depth setting is applied to the entire rack. If this depth is desired for all racks, check the Apply To All Racks box.

Configure

This menu will allow configuration of devices on the system.

Configure>>Configure Autosampler

This window allows users to specify the control instrument and autosampler emulation. Additionally, the user also has access to speed settings for the sample arm and probe.

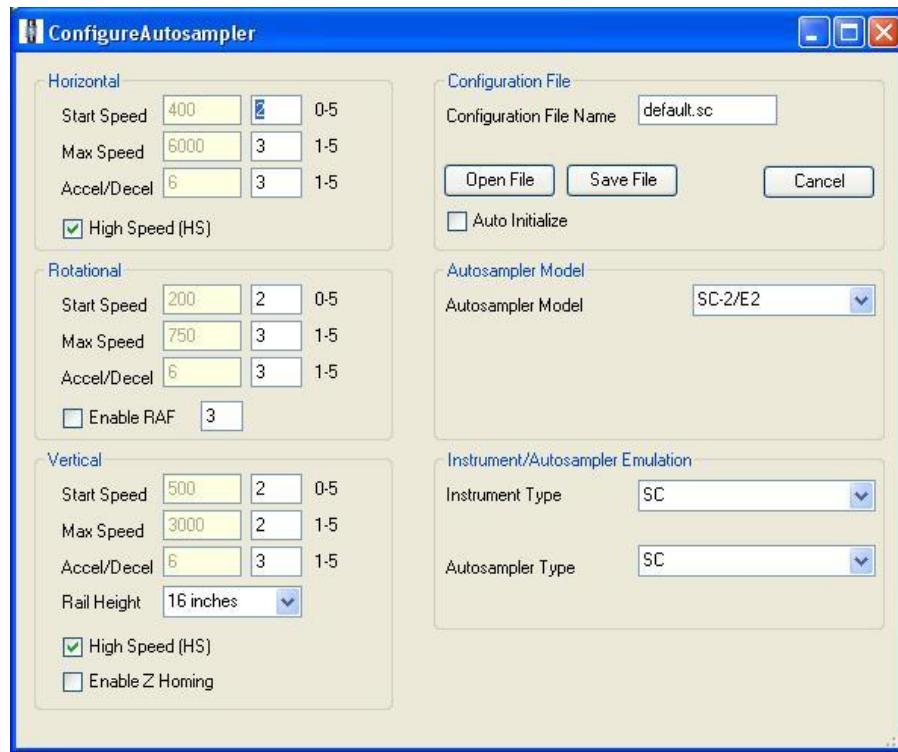


Figure 46: Configure Autosampler Window.

Configuration File Name: Indicates the name of the current autosampler configuration file. Saved files may be loaded by clicking on the “Open File” button and selecting the desired configuration file. To save any changes made to an existing file, click on the “Save File” button. To save a configuration under a new name, enter the name in the text box, then press the “Save File” button.

Auto Initialize: Enable to set the ESI SC to automatically initialize the SC autosampler when the program is started.

Autosampler Model: Indicates the current autosampler model being used. A drop-down menu allows users to select a different autosampler.

Instrument Type: Drop down menu lists the control instruments available.

Autosampler Type: Drop down menu identifies the autosamplers and/or conventions that are available for the chosen instrument.

Start Speed: Axis starting and stopping speed when moving sample probe. (1=slow, 5=fast)

Max Speed: Maximum axis speed when moving sample probe. (1=slow, 5=fast)

Accel/Decel: Rate at which movement changes speeds. (1=slow, 5=fast)

High Speed (HS): Depending on the autosampler, faster mechanical speeds may be possible. It is recommended to check this box if the serial number for the SC autosampler includes “HS”. For example, “X4-**HS**-SP...”

Enable RAF: When the Rotational Approach Function (RAF) is enabled, the approach to each position is adjusted by a small approach movement. This feature improves precision when accessing small tubes.

Rail Height: Depending on the autosampler, the configuration may require a different setting for the vertical travel of the probe. The configured length can be found in the serial number. In this example the vertical rail length is 18, "X4-HS-SP-18..."

Configure>>Configure Syringe

Configurations can be set for systems equipped with FAST syringes. See Figure 47.

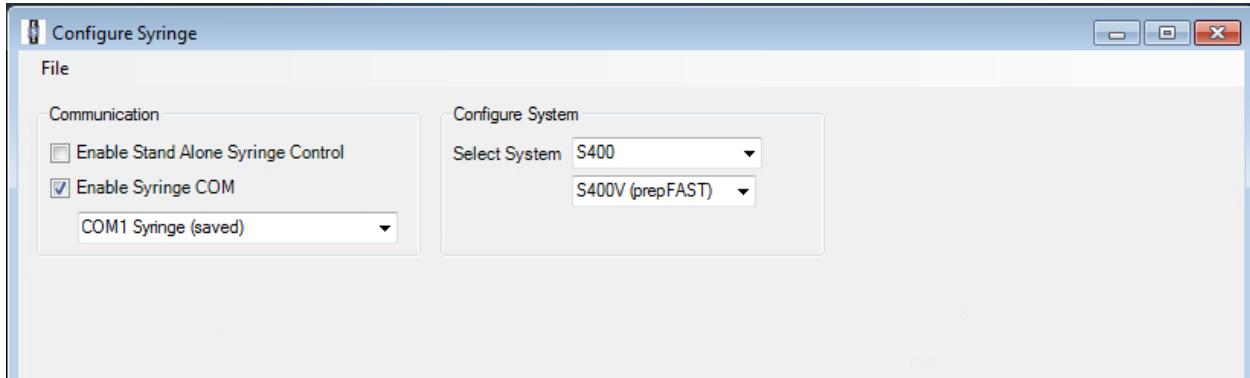


Figure 47: Configure Syringe window.

Syringe Type: Permits the selection of the syringe type. Options include syringe size, and selection for a continuous duty pairing.

Syringe Fill Rate: Enter value desired.

Syringe Dispense Rate: Enter value desired.

Enable Syringe: Enables or disables the Syringe device.

Enable Stand Alone Syringe Control: Enables the operation of syringe device(s) on systems without SC.

Enable Syringe COM Port: Specifies separate COM port address for Syringe(s) Control.

Syringe Manual Control: Will permit operation of syringe and syringe valve.

Syringe Initialize Parameters: Setting of Initialize Rate and specification of initial position of syringe when FAST system is initialized. Options included "Fully Dispensed", "Fully Filled", and "No Movement".

Syringe Priming Parameters: Setting of Priming Cycles and rate.

Configure>>Configure I/O

Advanced operations. Please consult application specific documentation.

Configure>>Configure Encoder

Future use.

Configure>>Configure Multi-FAST

This window permits the addition of “sample” positions for supported emulations. During the analysis sequence, each of the valves will be placed in the position as defined in the table. The entry labeled “Default” specifies the valve positions for sample positions not defined in the table. Since the FAST valve may be used for a normal analysis, a default position is not required.



Please note that functionality of this window may be limited depending on the instrument’s ability to add custom positions to the tray configuration.

In the following example, positions (0,50) through (0,53) will be added to the tray file used by the instrument. When samples other than those listed are to be analyzed Valve 1 and Valve 2 will be in positions 1 and 1 respectively. When position (0,52) is to be analyzed, the FAST valve will be placed in the Load position or position 2. Valves 1 and 2 will each be placed in positions 4 and 2 respectively. See Figure 48.

	Position (rr,vv)	Sample Name	Valve 1 (Ports 1 - 6)	Valve 2 (Ports 1 - 2)	FAST Valve
▶	0,50		2	2	2
	0,51		3	2	2
	0,52		4	2	2
	0,53		5	2	2
	Default		1	1	

Figure 48: Multi-Port Valve Configuration window.

Diagnosis

This menu provides access to information that will assist ESI technical personnel in troubleshooting the SC system.

Communication

This window, Figure 49, will provide access to manual and automatic configurations for the SC system.

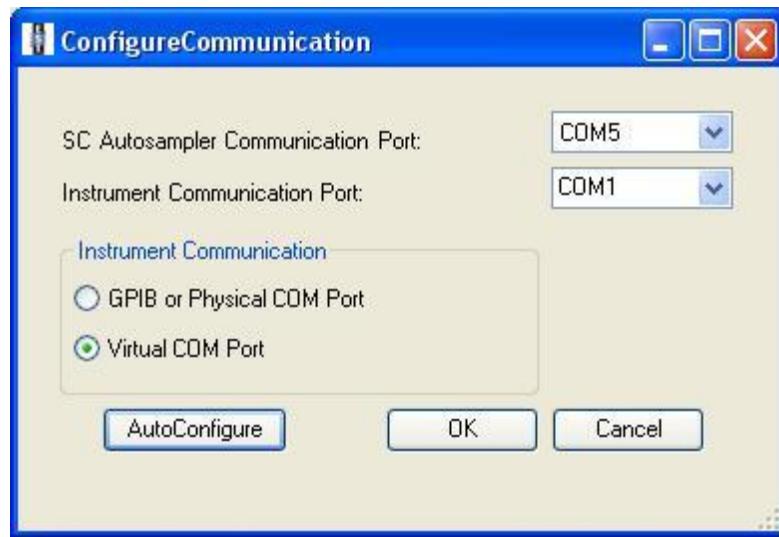


Figure 49: Configure Communication Window.

SC Autosampler Communication Port: Identifies the physical COM port where the SC autosampler is connected.

Instrument Communication Port: Identifies the physical or virtual COM port that the host (instrument) software uses to communicate to the ESI SC software.

Instrument Communication: Indicates the type of communication connection used. Depending on the emulation used, this option may not be available.

AutoConfigure: Clicking this button will allow the ESI SC to attempt to automatically configure the communication ports. However, not all instruments can be configured in this manner alone.

FAST

This window provides access to the FAST method assigned to the current SC configuration. The following controls are available to the user. See Figure 50.

- 1) A method can be opened or saved using the **File** menu.
- 2) **Method File Name** identifies the name of the current FAST method.
- 3) A FAST Method can be created by “Drag-and-Dropping” from the **Events** and **Actions** listings.
- 4) **Rinse Time (sec)** shows how long the probe will stay at the rinse station(s).
- 5) **Enable FAST Control** will activate or de-activate the FAST method from executing when instructions are received from the instrument. If not checked, the autosampler will behave as instructed by the instrument and no FAST features are enabled.
- 6) **Max Vacuum Time (s)** is the time limit that the vacuum will remain on at the end of an analysis sequence.
- 7) **FAST Control** will allow the user to manually operate the FAST valve and vacuum.

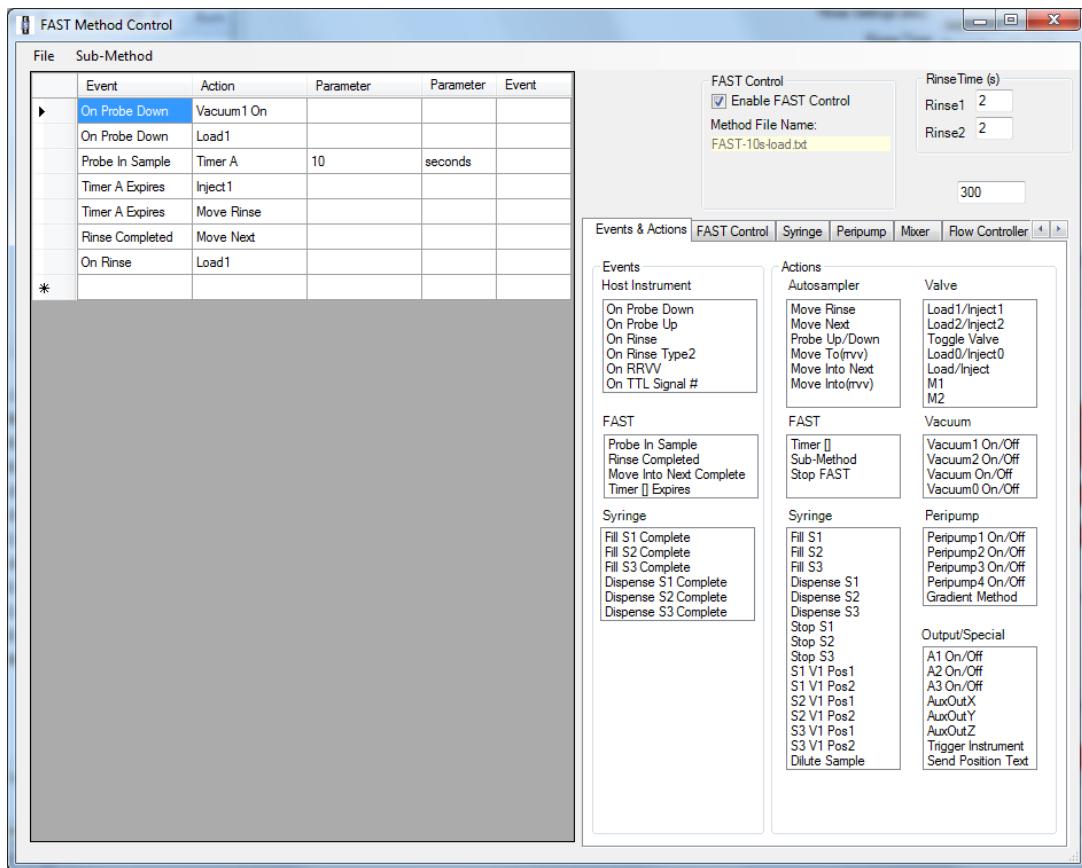


Figure 50: FAST method window.

Additional controls for syringe operations and I/O Device settings are available in assorted tabs.

About

The About menu will contain information regarding version number and will also provide access to help documents.

FAST Method Design

FAST methods enable advanced, customized automation for maximum sample introduction flexibility and utility. Understanding how a FAST method works and how to create or modify FAST methods allows laboratories to achieve maximum benefit from the FAST system. FAST automation includes but is not limited to the following devices:

- Valves
- Diaphragm Pumps
- Syringe
- Peristaltic Pump
- Customizable I/O

How a FAST Method is Activated

If the FAST is enabled through the ESI SC software, the current FAST method will be active any time an ICP/ICPMS instrument sends the SC probe to a location.

How a FAST Method is Defined

FAST methods have three basic components: **Events**, **Actions**, and **Parameters**. When an **Event** occurs, any and all **Actions** associated with that event, in the FAST method, will occur. Some **Events** and **Actions** have associated **Parameters**, which provide the software with essential information about that **Event** or **Action**. For example, **Actions** such as timers have parameters that set the length of the timer.

FAST methods are built by drag-and-drop from the list of Events and Actions. If an Action or Event requires a parameter, type it in the appropriate column.

FAST methods are written by assigning an **Action** to an **Event**, and therefore it is not required that the list be written sequentially. For example, the following two methods will perform identically:

Method 1:

	Event	Action	Parameters	Parameter Units	Event Parameter
▶	On Probe Down	Load1			
	On Probe Down	Timer A	10	seconds	
	Timer A Expires	Inject1			
*					

Method 2:

	Event	Action	Parameters	Parameter Units	Event Parameter
▶	Timer A Expires	Inject1			
	On Probe Down	Timer A	10	seconds	
	On Probe Down	Load1			
*					

In both of these FAST methods, when the ICP/ICPMS instrument sends the SC probe to a location (Event: **On Probe Down**), valve 1 is switched to load (Action: **Load1**) and Timer A is started (Action: **Timer A**). When Timer A expires (Event: **Timer A Expires**), then valve 1 is switched to inject (Action: **Inject1**).

Basic FAST Method

A typical sample analysis will consist of a FAST method as outlined in Method 3 below.

