

EZPump (SSI LA) Driver Manual
Revision 1.01 January 6, 2005

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- 1. Introduction and Scope:** EZPump is a software addition to the EZChrom Elite or EZStart chromatography software package by Scientific Software Inc. It allows EZChrom (Elite or EZStart) to control the Series1, Series 2, Series 3, Prep 24, Prep 100, Q-Grad, and 1500 pumps manufactured by Scientific Systems Inc. Each pump requires a RS-232 computer port for control communication. In most cases, computers will require the addition of a PCI Serial Port Expansion card.

This interface describes

- ❑ Connection of all signal and electrical cables.
- ❑ Installation and configuration of the EZPump software.

It does NOT cover

- ❑ Plumbing issues, (which are system specific)
- ❑ EZChrom Elite or EZStart software installation
- ❑ Connections to all auto-samplers or detectors.

- 2. Materials checklist and familiarization:** It is important to identify which kit you are installing, please review this section thoroughly prior to hardware installation. There are 4 variations of the kit, and it is important to confirm which kit you have.

2.1. Types of EZStart kits:

- ❑ SSW0101 (EZPump, EZStart, SN4000)
- ❑ SSW0102 (EZPump, EZStart, SS420X)
- ❑ SSW0103 (EZPump, SN4000)
- ❑ SSW0104 (EZPump, SS420X)

2.2. EZPump Kits ALWAYS contain

2.2.1. A CD with the EZPump installation program.

2.2.2. A PCI RS232 adaptor card with 4 communication ports to connect pump(s) to the PC.

2.3. EZPump Systems MAY ALSO contain:

2.3.1. An SS420X interface for digitizing analog detector signals.

2.3.2. An SN 4000 TSP system interface module for digital control of TSP Detectors and/ or Autosamplers.

2.3.3. EZStart chromatography data package.

2.4. Unpack all materials and confirm that the items you received agree with the following BOM.

2.5. Bills of Materials:

BOM SSW0101

| Part Number | Description | Qty |
|-------------|--|-----|
| 070100 | EZPump Installation CD (<u>Includes Manual</u>) | 1. |
| 071000 | EZStart Full Digital Software (USB Key) | 1. |
| 071003 | Thermo System Interface (SN4000) (Includes RS-232 Serial Cable) | 1. |
| 071004RD | Start-up Guide, EZStart Full Digital | 1. |
| 071012 | PCI RS-232 4-Port Expansion Card (Includes DB-9M Fan out Cable) | 1. |
| 120677 | Modular Data Cable (Pumps) | 4. |
| 120672 | Adaptor, RJ45 to DB9-Female | 4. |

BOM SSW0102

| Part Number | Description | Qty |
|-------------|---|-----|
| 070100 | EZPump Installation CD (<u>Includes Manual</u>) | 1. |
| 071001 | EZStart Digital/Analog Software (USB Key) (Includes SS420X Interface and Serial Cable) | 1. |
| 071005RD | Start-up Guide, EZStart Digital/Analog | 1. |
| 071012 | PCI RS-232 4-Port Expansion Card | 1. |
| 120677 | Modular Data Cable (Pumps) | 4. |
| 120672 | Adaptor, RJ45 to DB9-Female | 4. |
| 200461 | Signal Cable, Detector | 1. |
| 935108 | Switch Power Supply | 1. |

BOM SSW0103

| Part Number | Description | Qty |
|-------------|--|-----|
| 070100 | EZPump Installation CD (<u>Includes Manual</u>) | 1. |
| 071003 | Thermo System Interface (SN4000) (Includes RS-232 Serial Cable) | 1. |
| 071004RD | Start-up Guide, EZStart Full Digital | 1. |
| 071010 | RS-232 Serial Cable (SN4000) | 1. |
| 071012 | PCI RS-232 4-Port Expansion Card (Includes DB-9M Fan out Cable) | 1. |
| 120677 | Modular Data Cable (Pumps) | 4. |
| 120672 | Adaptor, RJ45 to DB9-Female | 4. |

BOM SSW0104

| Part Number | Description | Qty |
|-------------|--|-----|
| 070100 | EZPump Installation CD (<u>Includes Manual</u>) | 1. |
| 071005RD | Start-up Guide, EZStart Digital/Analog | 1. |
| 071012 | PCI RS-232 4-Port Expansion Card | 1. |
| 120677 | Modular Data Cable (Pumps) | 4. |
| 120672 | Adaptor, RJ45 to DB9-Female | 4. |
| 200461 | Signal Cable, Detector | 1. |
| 935108 | Switch Power Supply | 1. |

3. Review PC Requirements

3.1. Minimum Suggested PC requirements

- Pentium III, 800Mhz Desktop
- 512 MB RAM (5 Instruments)
- 10GB Free Disk Space
- One 24X CD-R drive
- At least One RS-232 Com Port (two required for scanning or diode array (UV3000/UV6000) coupled with SN4000/ SS420x
- At least Two USB ports
- At least One PCI Expansion Slot
- TCP/IP Ethernet
- Microsoft Windows XP Professional or Windows 2000 Professional Operating System

4. Install Hardware:

4.1. Install PCI 4-Port Serial Adaptor

- 4.1.1. Start PC and Install PCI Serial Card Software as instructed by manufacturer. Driver software must be installed before hardware to facilitate plug and play installation. Shutdown and disconnect power after driver installation is complete.
- 4.1.2. Remove PC Cover.
- 4.1.3. Locate first available PCI card slot and remove slot cover.
- 4.1.4. Install PCI Serial Card as instructed by manufacturer.
- 4.1.5. Reconnect power and start PC. Follow instructions from operating system to install communication ports and new hardware.

4.2. Connect all cables and adaptors as shown on Start-up Guide drawing 071004RD for SSW0101 and SSW0103
071005RD for SSW0102 and SSW0104.

4.3. Connect all power supplies.

5. Install EZStart (EZChrom *Elite*) Software (Skip if previously installed)

- 5.1. Insert CD labeled "EZStart Version" x.x.x.xxxx ("EZChrom *Elite* V.x.x.x(Build xxx)) into CD Drive.
- 5.2. On AutoStart, follow the manufacturer instructions to install software. Generally use default directories and folders.
- 5.3. Reboot machine as instructed at completion of EZStart (EZChrom *Elite*) software.
- 5.4. Insert CD labeled "Add-On" into CD Drive.
- 5.5. Use Windows Explorer to find and run "Setup" file. Follow manufacturer's instructions on software installation.

6. EZStart (EZChrom *Elite*) USB Key Dongle

6.1. Install EZStart (EZChrom *Elite*) software protection key dongle in available USB port.

7. Create “