	Event	Action	Parameter	Parameter Units	Event Parameter
a) 1	On Probe Down	Vacuum1 On			
b) 2	On Probe Down	Load1			
c) 3	Probe In Sample	Timer A	10	seconds	
d) 4	Timer A Expires	Inject1			
e) 5	Timer A Expires	Move Rinse			
6	Rinse Completed	Move Next			
7	On Rinse	Load1			
►* 8					

Method 3: Basic FAST Method

The arrangement of the FAST method associates corresponding Actions in the second column, to Events defined in the first column. Parameters if required, can be entered/modifies in the third column. In the example from Method 3, the following lines result in the following actions or movements of FAST components:

- a) When the host instrument instructs the probe to move down into sample (**On Probe Down**), the vacuum will turn on (**Vacuum1 On**) and the FAST Valve will move to the Load position (**Load1**).
- b) When the probe reaches the bottom of the sample tube (**Probe In Sample**) a timer is started that will expire after 10 seconds, (**Timer A**)(10).
- c) When (**Timer A Expires**) the FAST Valve will move to the Inject position (**Inject1**) and the autosampler will be instructed to wash/rinse the probe, (**Move Rinse**).
- d) When the autosampler has finished the wash/rinse, (**Rinse Completed**), the autosampler will be instructed to move over the next predicted sample tube (**Move Next**).
- e) When the host instrument sends a wash/rinse instruction (**On Rinse**), the FAST valve will move to the Load position (**Load1**).

When using this method it is important to verify that the wash/rinse time in the ICP/ICPMS is long enough to allow the sample loop to evacuate completely.

Typical Sample Analysis

The typical sample analysis will consist of configuring the loading and injecting of a loop of sample to the nebulizer. In addition, the FAST software will manage the operations of the FAST valve, vacuum, and autosampler, while synchronizing to the control of the host software that manages the instrument. The two basic arrangements of the system and liquid flow paths are illustrated in the following diagrams.

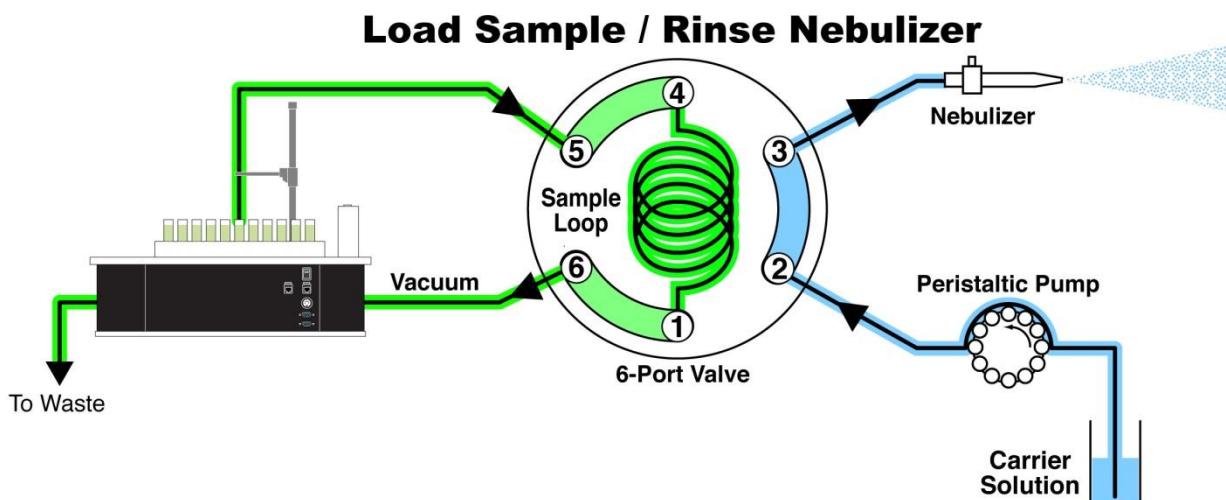


Figure 51: Load position.

At the beginning of a sample analysis, the vacuum will rapidly draw sample through the autosampler probe and Load the loop. At the same time the instrument's peristaltic pump will advance clean carrier solution to nebulizer.

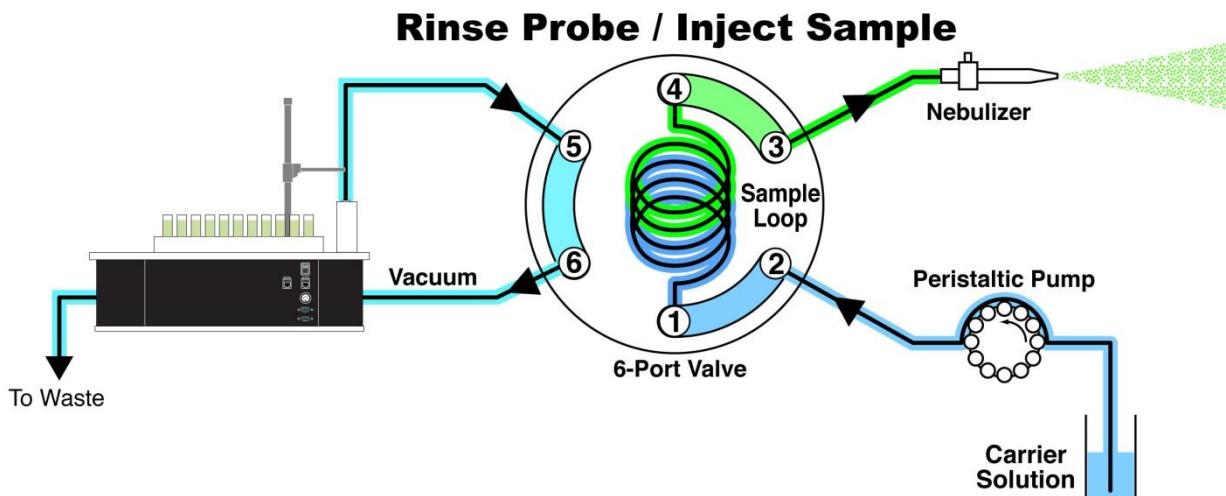


Figure 52: Inject Position.

With a full loop of sample, the valve will then be switched to the Inject position where the clean carrier will advance the sample volume to the nebulizer via the peristaltic pump and therefore to the instrument to be analyzed. In a well configured system the FAST valve will be positioned as close as possible to the nebulizer therefore reducing the time necessary for the sample to arrive at the nebulizer.

The resulting benefits to a sample analysis due to the implementation of the FAST can include the following:

- 1) Reduced sample analysis time. Refer to Figure 53: Example of reduced analysis time. Shown is an example of how the analysis time is reduced.
- 2) Reduced instrument maintenance. Since the sample loop is the only sample volume that is presented to the spray chamber, system maintenance /cleaning is reduced since less "dirty" sample material will deposit on surfaces such as cones.

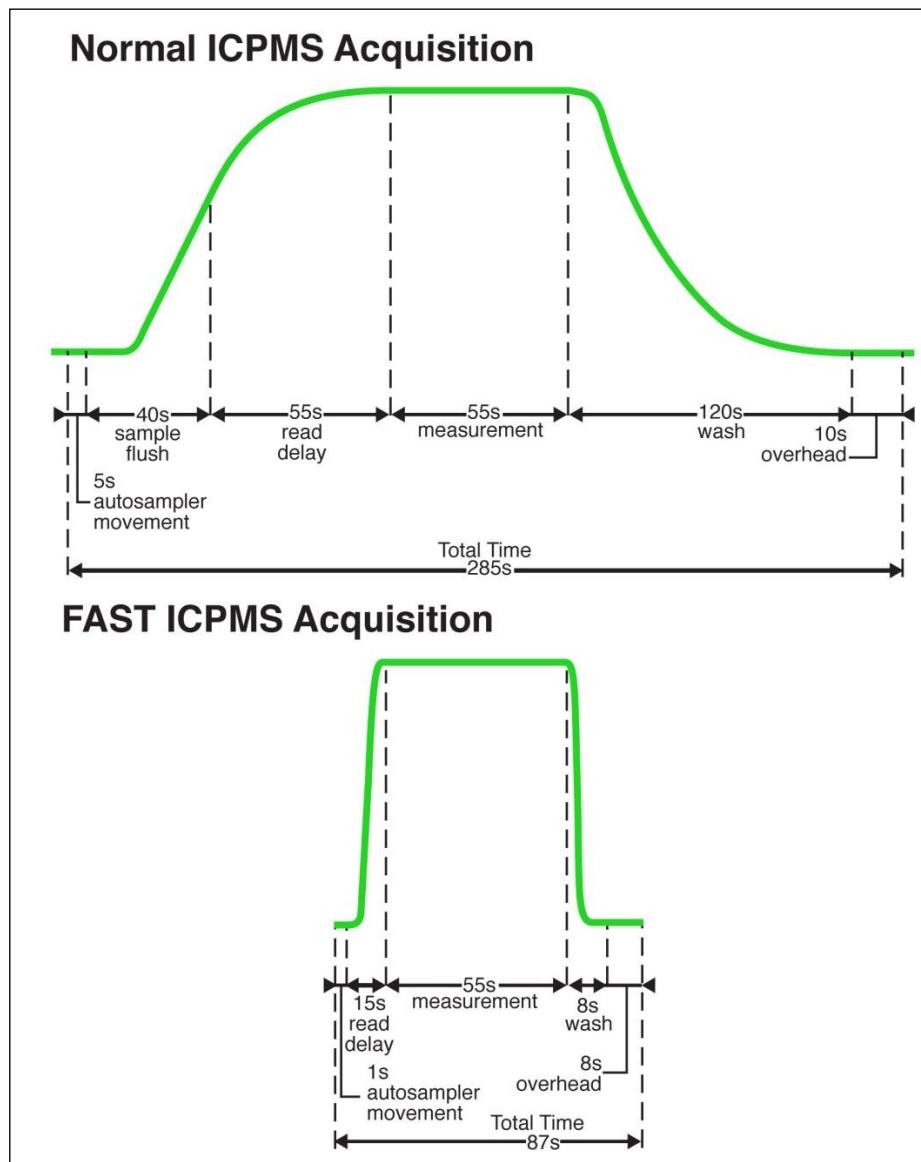


Figure 53: Example of reduced analysis time.

Tuning the Instrument when connected to FAST

If the instrument requires routine calibration, this can be accomplished by moving the carrier probe from the carrier solution and placing it in the “tuning” solution. Simply place the probe back into the carrier in preparation for sample analysis. Note: It is recommended to wipe and place the probes in rinse solution momentarily to reduce contamination of solutions.

Important Design Criteria for a Basic FAST Method

The following should be considered when improving performance and increasing throughput with the use of the FAST system.

The basic elements of a sample analysis consist of 1) autosampler movement, 2) sample uptake time, 3) stabilization time, 4) measurement time, 5) instrument overhead time, and 6) rinse/wash time. The FAST system can reduce sample analysis time by efficiently transporting the sample to the nebulizer and simultaneously rinsing the transport line and probe while the instrument is analyzing the sample.

Use the smallest loop possible that will provide enough sample volume for analysis.

Higher sample throughput and shorter sample analysis times require the selection of a loop that will both provide an adequate sample volume for measurement and be as small as possible to reduce loading time and rinse times.

Setting Read-Delay

The optimum “Read-Delay” should be determined so that the ICP method can start measurements as soon as the signal intensity has stabilized. The effective “Read-Delay” time in the instrument method should be long enough to permit the following sequence of events to occur:

- a) Loop Load time in the FAST method,
- b) Sample travel time from valve to nebulizer,
- c) Signal stabilization time.

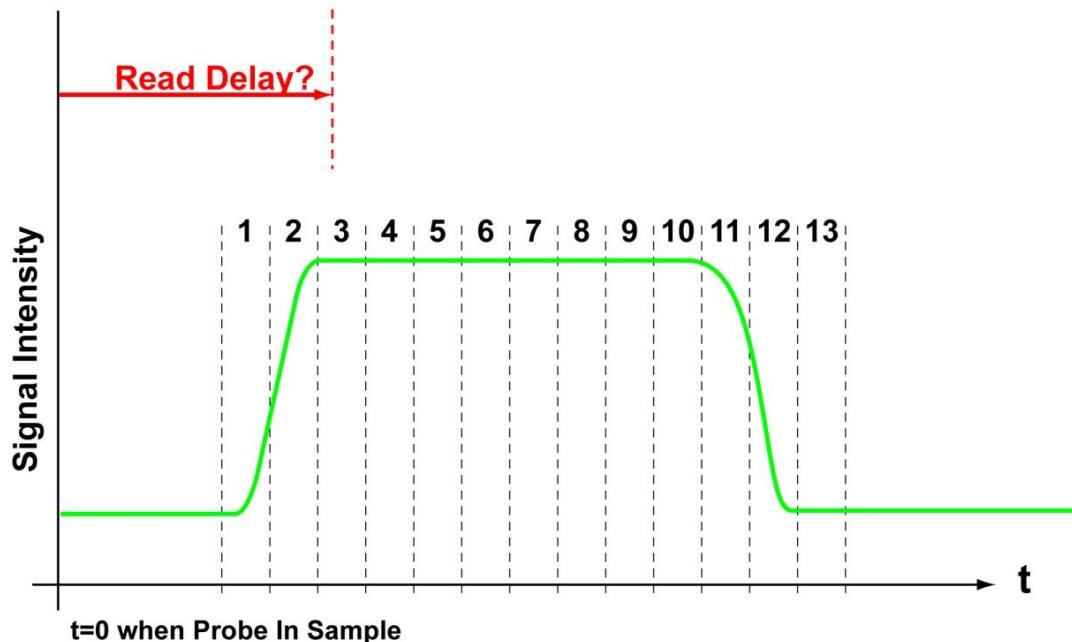


Figure 54: Signal Intensity during FAST method.

The start of the “Read-Delay” is when the instrument is signaled by the FAST that the probe has reached the bottom of the sample vial. The length of “Read-Delay” should be set so that the data acquisition starts when the signal has stabilized. This example diagram, (Figure 54), represents a series of 13 replicates used to determine when the signal intensity has stabilized. If each replicate is 1 second long and the first starts 4 seconds after the probe has entered the sample vial, it is reasonable to consider a “Read-Delay” of approximately 6 seconds so that the first replicate for an analysis starts when the signal has stabilized. The example diagram also indicates that there is approximately 8 seconds of stable signal for analysis.

Setting Wash/Rinse Time

It is important to configure the ICP/ICPMS wash/rinse time to be sufficiently long so that the following two actions occur:

- 1) When the wash/rinse instruction is received from the host instrument, the valve will switch to Load and the loop will evacuate.
- 2) The MoveNext action should occur, placing the probe above the next predicted sample before the wash/rinse time expires.

Procedure for Qualification of a Basic FAST Method

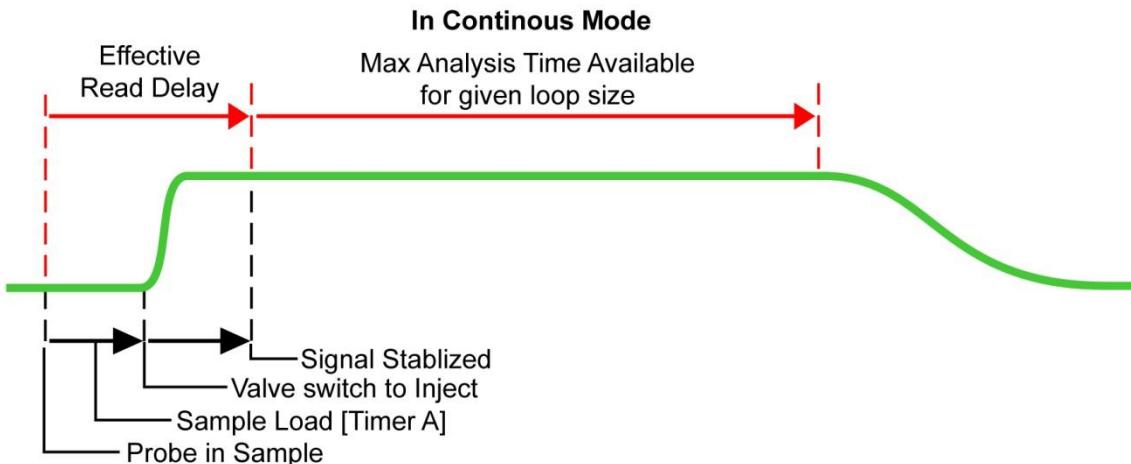
The following procedure provides an approach to validating the Basic FAST Method. The application of this procedure will likely extend to most FAST Methods.

- 1) With the FAST Valve in “Load” position, place the Carrier probe in tuning solution. Tune the ICP.



NOTE: When tuning is finished, wipe off the probe, flush it momentarily in rinse solution, and then place the probe back into the carrier solution.

- 2) In continuous mode, run a sample and note the time from when the probe reaches the bottom of the sample vial to the time of signal stabilization. (This will be the Effective Read Delay.)

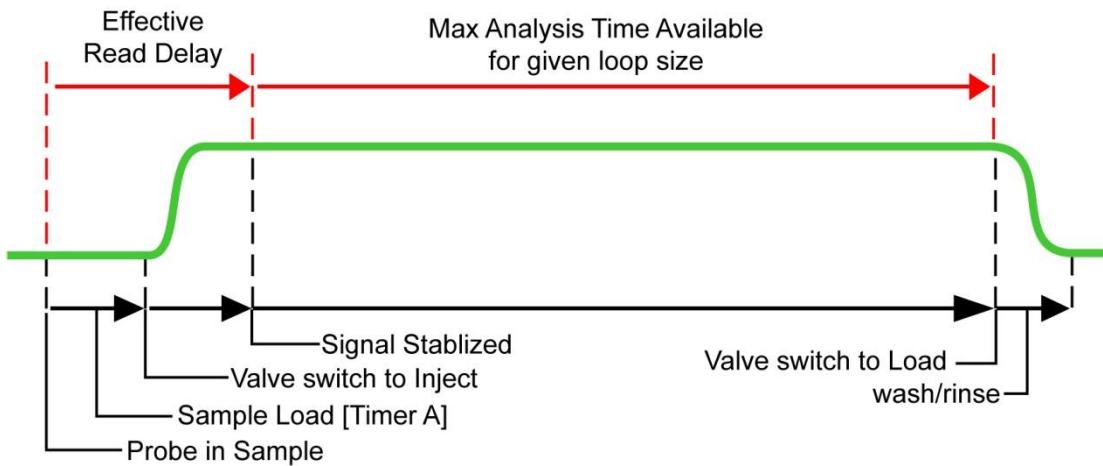


- 3) Ensure that the “Analysis Time Available” is adequate for your ICP method. If not, then an adjustment of loop size must be made.



NOTE: A change in loop size will likely require a change in sample loading time, thus changing your “Effective Read Delay.”

- 4) Apply the effective read delay in your ICP method so that the first replicate is acquired after a stable signal has been achieved.
- 5) Wash/Rinse time should be approximately 3-5 seconds (depending on FAST Method), to ensure that the sample loop is evacuated and FAST Method is completed prior to the ICP’s request for the next vial location.

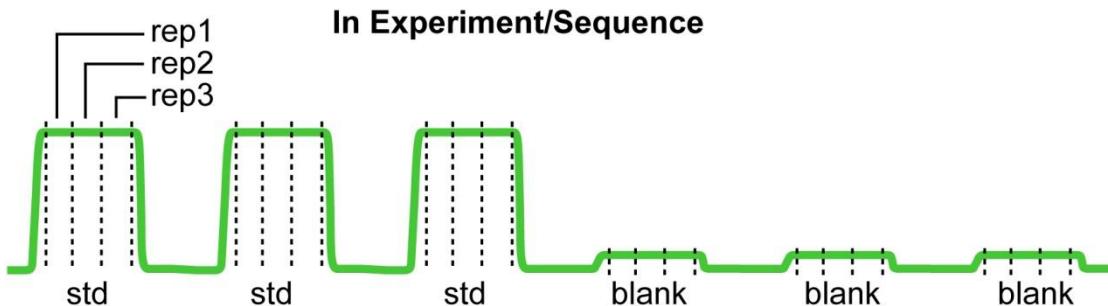


Note: When the Valve switches back to “Load” at the end of an analysis, a sharp drop should be seen in Continuous Mode.

- 6) Run a series of 6 samples, 3 high standards followed by 3 blanks. The high standards will have good RSD if the read delay and loop size are correct. Verify at least 2,000x washout is observed in the first blank and 10,000x washout is observed in the second blank compared to the high standard.



Samples not run in Continuous Mode.



Loop Rinse Toggle (LRT) Method

An additional rinsing mechanism can be employed when it is desired to further reduce carry-over. The additional rinsing step shown below (Figure 55) will circulate additional rinsing solution after the Sample Injection.

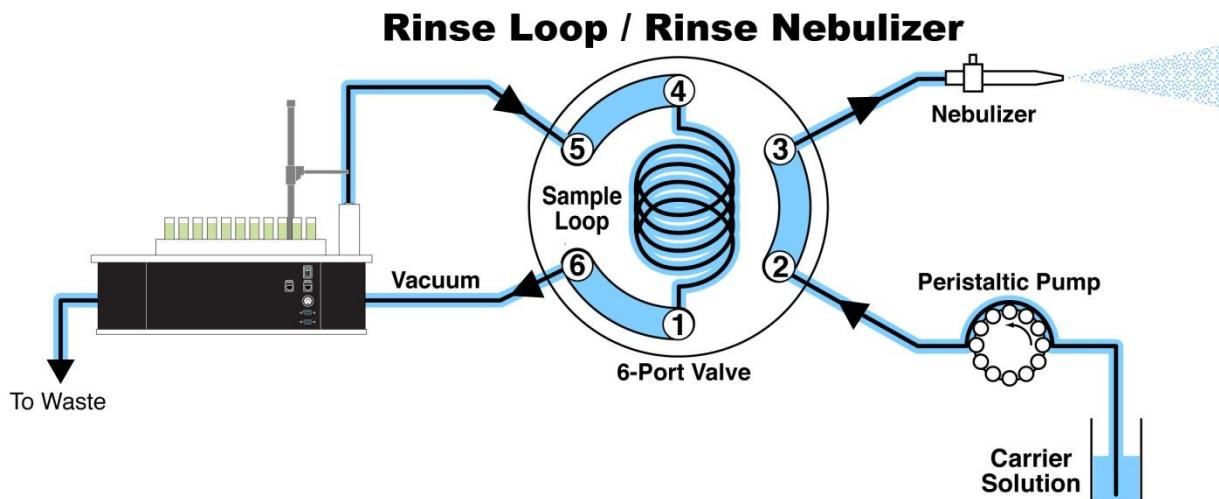


Figure 55: Loop Rinse

The following method illustrates a modification to the Basic FAST Method (Method 3) in order to add rinsing to the loop after the ICP/ICPMS has finished acquiring data from the sample.

FAST Method Control					
	Event	Action	Parameter	Parameter Units	Event Parameter
1	On Probe Down	Vacuum1 On			
2	On Probe Down	Load1			
3	Probe In Sample	Timer A	5	seconds	
4	Timer A Expires	Inject1			
5	Timer A Expires	Move Rinse			
a)	6	Rinse Completed	Move To(rrvv)	rrvv	
b)	7	On Rinse	Load1		
c)	8	On Rinse	Move Into(rrvv)	rrvv	
d)	9	On Rinse	Timer B	3	seconds
e)	10	Timer B Expires	Inject1		
	11	Timer B Expires	Timer C	1	seconds
	12	Timer C Expires	Load1		
	13	Timer D Expires	Timer D	1	seconds
	14	Timer D Expires	Move Next		
*	15				

Method 4: Loop Rinse Toggle.

- a) The Action was replaced by a (**Move To-R2**) so that the resulting move will be that the probe moves up out of the rinse station and above R2.
- b) When the host instrument sends a wash/rinse instruction (**On Rinse**), the probe will move down into R2 again (**Move Into-R2**).
- c) When the host instrument sends a wash/rinse instruction (**On Rinse**), a timer is started that will expire in 3 seconds. When this timer expires the valve will move to the Inject position (**Inject 1**).
- d) When (**Timer B Expires**), another timer (**Timer C**), is started that will expire in 1 seconds. When this timer expires the valve will move to the Load position (**Load1**).
- e) When (**Timer C Expires**), another timer (**Timer D**), is started that will expire in 1 seconds. When this timer expires the probe will move to the next sequential vial position (**MoveNext**).

The following table provides a “starting” set of values when constructing a “Basic” or “LRT” FAST method for typical samples using a 1.0 mm ID (grey) sample probe and carrier flow rate at 0.8 mL/min. See Table 1.

Table 1: Starting values for FAST method creation.

Estimated Analysis Time (s)	Loop Size (mL) (Ports 1 & 4)	ICP Read Delay Time (s)	FAST Method Timer A (s) (Loop Load)	Basic Method		LRT Method	
				ICP Wash Time (s)	FAST Method Timer B (s) (Loop Rinse)	ICP Wash Time (s)	
< 10	0.3	14	2	2	1	10	
10-25	0.5	15	3	3	1	10	
25-60	1	17	5	4	3	12	
60-80	1.5	18	8	6	4	13	
80-120	2	20	10	8	6	15	
120-160	2.5	22	12	8	8	17	
160-210	3	25	14	10	8	17	
210-300	4	29	18	12	8	17	
> 300	Custom	Custom	Custom	Custom	Custom	Custom	

FAST Method Event and Action Definitions

Events initiated by ICP/ICPMS:

On Probe Down:

The ICP/ICPMS has told the SC to move the probe to a specific location. The FAST method will always respond to this instruction from the ICP/ICPMS. If necessary, other FAST instructions will reset at this point.

On Probe Up:

The ICP/ICPMS has told the SC to move the probe up.

On RRVV:

The ICP/ICPMS has sent the SC probe to a location, defined by RRVV (Rack Rack Vial Vial). For example, 1234 will define tube 34 in rack12.

On Rinse:

The ICP/ICPMS has sent a rinse command to the SC. This Event is important since it is a critical synchronization point with the ICP/ICPMS. This is often used to initiate an evacuation of the sample loop or to start a loop rinse operation. An interruption of the FAST method will occur if the ICP/ICPMS sends a rinse instruction to the SC before the MoveRinse action has been started.

On Rinse Type2:

Similar to On Rinse, however, if this Event is used it will not result in an interruption of the FAST method if the instrument sends a rinse command before the ESI SC has performed a MoveRinse action.

On TTL Signal #:

This event compares a TTL input (#) to a value of High (H) or Low (L). If the condition is true, the Event is true. Please consult ESI technical group regarding connections and operation.

Events initiated by ESI SC:

Probe In Sample:

The SC probe has reached the bottom of the specified location. This Event is important since it is a critical synchronization point with the ICP/ICPMS. The effective “Read-Delay” or “Uptake-Delay” in the ICP/ICPMS method starts to count at this point.

Rinse Completed:

The SC has finished a Rinse operation as defined by the FAST method.

Move Into Next Complete:

The SC has finished the Move Into Next action.

Timer # Expires:

A Timer with label # has expired.

Actions:

AuxOutX:

Output X is turned ON or OFF.

Inject(x):

Switches the specified valve to Inject.

Load(x):

Switches the specified valve to Load.

Move Into(rrvv):

The SC moves the probe into a (r)ack (v)ial position.

Move Into Next:

The SC moves the probe into the next sequential vial position.

Move Next:

The SC moves the probe above the next sequential vial position. For example, if the current vial position is 101, then MoveNext will move probe above position 102.

Move Rinse:

The SC performs the probe rinse as specified in the FAST method.

Move To(rrvv):

The SC moves the probe above a (r)ack (v)ial position.

Probe Down:

The SC moves the probe down.

Probe Up:

The SC moves the probe up.

Timer #:

A countdown Timer with label # is started for the specified length of time.

Toggle Valve:

The specified valve is toggled from its current position (Load to Inject or vice versa).

Trigger instrument:

Sends a momentary switch-closure or 5V signal to a specific output.

Vacuum(x) Off:

Turns the specified vacuum pump off.

Vacuum(x) On:

Additional Features

The following is a list of additional features provided by the SC system. These are often dependent on the host instrument and autosampler combination used.

- 1) Flexibility in generating a combination of different rack types within the same layout,
- 2) Control of tube count directions within the rack,

Hardware Calibration Procedures

It is recommended that factory calibration values be used. These values are provided as part of the documentation included with each SC Autosampler. The values may be entered as follows:

- 1) Go to **Calibrate>>Calibrate Autosampler** menu.
- 2) Enter **X & Y Calibration Offsets** values and click **Apply Calibration Offset(s)**. Probe will move above Rinse Station.
- 3) For the Rinse positions, enter **X & Y Offset** values and click **Apply Entered Rinse Offset(s)**.
- 4) Click **OK** to close window.

Following are the recommended procedures for calibration of various SC Autosamplers.

Calibration Procedure for SC-models: 2, 2DX, E2, 4, 4DX, E4

- 1) Ensure the correct Probe Length (usually 150mm), has been chosen.
- 2) Remove any samples from the Manual Sample location.
- 3) Locate the calibration mark (a small dimple on the sample platform, to the side of the rinse station).
- 4) Select the **Go To Calibration Point** button to move the probe to the calibration location.
- 5) Place the probe in the arm so that the tip of the probe nearly touches the sample platform. Verify that the probe is straight and parallel to vertical axis of the autosampler.
- 6) Verify that the probe is properly positioned in the arm as shown in Figure 56.

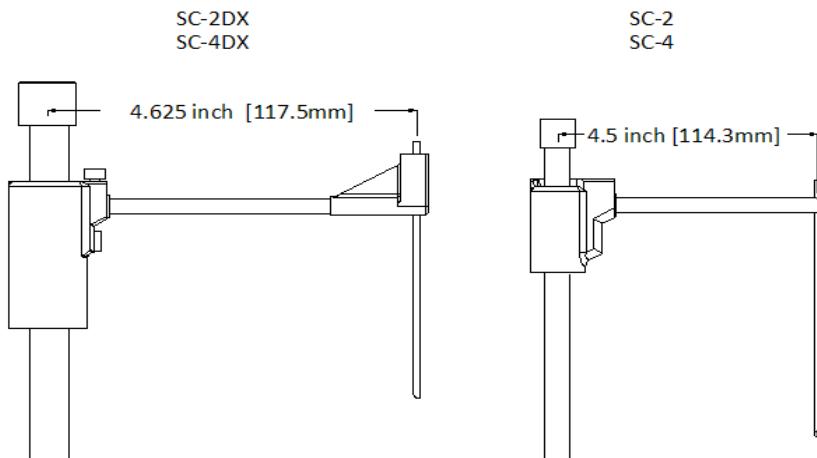


Figure 56: Probe arm measurements.

- 7) If the probe is not directly above the calibration mark, the user must make adjustments using the horizontal (X, XXX) and rotational (Y, YYY) buttons.
- 8) Press the **Set Calibration** button to save the current calibration position. The SC autosampler will automatically calculate and update the “Calibration Offsets” values.
- 9) Click **Move to Rinse1**, to move the sample probe over the rinse station. Make adjustments using the horizontal (X) and rotational (Y) buttons, so that the probe is centered above the rinse station. Click **Apply Offset**. Repeat these steps for Move to **Rinse2**.
- 10) Select **OK** to close window.



If further calibration is required, the **Calibration>>Rack Calibration** menu may be used to calibrate each quadrant.

Advanced Rack Calibration Procedure for SC-models: 2, 2DX, E2, 4, 4DX, E4

Each Rack can be calibrated individually by following the procedure below:

- 1) First place the appropriate **Rack #**.
- 2) The probe can be directed to a rack corner by choosing from the buttons; Corner 1-4.
- 3) Next, use the **Horizontal** and **Rotational** move buttons to center the probe over the vial position. The **Set Calibration** button can now be selected to apply the offset values.



Because a region may cover only a portion of a rack, it is recommended that the “**Center Probe in Vial Number**” field be referenced so that the probe is adjusted to the correct vial position.

- 4) Next, the probe should be directed to a diagonally opposite corner. For instance, if the first corner calibrated was Corner 1, then Corner 4 should be used for this step.
- 5) Repeat step (3).

- 6) Verify all four corners of rack and repeat starting at step (2) if necessary.

Alternatively, values can be modified manually, followed by clicking the **Apply Calibration Value** button. See Figure 57.

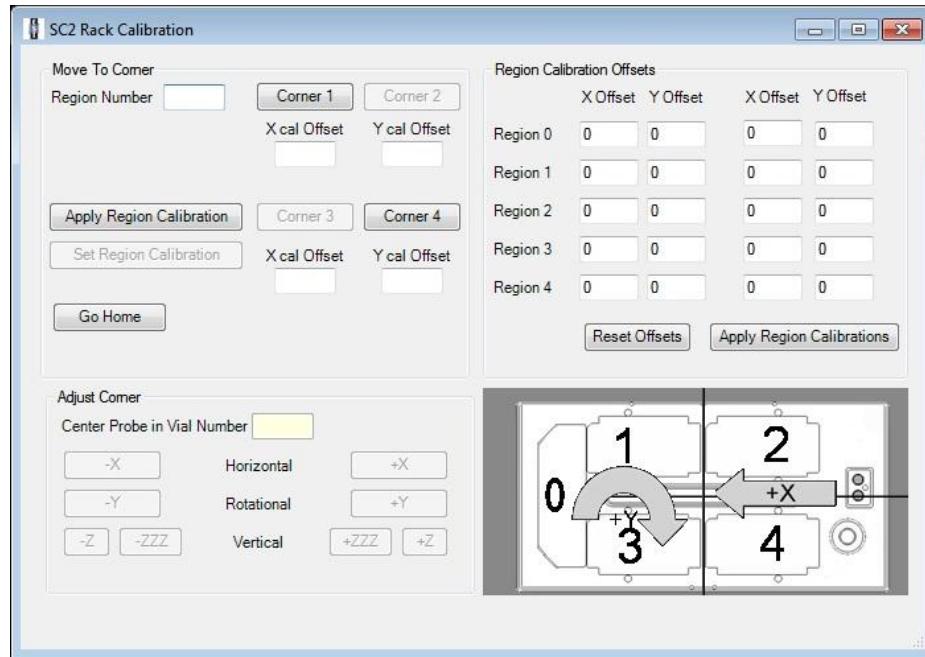


Figure 57: Regional Calibration Window.

Calibration Procedure for SC-models: 8, 8DX, 14, 14DX

- 1) Ensure the correct Probe Length (usually 150mm), has been chosen.
- 2) Remove any samples from the Manual Sample location.
- 3) Locate the calibration mark (a small dimple on the sample platform, to the side of the rinse station).
- 4) Select the **Go To Calibration Point** button to move the probe to the calibration location.
- 5) Place the probe in the arm so that the tip of the probe nearly touches the sample platform. Verify that the probe is straight and parallel to vertical axis of the autosampler.
- 6) Verify that the probe is properly positioned in the arm as shown in Figure 56.

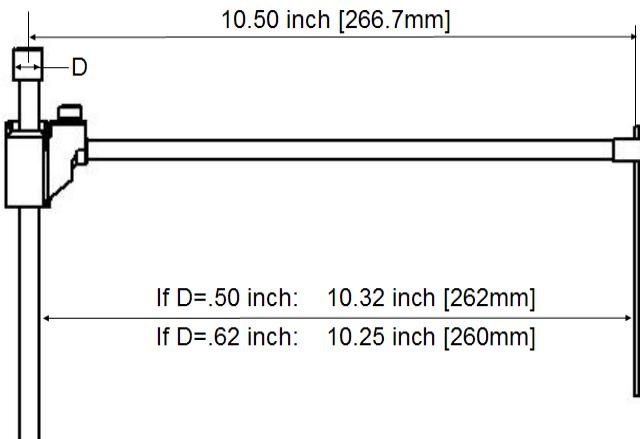


Figure 58: Probe arm measurements.

- 7) If the probe is not directly above the calibration mark, the user must make adjustments using the horizontal (X, XXX) and rotational (Y, YYY) buttons.
- 8) Press the **Set Calibration** button to save the current calibration position. The SC autosampler will automatically calculate and update the “Calibration Offsets” values.
- 9) Click on **Go To Verify Calibration Point**, the probe will now move to the Calibration Verification Point. Next determine what adjustment may be necessary to place the probe over both calibration points. The adjustment that is determined can be entered into the X & Y Offsets followed by clicking on **Apply Calibration Offsets**. The direction of the offsets can be determined by referring to the convention noted in the diagram. It is recommended that small incremental adjustments be tested so that the affect to each of the calibration points can be observed. Approximate offset equivalents in the X-direction: 100steps=0.125 inch [3.175mm]. Approximate offset equivalents in the Y-direction: 2 steps=0.165inch [4.19mm] .
- 10) Click **Move to Rinse1**, to move the sample probe over the rinse station. Make adjustments using the horizontal (X) and rotational (Y) buttons, so that the probe is centered above the rinse station. Click **Apply Offset**. Repeat these steps for Move to **Rinse2**.
- 11) Select **OK** to close window.



If further calibration is required, the **Calibration>>Rack Calibration** menu may be used to calibrate each rack.

Advanced Rack Calibration Procedure for SC-models: 8, 8DX, 14, 14DX

The detailed calibration procedure below may not be necessary however it will improve performance depending on the uniformity of racks used. It is recommended that the RAF function also be used. (See Configure Autosampler Menu.) The detailed procedure below shows images for the SC-14. The images for the SC-8 are similar but not shown in this section.

- 1) Enter factory offsets given for the Autosampler. (Offsets are provided with the installation documentation.)
 - a. Go to **Calibrate>>Calibrate Autosampler**
 - b. Enter Calibration offsets for X and Y.
 - c. Click on **Apply Calibration Offsets** button
 - d. Send autosampler to Home position
- 2) Enter factory offsets given for each autosampler rack (Offsets are provided with the installation documentation.) See Figure 59.
 - a. Go to **Calibrate>>Calibrate Rack**
 - b. Enter offsets for each rack
 - c. Click on **Apply Rack Calibration**

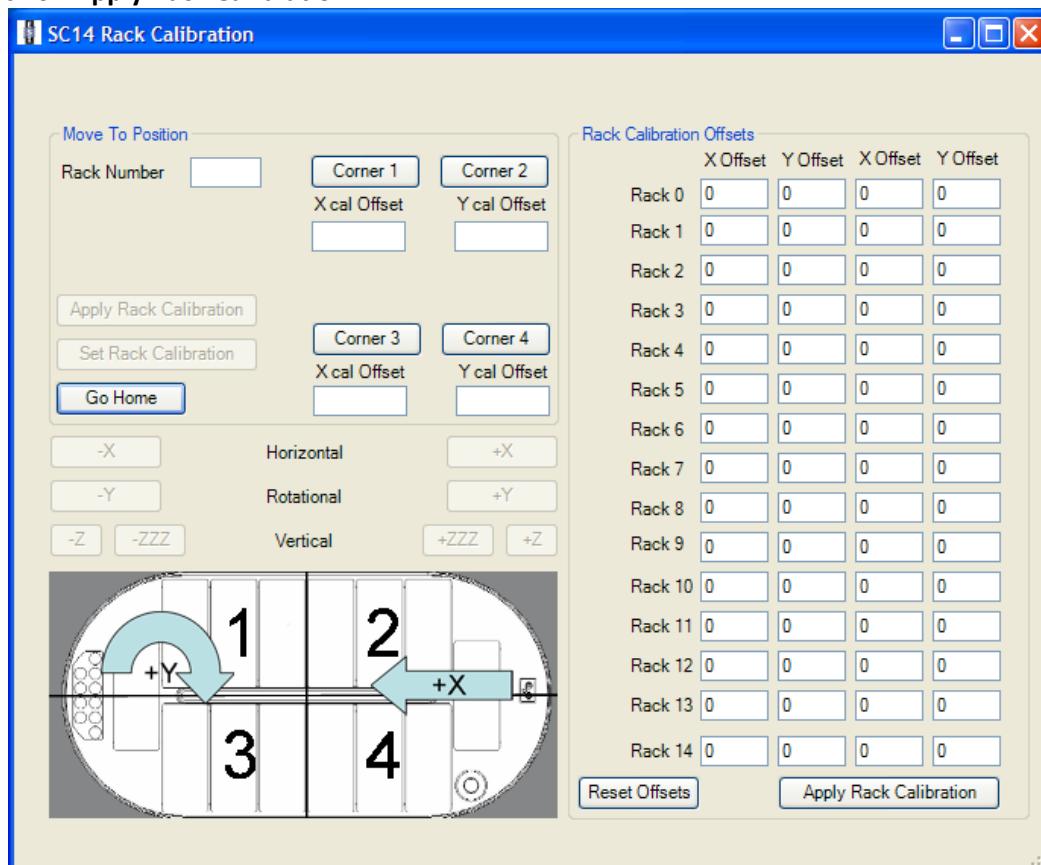


Figure 59: Calibrate rack window for SC-14.

- 3) Set the calibration of Racks 0-6 of the autosampler. See Figure 60. For each rack:
 - a. Click **Corner 4** (closest to the center channel).
 - b. Make adjustments if necessary starting with the (Y) then the (X) jog buttons.
 - c. When finished click on **Set Rack Calibration** followed by **Go Home**.
 - d. Click **Corner 1** (opposite from Corner 4)
 - e. Make adjustments if necessary starting with the (Y) then the (X) jog buttons.
 - f. When finished click on **Set Rack Calibration** followed by **Go Home**.
 - g. Check adjustments by clicking Corner 2 and Corner 3.

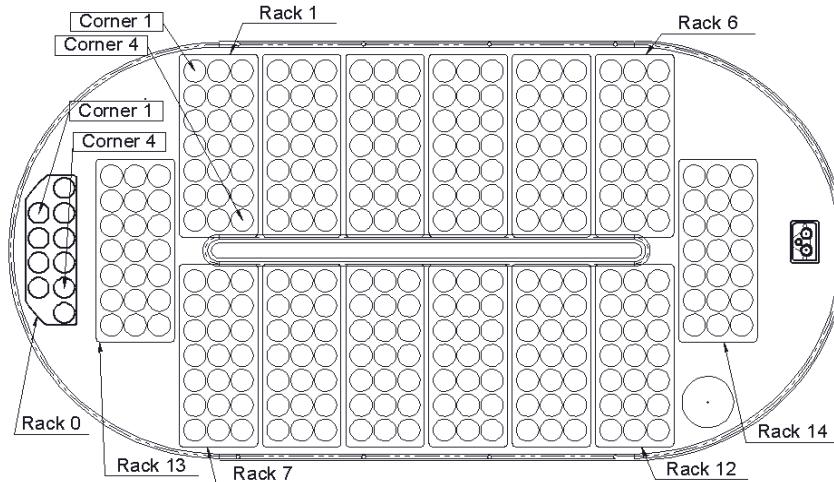


Figure 60: SC-14 Location of Calibration Corners.

- 4) Set the calibration of Racks 7-12, 13, 14 of the autosampler. See Figure 60. For each rack:
 - a. Click **Corner 1** (closest to the center channel).
 - b. Make adjustments if necessary starting with the (Y) then the (X) jog buttons.
 - c. When finished click on **Set Rack Calibration** followed by **Go Home**.
 - d. Click **Corner 4** (opposite from Corner 1)
 - e. Make adjustments if necessary starting with the (Y) then the (X) jog buttons.
 - f. When finished click on **Set Rack Calibration** followed by **Go Home**.
 - g. Check adjustments by clicking Corner 2 and Corner 3.
- 5) Close the Rack Calibration window then on the main autosampler window go to **File** and click on **Save**.

Calibration Procedure for EL-4

- 1) Ensure the correct Probe Length (usually 150mm), has been chosen.
- 2) Remove any samples from the Manual Sample location.

- 3) Using the **Calibrate>>Calibrate Autosampler** window. See Figure 61.
- 4) Enter the Calibration Offsets provided with the unit's documentation, followed by clicking **Apply Calibration Offsets**.
- 5) Identify location 1 of Standards Rack, and remove any vials. See Figure 63.
- 6) Next, select the **Go To Calibration Point** button to move the probe to the center of location 1.
- 7) Manually, position the probe in the arm so that the tip of the probe reaches near the bottom of the rack. Verify that the probe is straight and parallel to vertical axis of the autosampler.
- 8) Verify that the probe is properly positioned in the arm and held straight vertically.
- 9) If the probe is not directly above the calibration mark, the user must make adjustments using the horizontal (X, 20X) and rotational (Y, 10Y) buttons.
- 10) Press the **Set Calibration** button to save the current calibration position. The EL autosampler will automatically calculate and update the "Calibration Offsets" values.
- 11) Click **Move to Rinse1**, to move the sample probe over the rinse station. Make adjustments using the horizontal (X) and rotational (Y) buttons, so that the probe is centered above the rinse station. Click **Set Rinse Offset**.
- 12) Select **OK** to close window.
- 13) On the main window of ESI SC, verify that the locations on the EL are configured with the desired rack types, but do not place any racks on the autosampler.
- 14) Next, go to **Calibrate>>Calibrate Rack** and enter the rack number of the rack to be calibrated. See Figure 62.
- 15) Select Corner1 and probe will move to corner vial.
- 16) Jog (Z) if necessary to allow placement of rack under probe.
- 17) Jog using the horizontal (X) and rotational (Y) buttons, so that the probe is centered in the corner vial. Follow by clicking **Set Rack Calibration**.
- 18) Remove the rack and select Corner4 and probe will move to corner vial.
- 19) Jog (Z) if necessary to allow placement of rack under probe.
- 20) Jog using the horizontal (X) and rotational (Y) buttons, so that the probe is centered in the corner vial. Follow by clicking **Set Rack Calibration**.
- 21) Repeat steps 14) thru 20) for each rack to be calibrated.
- 22) Close window.

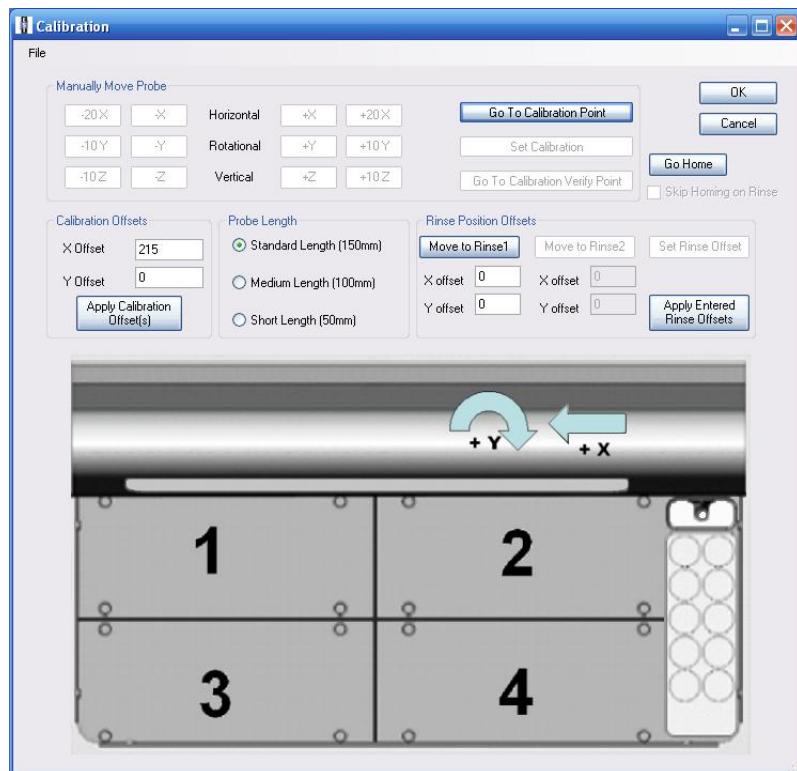


Figure 61: Calibrate Autosampler window.

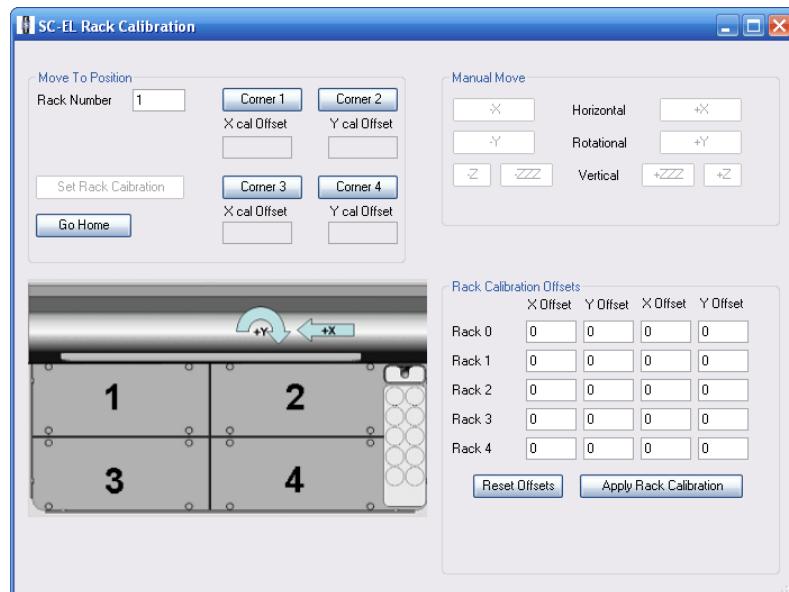


Figure 62: Calibrate Rack window.



Figure 63: Calibration at STD 1.

Maintenance

Preventive Maintenance for SC FAST Systems (TN090928 Rev1)

The following preventive maintenance procedures are recommended to help insure proper functioning of the SC and FAST systems. The time between scheduled inspections may vary dependent on the duty time of the unit and the type solutions/samples used.

Daily

- Inspect all devices for leaks. Replace any damaged lines or fittings.
- A flushing routine is recommended when aggressive solutions are used. The routine may consist of simply placing a sample of DI water at the end of the final sequence or daily run.
- If an aggressive carrier or rinse solution is used, the routine should include placing the carrier and internal standard probes in DI water. Using the Manual menu in the ESI SC software, the vacuum should be turned on and the probe moved to a vial with DI water. As the probe is in the vial, the valve should be cycled between Load and Inject.

Every six months

- Test FAST vacuum pump. FAST vacuum should draw at least 20ml/min using a blue or gray marker line between the pump and a vial of DI water. Replace any FAST vacuum pump that is showing leaks or loss of efficiency.

Depending on application and sample count

- Frequently clean and inspect the valve if:
 - Using the PTFE rotor,
 - Sample frequency is high,
 - Solutions have a high amount of solids.

Maintenance for High Flow FAST Valve

Initial Precaution

All surfaces of the valve should be clean and free of contaminants and must be kept clean to prevent valve damage. Open ports and fittings cause unnecessary risk of particulate matter entering the valve and scratching the sealing surfaces, which is the most frequent cause of premature valve failure.

Disassembly and Cleaning

1. Cleaning a valve can often be accomplished by flushing all the lines with appropriate solvents, such as isopropyl alcohol.
2. To disassemble the valve, use a 7/64" hex driver to remove the socket head screws which secure the stator and body ring onto the valve body.

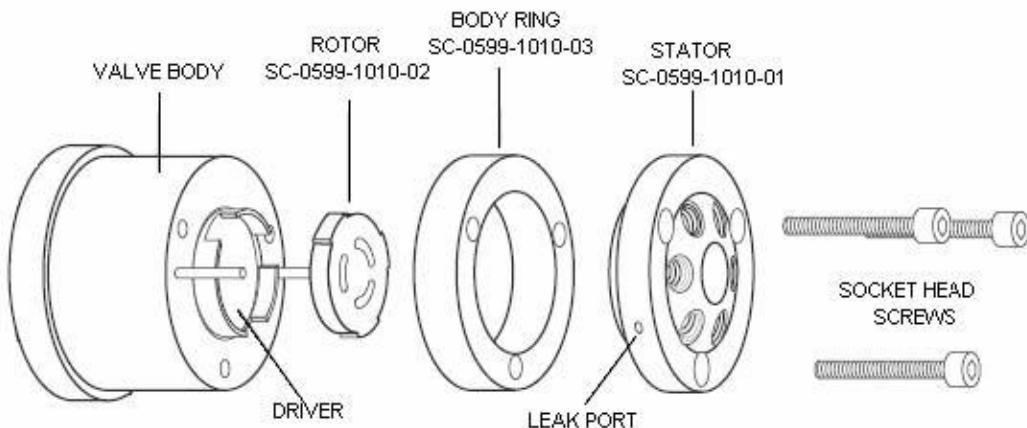


Figure 64: Exploded View of the High Flow Valve

3. To prevent any damage to the sealing surface of the stator, rest it on its outer face. If the tubing is still connected, leave it suspended by the tubing.
4. With your fingers or a small tool, gently pry the rotor away from the driver on the body of the valve.
5. Examine the rotor sealing surface for scratches. If scratches are visible to the naked eye, the rotor must be replaced.
6. Clean all the parts thoroughly with an appropriate solvent, such as isopropyl alcohol, while exercising care so that surfaces do not get scratched.
7. Carefully examine ports in the stator for Teflon shavings. If shavings are present, use canned air to direct airflow from the opposite side of the stator through each individual port.

8. Use a foam swab with isopropyl alcohol to gently clean the threads of the port, being careful not to force any shavings deeper into the port. Once this has been completed, repeat step 7 with canned air.

Reassembly

1. Replace the rotor in the driver on the body, making sure that the rotor sealing surface with its engraved flow passages is facing out. The pattern is asymmetrical to prevent improper placement so be sure to align the rotor correctly into the slots on the driver.

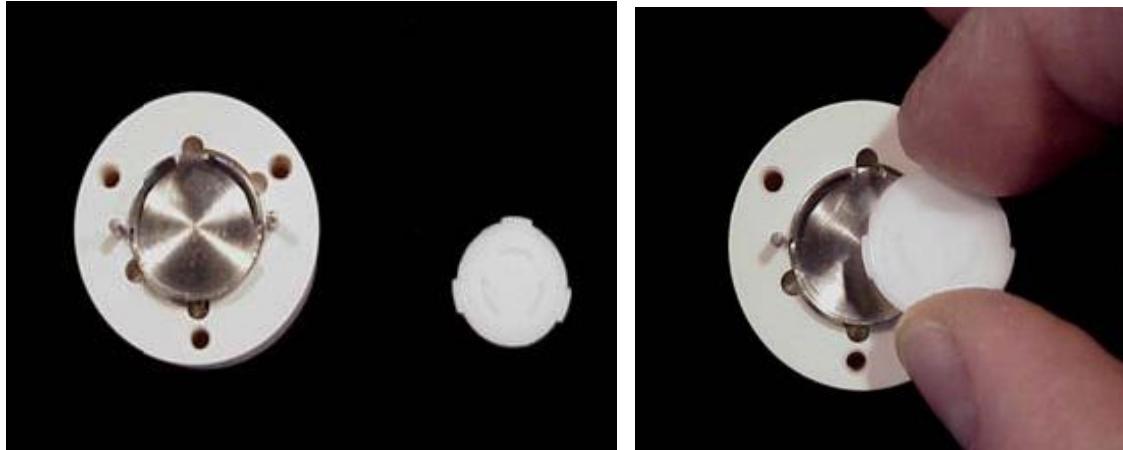


Figure 65: Replacing rotor into the driver.

2. Replace the body ring, being careful to align the holes for the socket head screws.

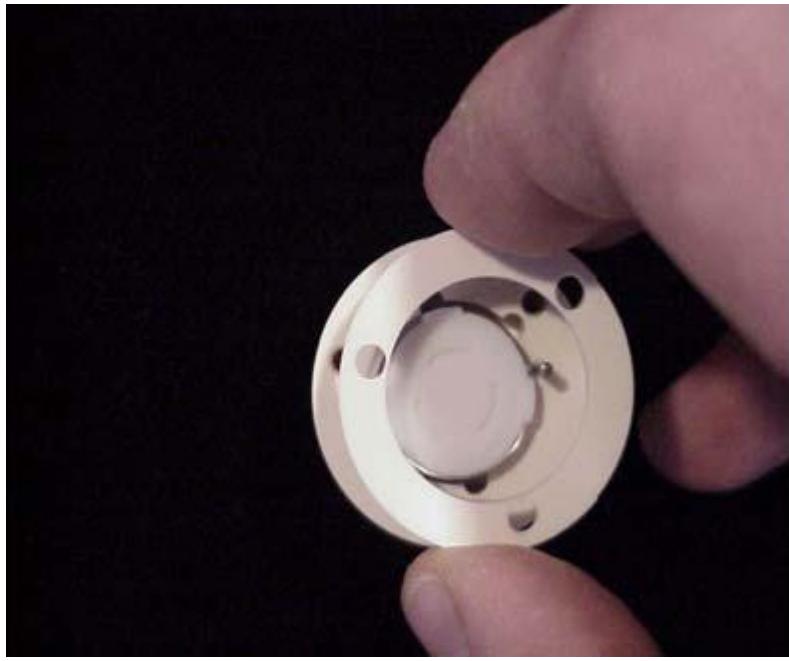


Figure 66: Replacing body ring.

3. Replace the stator by aligning the two holes on the back of the stator with the pins on the body of the valve. The pattern is asymmetrical so be sure that the holes for the socket head screws are aligned.

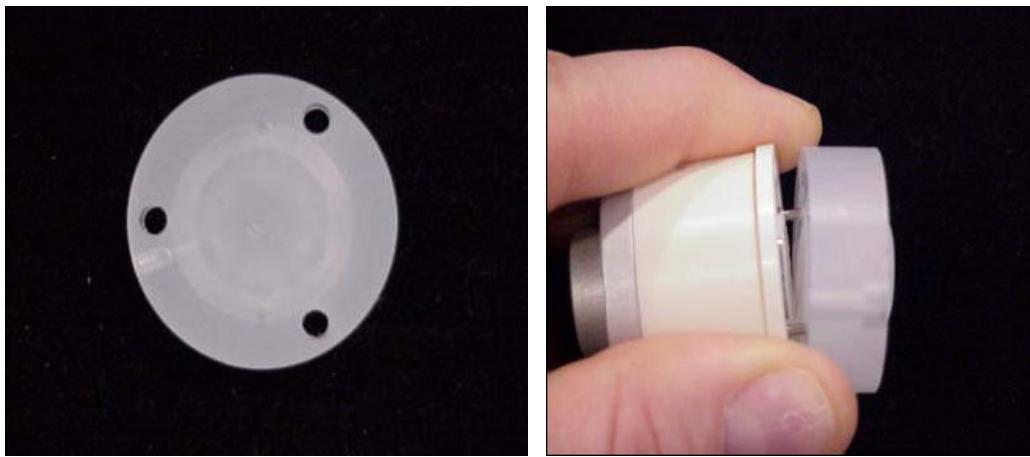


Figure 67: View of aligning pins and replacing the stator.

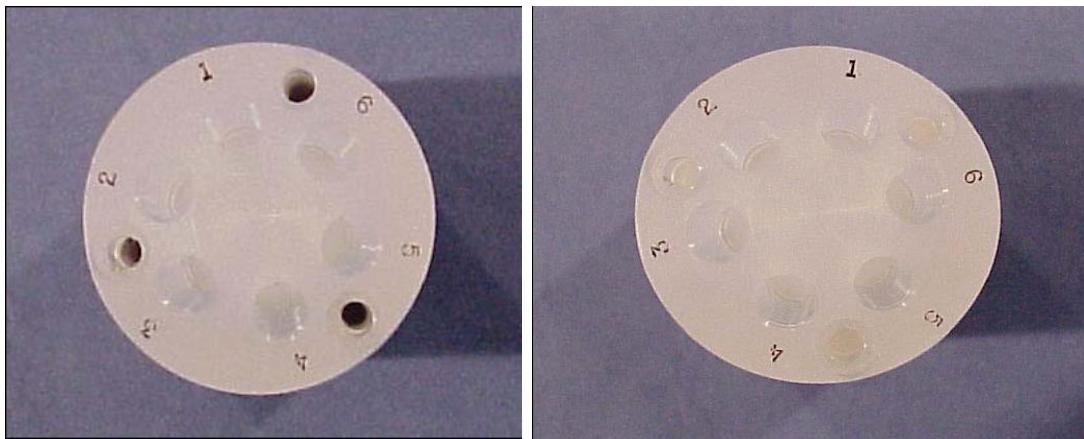


Figure 68: Correctly aligned stator left, and incorrect on right.

4. Insert the socket head screws and tighten gently and evenly until snug. The screws simply hold the assembly together and do not affect the sealing force, which is automatically set as the screws tighten the stator against the valve body. **Be careful not to over-tighten!** Over-tightening may damage the stator and create a leak.



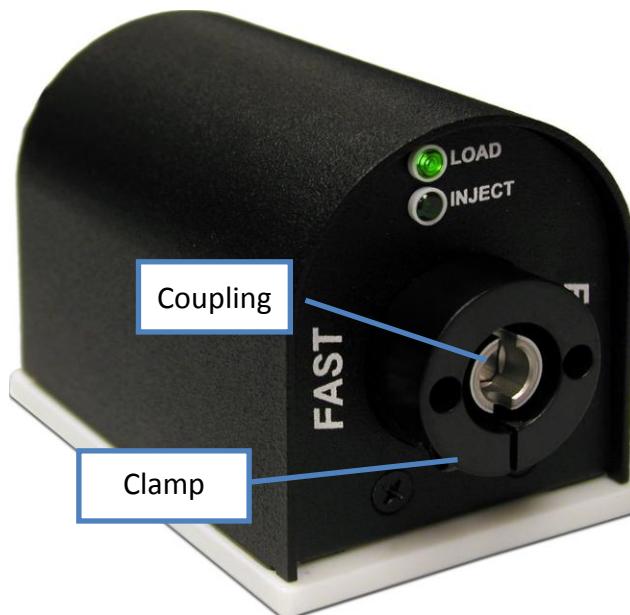
Figure 69: Reassembled High-Flow Valve.

5. Reassembly of the valve is now complete.

6. Attach one end of the loop with white fittings to port #1 and the other to port #4 on the stator of the FAST valve.
7. Attach the Carrier In line with red fitting to port #2.
8. Attach the Nebulizer line with green fitting to port #3.
9. Attach the Probe line with blue fitting to port #5.
10. Attach the Vacuum line with black fitting to port #6.
11. The valve is now ready for use. It may be necessary to cycle the valve a few times to properly index and align the rotor and stator. It is important to verify that the LEDs switch properly indicating proper motion. If the LED lights do not appear to transition consistently, the Diagnosis menu will provide access to a selection list where the valve actuator is chosen followed by the use of the “Index Valve” button.

 Removal of the valve assembly is not required for cleaning. However, if you choose to do so, please verify the proper placement of the Coupling and secure the Clamp Ring tightly during reassembly.

 If after reassembly the valve does not properly cycle or properly index, perform the following steps: 1) Disconnect control cable, 2) Cycle Load & Inject three times using the software, 3) Reconnect control cable and again cycle Load & Inject three times using the software.



If you have any questions, please contact ESI technical support at support@icpms.com or +1.402.991.7800

Technical Notes

This section contains technical notes.

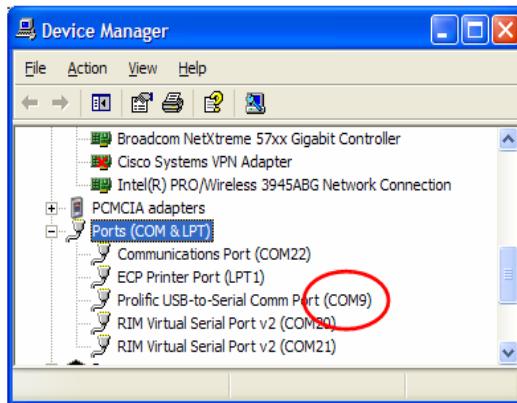
Document Number	Title	Keyword
TN040808	Adjustment of COM port Performance Buffer	Communication
TN050808	Background Services	communication
TN030808	Elevating Priority of ESI SC	communication
TN110609	Loss of GPIB Communication on PE Elan Configuration	Communication, GPIB, Elan
TN090928	Preventive Maintenance of SC-FAST Systems	maintenance
TN090925	Proper Venting & Exhaust of SC Autosamplers	maintenance
TN091001	Backups of Key SC/FAST Files	software
TN110610	Updating ESI SC Software	software
TN110518	SC-DX Probe Arm Realignment Guide	hardware
TN141111	Configuring SC-Exact	hardware, SC-Exact
TN010906	Access to Micro48 and Micro96 Plates in PlasmaLab.	PlasmaLab
TN120709	Access to MT24G Rack in PlasmaLab	PlasmaLab
TN120814	Access to SC-14 Racks in PlasmaLab	PlasmaLab
TN200807	Communication Loss in PlasmaLab	PlasmaLab
TN110225	Using Custom MAP files in iTEVA	iTEVA
TN160807	Custom Racks in Thermo Element & Neptune	Element, Neptune
TN060406	Use of GPIB232CV-A	Elan, Optima

Adjusting COM Port Buffer (TN040808)

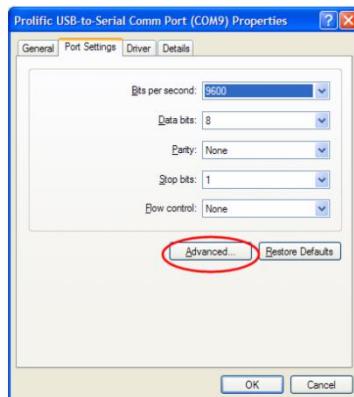
Some hardware configurations may have intermittent communication loss. Follow the steps below to adjust the COM port buffer settings and improve communication performance.

The following step can be taken to correct the problem:

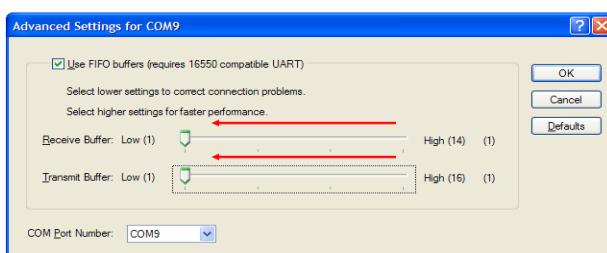
- 1) Open **Control Panel>>System>>Hardware>>Device Manager** and right-click on the desired COM port and choose **Properties**.



- 2) Select **Port Settings>>Advanced**.



- 3) Set the Receive and Transmit Buffers to **Low (1)**.



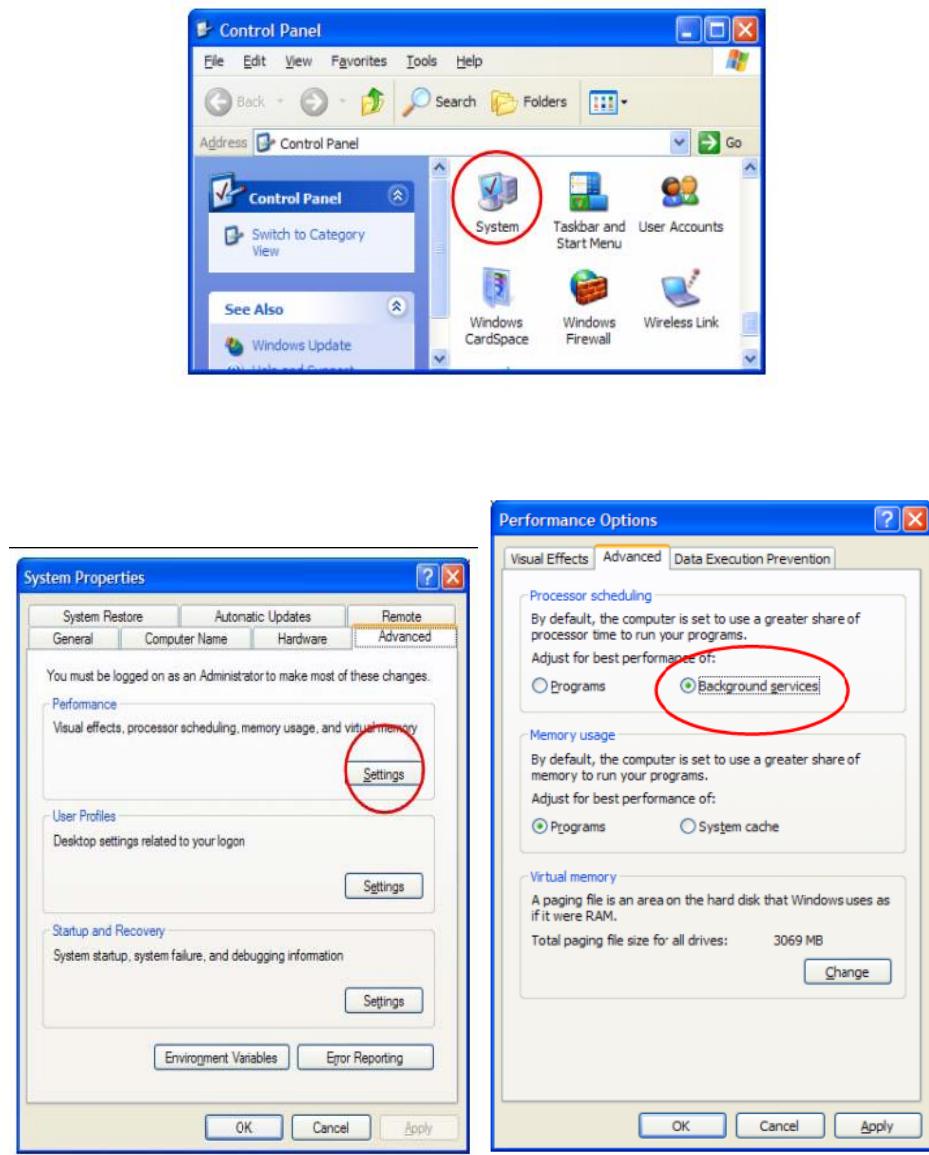
- 4) Click **OK** and exit the Device Manager

Setting Background Services Priority (TN050808)

Depending on peripheral devices that are connected to computer, such as printers or USB connections, the following adjustment is recommended to improve communication performance.

The following step can be taken to correct the problem:

- Open **Control Panel**>**System**>**Advanced**>**Performance Settings**>**Advanced** and set the Processor scheduling to **Background services**. See Figures below.

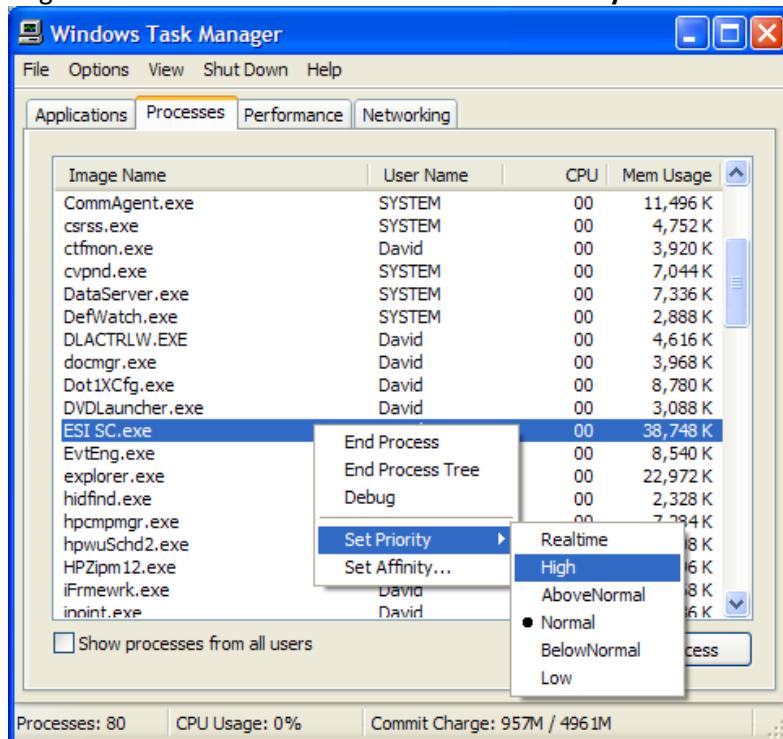


Elevating Priority of ESI SC (TN030808)

Changing the priority of the ESI SC software may ease resource limitations of computer.

The following steps can be taken to test for the problem. The settings will revert to original settings at the next start of the ESI SC program.

- 1) After starting the ESI SC software, use **Ctrl-Alt-Del** to access the task manager and switch to the **Processes** tab.
- 2) Locate and right-click on the **ESI SC.exe** and select **Set Priority** and choose **High**.



- 3) Run ESI SC and evaluate. Note that this setting is maintained only until the ESI SC software is shut down.

Loss of GPIB Communication on PE Elan Configuration (TN110609)

The following start-up procedure may be used to help correct GPIB communication problems that may be related to “noisy” connections on the GPIB controller.

- 1) Begin with the GPIB to RS-232 interface set to OFF. The Elan and ESI software should also be closed.
- 2) With the ESI SC hardware powered ON, start the ESI SC software and initialize.
- 3) Start the Elan software.
- 4) Verify that the “Instrument” panel in the Elan software shows a “yellow” or “green” state.
(If the status shows an error or “red” status, restart the computer and refer to the Elan operation manual for instruction on how to restart the Elan instrument. This should be required only once and should not be necessary if using this start-up procedure.)
- 5) Switch the GPIB to RS-232 interface to ON.
- 6) In the Elan software, use the Devices window to initialize the connection to the autosampler.
- 7) Verify control of the SC autosampler from the Elan software (Probe window).

Preventive Maintenance for SC FAST Systems (TN090928 Rev1)

The following preventive maintenance procedures are recommended to help insure proper functioning of the SC and FAST systems. The time between scheduled inspections may vary dependent on the duty time of the unit and the type solutions/samples used.

Daily

- Inspect all devices for leaks. Replace any damaged lines or fittings.
- A flushing routine is recommended when aggressive solutions are used. The routine may consist of simply placing a sample of DI water at the end of the final sequence or daily run.
- If an aggressive carrier or rinse solution is used, the routine should include placing the carrier and internal standard probes in DI water. Using the Manual menu in the ESI SC software, the vacuum should be turned on and the probe moved to a vial with DI water. As the probe is in the vial, the valve should be cycled between Load and Inject.

Every six months

- Test FAST vacuum pump. FAST vacuum should draw at least 20ml/min using a blue or gray marker line between the pump and a vial of DI water. Replace any FAST vacuum pump that is showing leaks or loss of efficiency.

Depending on application and sample count

- Frequently clean and inspect the valve if:
 - Using the PTFE rotor,
 - Sample frequency is high,
 - Solutions have a high amount of solids.

Proper Venting & Exhaust of SC FAST Systems (TN090925)

Enclosures for the ESI SC autosampler can be beneficial for both protecting the samples from contaminants and also protecting the user from harmful vapors. Additionally, the enclosure provides protection to the mechanical probe movements against accidental bumping. To avoid warranty issues, the autosampler enclosures must be used in one of the following basic configurations. With any configuration it is recommended that the enclosure be connected to an exhaust system.

ULPA Filter with Exhaust

ULPA filter is designed to be 99.999% efficient at removing 0.12 micron or larger particulates.

- The following notes are provided regarding this configuration. It is the user's responsibility to insure the proper exhaust and/or containment of any harmful gasses. Failure to do this may result in risk to samples, equipment, or otherwise be harmful to the user.
- If the chemistry permits the harmless release of vapors to the exterior of the enclosure, the SC unit may be placed in the laboratory without the need of an exhaust vent or without the need to place it within a hood.
- The ULPA filter should be powered ON during any time that vapors could collect within the enclosure. The flow of air will prevent the collection of vapors that over time could attack the components of the autosampler.

Exhaust Only

If ULPA filter treatment is not required, the Exhaust configuration is especially useful for removing harmful gasses from the enclosure and safely preventing them from transferring to the lab environment.

- It is recommended that the enclosure be connected to laboratory exhaust system. The enclosures are provided with a 2 or 4 inch diameter connection depending on the model.
- The exhaust should be connected any time that vapors could collect within the enclosure. The flow of air will prevent the collection of vapors that over time could attack the components of the autosampler.

Backup of Key ESI SC Files (TN091001)

For the purposes of creating a backup of key ESI SC files, the following list is provided. It is recommended that copies of files be used only with the same installed version. Please note version of installed software. These files will be located in the following folders:

Windows 2000, XP: [Install Directory]\Program Files\ESI\ESI SC\

Windows Vista, 7: [Local Disk (C:)]\Users\Public\ESI\ESI SC\

Program files

initialize.sci

RackParameters.xml

DeviceParameters.xml

SC Initial Settings.xml

Configuration files (.sc)

default.sc

Any user-created configuration files.

FAST method files (.txt)

Any user-created FAST method files.

Also, include any customized files if used:

Any user-created static tray files. (*.tray, .try)

TevaRackOrigins.xml

Autostart files (.bat, delay.vbs)

Updating ESI SC Software (TN110610)

The following instructions may be used to update the ESI SC software to the latest version. Administrator privileges will be required on the computer.

- 1) Download software installer from: www.icpmms.com/support
Login is not required to use the link at bottom of page.
- 2) Uninstall old version. (Uninstall will not remove any created FAST method files and these file will be automatically updated to the format of the new version.)
If any customization has been performed on the ESI SC software such as custom racks or special device parameters, please collect copies of these files for reference by ESI technical support.
- 3) Reboot computer.
- 4) Install from downloaded files (you may have to unzip to a folder to be able to run the files.)
 - i. If asked "Confirm Uninstall" of PL-2303 choose, no.
 - ii. If asked to "Modify? Repair? Remove?" of PL-2303 choose, "Repair".
- 5) Check in the Control Panel>>System>>Hardware>>Device Manager to verify that the computer sees any Prolific USB-Serial drivers if used. If the computer does not see them, remove them for a few seconds then plug back in. (The driver version for the Prolific Driver should be 2.0.13.130 or later).
- 6) Run ESI SC and verify that ports are configured correctly. Please refer to install instructions pertaining to the specific "ESI + host instrument" configuration.
- 7) Verify that the correct instrument/emulation is selected in ESI SC.
- 8) Place the correct racks in ESI SC layout
- 9) Initialize ESI SC and use the Manual window to verify proper operation.
- 10) Test control from host instrument software.

SC-DX Probe Arm Realignment Guide (TN110518)

Background:

The radial position of the arm on the SC-DX autosampler should be as shown in Figure 70. The arm should be 180 degrees relative (opposite) of open side of vertical rail. If realignment is required, the following procedure is recommended.



Figure 70: Proper Radial Position of Arm.

Procedure:

- 1) Remove the probe momentarily from the arm during the initial steps of this procedure.
- 2) In the **Calibrate>Calibrate Autosampler** window, locate the Y-Offset value and change it to 0 as shown in Figure 71 and then click on “Apply Calibration Offset(s)” button. The arm should rotate and the open side of the vertical rail should now be facing away from the rinse station.

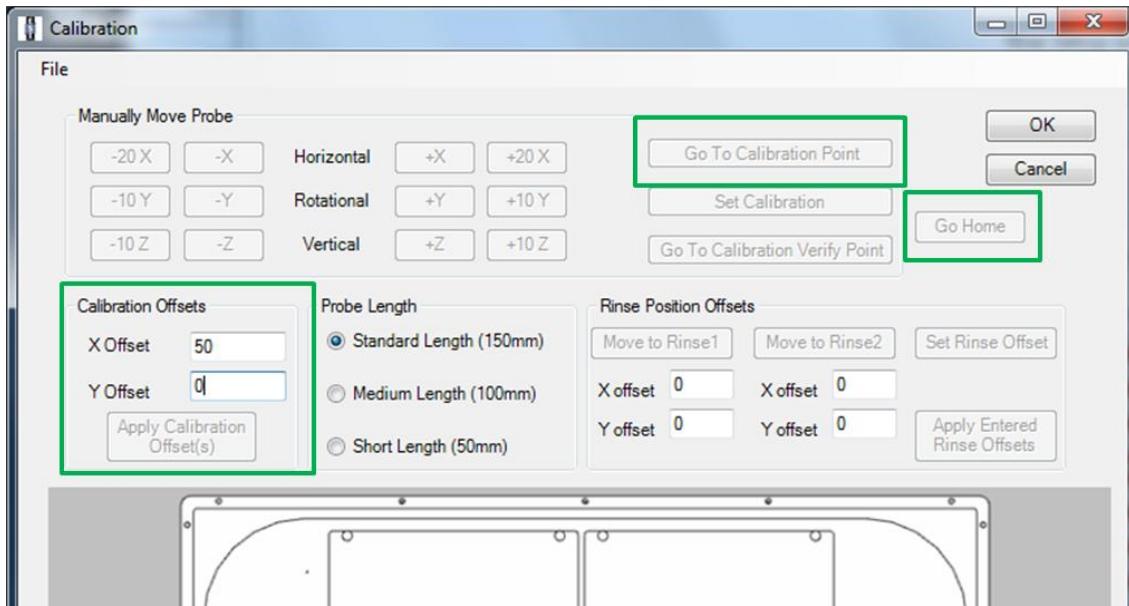


Figure 71: Calibrate Autosampler Window.

- 3) If the arm is not over the first rinse station, locate the screw shown in Figure 72 and loosen. This will permit the arm to be radially adjusted. (The arm does not need to be removed. It is shown removed only for clarity.)



Figure 72: Arm Holder securing screw.

- 4) Next, click on "Go To Calibration Point" to position the carriage assembly (Vertical axis) where it would normally be for calibration.
- 5) Now with the screw still loosened from Step 3), and with the probe in place, adjust the arm position by carefully rotating the Arm Holder about the vertical rail until the probe tip is on the calibration spot. Do not disturb (rotate) the carriage assembly (vertical axis) from its position to insure better accuracy. See Figure 73.

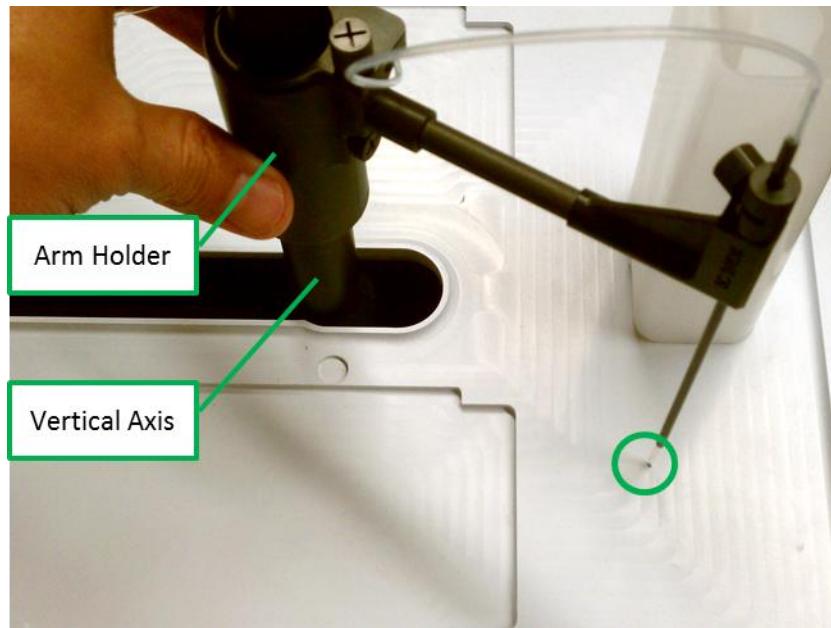


Figure 73: Proper position of probe over Calibration Point.

- 6) Next tighten the “Arm Holder securing screw” while being careful not to disturb the radial position.
- 7) Click on “Go Home”, the arm & probe should now be positioned above the rinse station.
- 8) Verify that the adjustment is good by again clicking on “Go To Calibration Position”. Repeat adjustments if the probe is not within 3mm (1/8 inch).
- 9) Further adjustments may be now made using the standard procedure outlined in the ESI SC Manual.

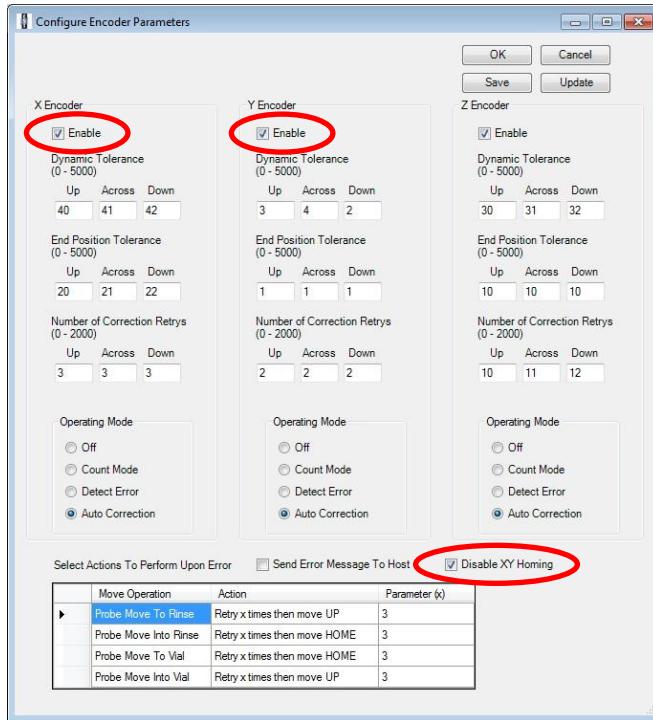
Configuring SC-Exact (TN141111)

Some initial configuration changes are needed for setup of a SC-Exact system. Follow the steps below to configure a SC-Exact system.

Enabling Triple Encoding:

- 1) Open **ESI SC, Configure>>Encoder** and check **Enable** for both the X and Y encoders
 - Also, check **Disable XY Homing**

 Note: If a password is requested, enter: 2440



- 2) After enabling you must then click **Save** and then **Update**

To check the encoder position log:

- 1) Using windows file explorer, browse to:
 - Win XP: C:\Program Files\ESI\ESI SC\Logs
 - Win 7: C:\Users\Public\ESI\ESI SC\Logs
- 2) All logs have the date in the file name. Log example:

A	B	C	D	E
1 Elemental Scientific				
2 ESI SC.exe v2.5.0.14				
3 vrm-PC	vm	Microsoft Windows NT 6.1.7600.0		
4 Position Received	Time Received	Time Reached	FAST	FAST method name
5 1 11112011 15:57:09:29	11112011 15:57:12:82		enabled	FAST-LRT.txt
6 2 11112011 15:57:15:79	11112011 15:57:21:30		enabled	FAST-LRT.txt
7 3 11112011 15:57:26:87	11112011 15:57:30:31		enabled	FAST-LRT.txt
8 4 11112011 15:57:33:35	11112011 15:57:36:65		enabled	FAST-LRT.txt
9 5 11112011 15:57:39:60	11112011 15:57:43:07		enabled	FAST-LRT.txt
10 6 11112011 15:57:46:03	11112011 15:57:49:39		enabled	FAST-LRT.txt

Access to Micro96 and Micro48 in PlasmaLab (TN010906)

Description: The following instructions describe how to access the Micro96 and Micro48 racks on the SC-2 when controlled by the PlasmaLab software.

- 1) PlasmaLab access to Micro96 racks: Select the 3x8 rack in the PlasmaLab software. Select the Micro96 rack in the corresponding location on the SC-2. Regardless of vial location used in the PlasmaLab, the depth values 1-96 will address vial positions 1-96 located on SC-2 for the corresponding rack location. Any vial position chosen in the corresponding rack defined in the PlasmaLab will be interpreted by only using the depth. If the depth is selected in the PlasmaLab is 0 or greater than 96 an error will be returned from the ESI SC software.
- 2) PlasmaLab access to Micro48 racks: Select the 3x7 rack in the PlasmaLab software. Select the Micro48 rack in the corresponding location on the SC-2. Regardless of vial location used in the PlasmaLab, the depth values 1-48 will address vial positions 1-48 located on SC-2 for the corresponding rack location. Any vial position chosen in the corresponding rack defined in the PlasmaLab will be interpreted by only using the depth. If the depth is selected in the PlasmaLab is 0 or greater than 48 an error will be returned from the ESI SC software.

Access to MT24G in PlasmaLab (TN120709)

Description: The following instructions describe how to access the MT24G racks on the SC-2/4 when controlled by the PlasmaLab software.

- 1) Using the “Accessory Setup and Control” of the PlasmaLab, use the Wizard to add a new device and choose the Cetac-500. If using a SC-4 with more than four rack locations it will be necessary to choose the Cetac-500ER during this step.
- 2) Choose the 24 position racks (3x8) for the corresponding locations on the SC that will have the MT24G rack. Although the racks dimensions (3x8) do not agree with the MT24G (4x6), the autosampler will sequentially process the rack for a total of 24 positions.
- 3) Save the new Accessory settings.

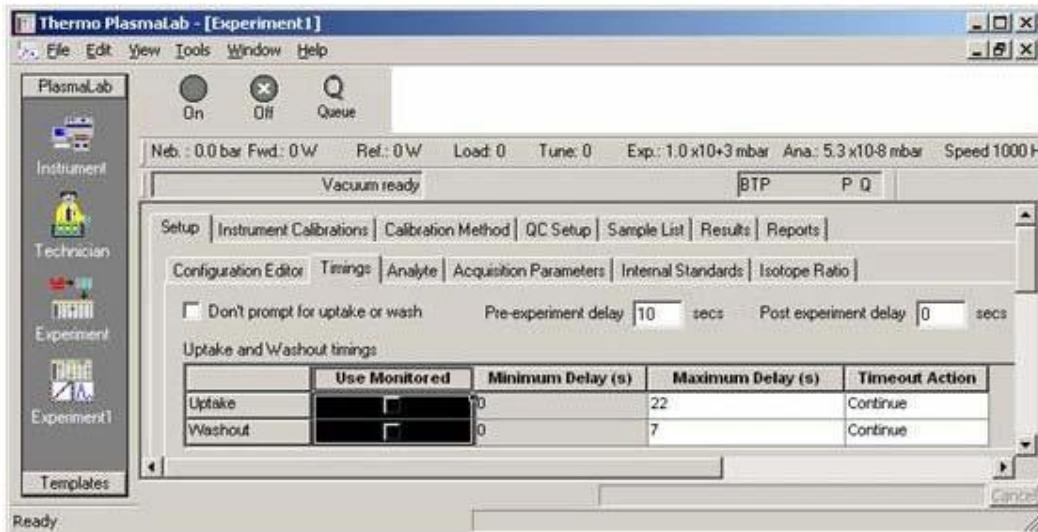
Communication Loss in PlasmaLab (TN200807)

This document describes the two main reasons for communication loss when using the ESI SC with PlasmaLab software.

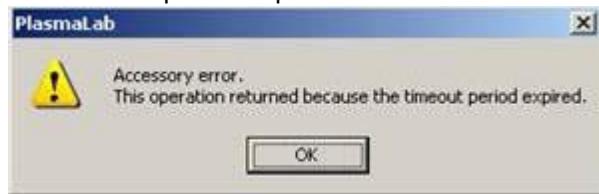
- A. Description: An error message from the PlasmaLab software states "Accessory error." and cannot communicate with ESI SC. This error is generally encountered during beginning of experiment run.



Solution: Set the Pre-experiment delay to at least 10 sec.



- B. Description: An error message from the PlasmaLab software states "Accessory error." and shows that a "timeout period expired"



Solution: Check SC autosampler movement settings in the Configuration menu and retraction speeds at each rack to verify that autosampler completes movements within the time allowed by the PlasmaLab method.

Using Custom MAP Files in iTEVA (TN110225)

Background:

This document illustrates the procedure for using custom autosampler configuration files with the iTEVA/TEVA software. This is useful for purposes of adding "standard" locations or naming sample locations so that they are identified in the Analyst window.

The example specifically shows how a "static" or custom SC autosampler configuration may be used. In normal operation, the ESI SC software continuously rewrites the MAP file to default settings based on the configuration in the ESI SC. By adding an additional configuration in the iTEVA/TEVA, an unchanging or "static" MAP file will preserve custom settings.

Example:

In the following example the default configuration for the SC-4 autosampler will be modified to allow the placement of additional STDs locations in Rack 1. See locations to be modified in Figure 60.

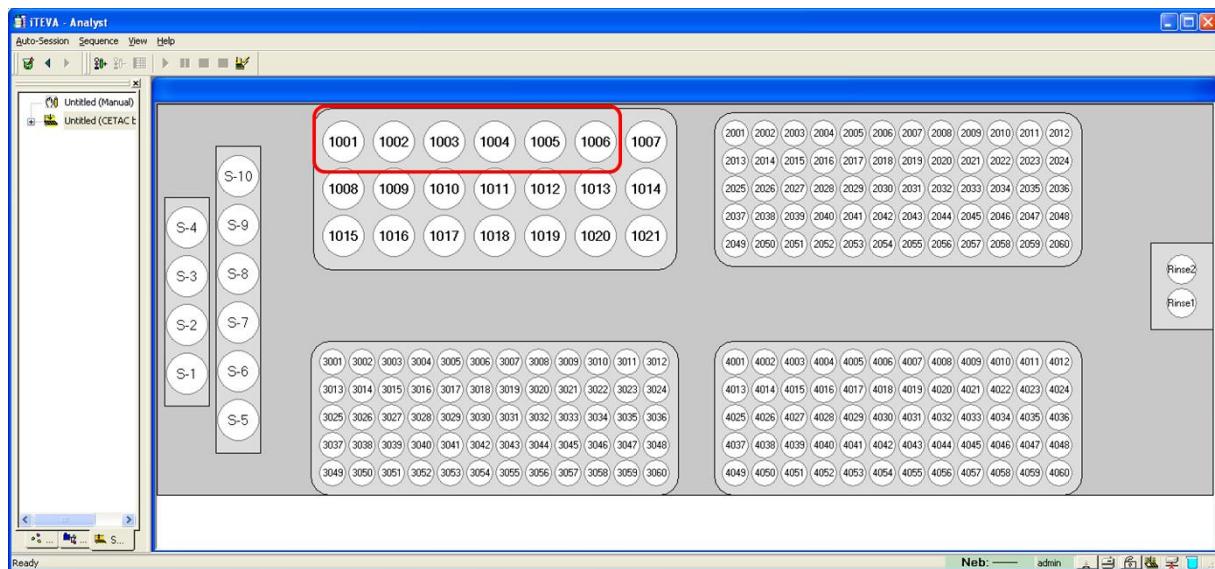


Figure 74: Example- Sample locations to be modified to Standards.

Example Procedure:

- 10) Configure the ESI SC software with the correct racks to be used. After implementation of this procedure, it is still required that the rack and tube counts match between the ESI SC software and the iTEVA custom configuration.
- 11) Close the iTEVA software.
- 12) Locate the working directory that has the files that iTEVA/TEVA uses for configuration of the Autosamplers. Typically these can be found in the following directories:

- a. If iTEVA for WindowsXP: Locate the \Program Files\Thermo\iTeva\SysData.
- b. If iTEVA for Windows 7: Locate the \Users\Public\Thermo\iTEVA\Autosamp.
- c. If TEVA: Locate the \SysData folder in TEVA install directory.



Note: These files may possibly be located in the similar path, in a folder called "Autosamp".

- 13) In this example the following files will be modified because a SC-4DX configuration is to be customized on a computer with Windows XP.

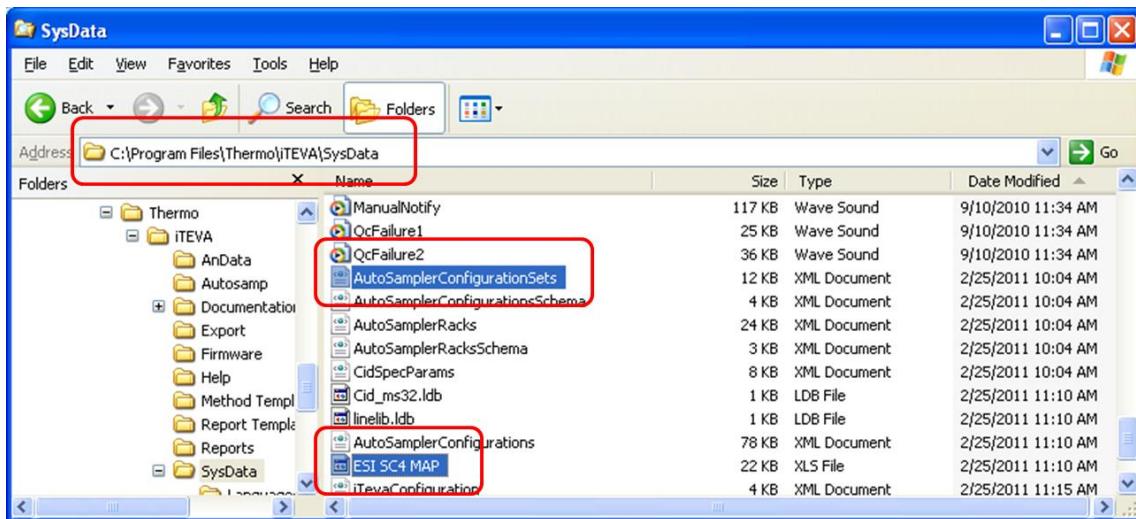


Figure 75: Example location and files to be modified.

- 14) Create a copy of the existing "ESI SC4 MAP" file and rename as "Custom SC4 MAP".
- 15) Using Microsoft Excel, open and modify the new "Custom SC4 MAP" file. For this example, we will modify the first six sample locations for the rack beginning with "Id" 1001. The "Type" will be changed from "U" to "S", specifying that location as a "Standard". See Figure 62.

	Type	Id	Rack	Row	Col	Label
1	S	1001		3	1	1 S-11
2	S	1002		3	1	2 S-12
3	S	1003		3	1	3 S-13
4	S	1004		3	1	4 S-14
5	S	1005		3	1	5 S-15
6	S	1006		3	1	6 S-16
7	S	1007		3	1	7
8	U	1008		3	2	1
9	U	1009		3	2	2
10	U	1010		3	2	3
11	U	1011		3	2	4
12	U	1012		3	2	5

Figure 76: Customizing values in the new MAP file.

- 16) The name of the tube can also be specified by entering the desired Label in the appropriate column. See Figure 62.
- 17) Save the new file.
- 18) Next, using Notepad.exe, modify the “AutoSamplerConfigurationSets file by selecting the appropriate Configuration definition and duplicating it. It is important to duplicate all of four lines as shown in Figure 63. In the new entry, the following changes should be made:
 - a. The ConfigurationSet Name should be modified by adding the suffix: “-Custom”.
 - b. The MapFile name will be modified to reflect the new MAP file created in Step 14).

```
<?xml version="1.0"?>
<AutosamplerConfigurationSets>
  <ConfigurationSets>
    <ConfigurationSet Name="CETAC by ESI SCmicro" Comment="Emulation by ESI">
      <MapFile>ESI SCmicro Map.xls</MapFile>
      <Configuration>ESI SCmicro</Configuration>
    </ConfigurationSet>
    <ConfigurationSet Name="CETAC by ESI SC2" Comment="Emulation by ESI">
      <MapFile>ESI SC2 Map.xls</MapFile>
      <Configuration>ESI SC2</Configuration>
    </ConfigurationSet>
    <ConfigurationSet Name="CETAC by ESI SC4" Comment="Emulation by ESI">
      <MapFile>ESI SC4 Map.xls</MapFile>
      <Configuration>ESI SC4</Configuration>
    </ConfigurationSet>
    <ConfigurationSet Name="CETAC by ESI SC4-Custom" Comment="Emulation by ESI">
      <MapFile>Custom ESI SC4 Map.xls</MapFile>
      <Configuration>ESI SC4</Configuration>
    </ConfigurationSet>
    <ConfigurationSet Name="CETAC by ESI SC8" Comment="Emulation by ESI">
      <MapFile>ESI SC8 Map.xls</MapFile>
      <Configuration>ESI SC8</Configuration>
    </ConfigurationSet>
    <ConfigurationSet Name="CETAC by ESI SC14" Comment="Emulation by ESI">
      <MapFile>ESI SC14 Map.xls</MapFile>
      <Configuration>ESI SC14</Configuration>
    </ConfigurationSet>
    <ConfigurationSet Name="CETAC by ESI SCscout" Comment="Emulation by ESI">
      <MapFile>ESI SCscout Map.xls</MapFile>
      <Configuration>ESI SCscout</Configuration>
    </ConfigurationSet>
  </ConfigurationSets>
</AutosamplerConfigurationSets>
```

Figure 77: New ConfigurationSet added.

- 19) Save and close the file.
- 20) With the modifications now complete, the additional autosampler configuration should now be available as shown in Figure 64.



Note: If multiple autosampler configurations are duplicated but the newly created Custom configuration does not match the racks in the ESI SC software, it is likely due to the existence of multiple configuration files located in both the **\SysData** and the **\AutoSamp** directories. Repeat Step 18), using the file in the alternate directory.

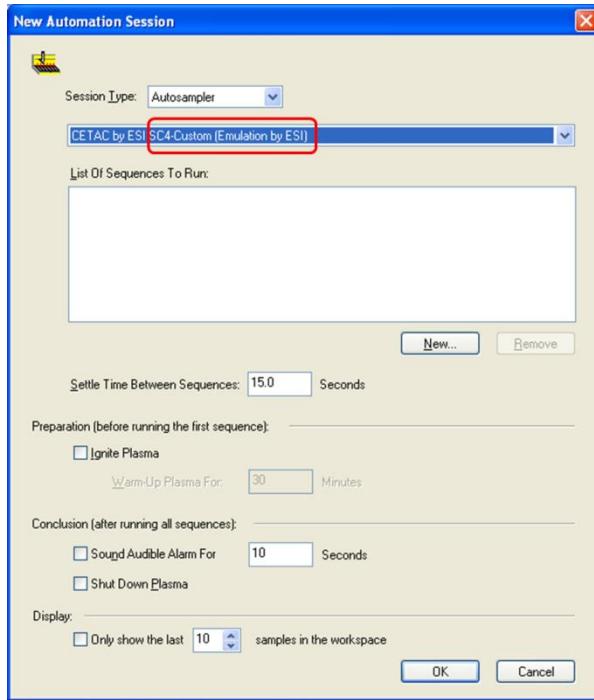


Figure 78: Newly added "Custom" configuration.

- 21) The new configuration for this example will now enable the additional Standards locations S-11 through S-16.
See Figure 65.

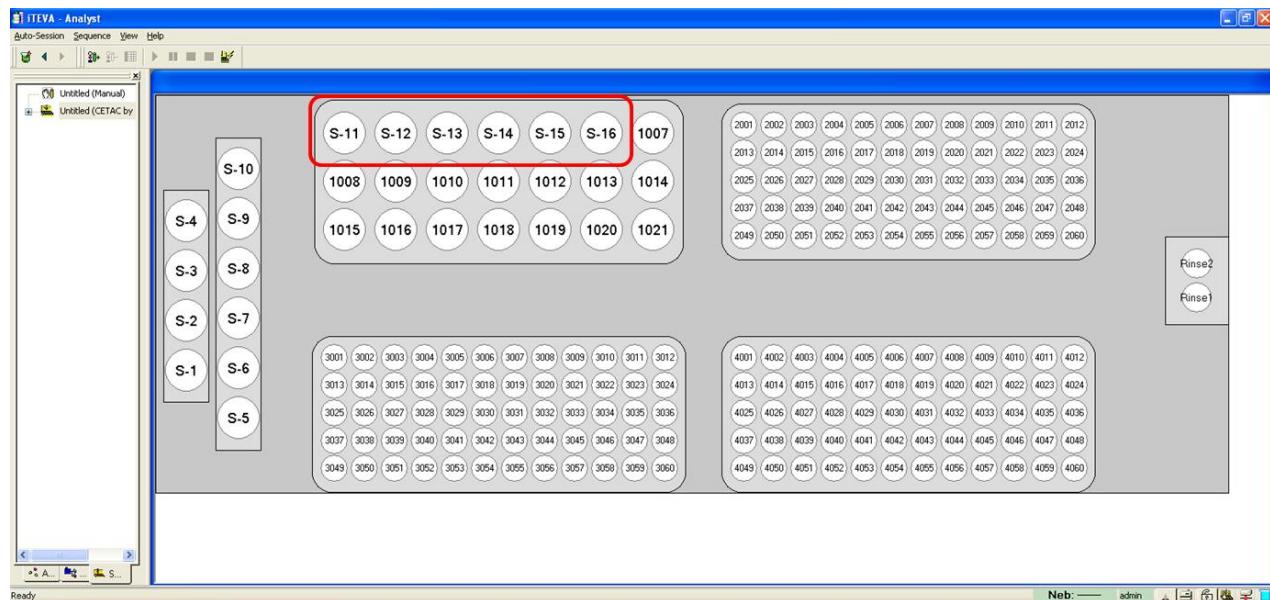
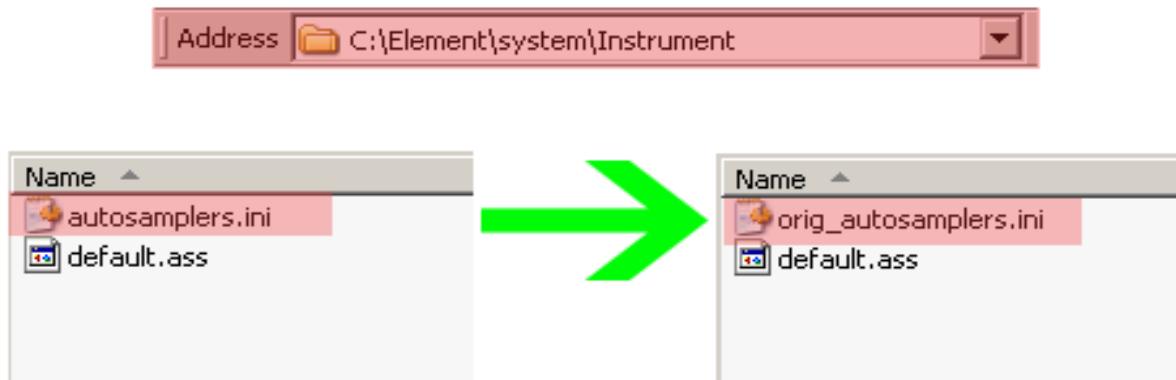


Figure 79: New Custom autosampler configuration.

Custom Racks in Thermo Element & Neptune (TN160807-R1)

If custom racks are to be configured, the following procedure can be used to modify the selection set available in the Executive. From the available selection set, the user can choose what racks are available to the Thermo Instrument.

- 1) Locate and save the existing Thermo "autosamplers.ini" file as "orig_autosamplers.ini". Commonly, this directory may be C:\element\system\Instrument or C:\ element\system\idsc or C:\ Neptune\System\Autosampler

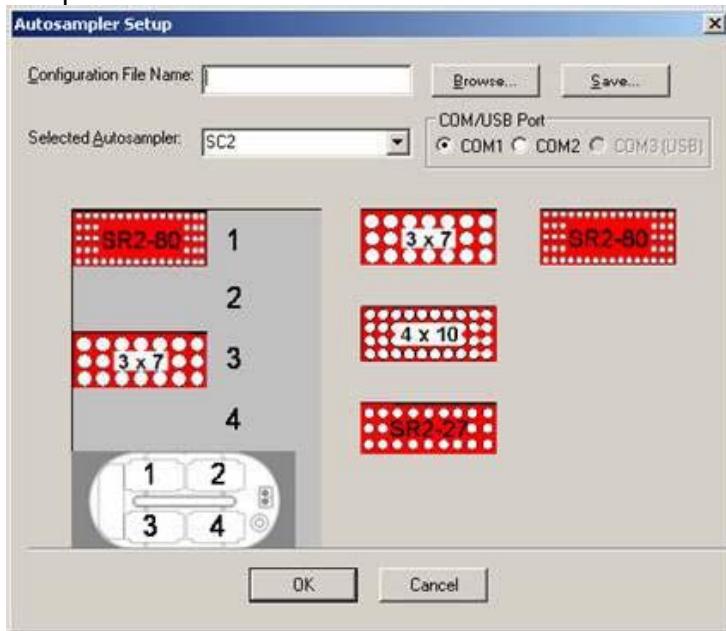


- 2) Copy all files from the C:\Program Files\ESI\ESI SC\SupportFiles\ElementSupportFiles directory to the Thermo directory that contains the "autosamplers.ini" file. Do not overwrite any existing Thermo files.
- 3) Open the new "autosamplers.ini" file using Notepad and follow directions for steps A & B for the SC model to be configured. A selection set of four racks can be defined by specifying the rack type and associated graphic name. The following excerpts show the values (highlighted in red), that can be changed by referencing the comments in the file.

```
[SC2_RTYPES]
RTypBitmapName_0=0
RTypBitmapName_1="E3x7.bmp"
RTypBitmapName_2="E4x10.bmp"
RTypBitmapName_3="SR2-27.bmp"
RTypBitmapName_4="SR2-80.bmp"
*
*
```

```
[SC2_RIDS]
RTypID_0= SC2_STD
RTypID_1= SC2_RTYP_6
RTypID_2= SC2_RTYP_7
RTypID_3= SC2_RTYP_14
RTypID_4= SC2_RTYP_11
```

- 4) Save the modified “autosamplers.ini” file.
- 5) Open Thermo Executive and select the corresponding SC model in “Selected Autosampler”. The custom rack options will now be visible as in the following image. The desired rack can be placed in the corresponding location using “Drag and Drop.”



Please note that if the **Instrument>>Dockable Windows>>Autosampler** window can control the SC autosampler but the sequence does not update, it may be necessary to create a new sequence.

After setup of your desired rack, please make a copy of the new “autosamplers.ini” file and rename the copy to “bkup_autosamplers.ini”. If the Thermo software is updated it will likely overwrite the existing “autosamplers.ini” file, you can then restore your configuration with the “bkup_autosamplers.ini” file.

Using a GPIB-232CV-A with ESI SC (TN060406)

This document will illustrate the proper configuration and use of a National Instruments GPIB-232CV-A that is provided with the ASX-500. The combination of these DIP switch settings and the addition of a Null adapter (SC-0906) along with a DB9 M/F Serial Cable (SC-0904), can be used to connect the converter to the computer.

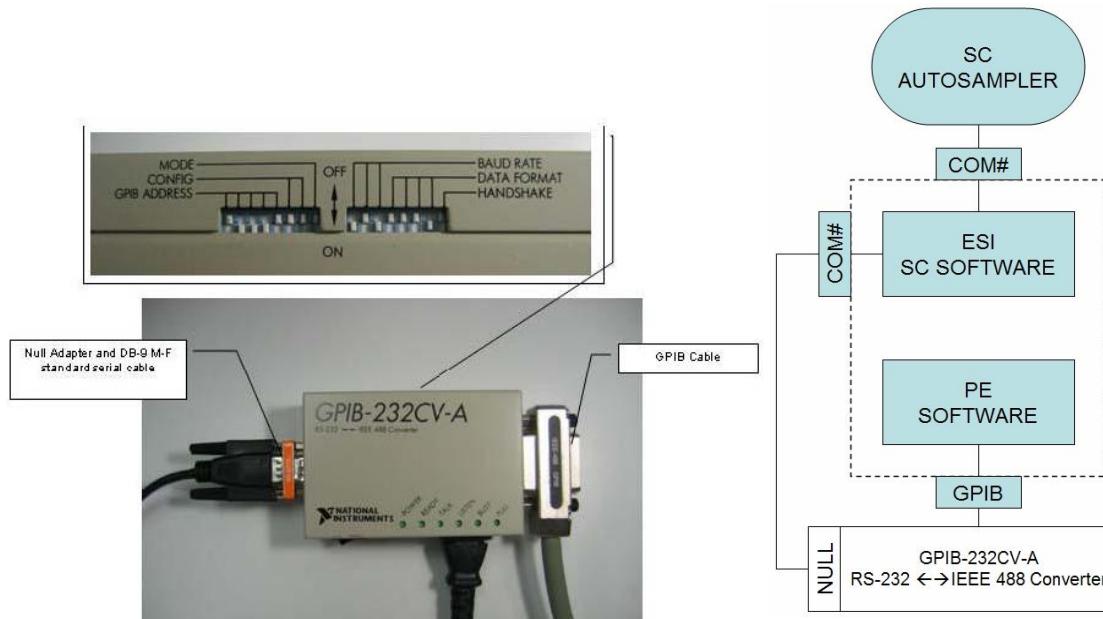


Figure 80: Dip Switch Settings to connect GPIB 232CV-A to DB9 on host computer.

Hardware installation procedure:

- 1) Verify that the GPIB-232CV-A was originally configured for the autosampler. Incorrect firmware will prevent proper installation.
- 2) Remove existing serial cable and replace with Null adapter (SC-0906) and DB9 M/F Serial Cable (SC-0904). See Figure 80.
- 3) Secure other end of Serial Cable (SC-0904) to a serial port on host computer.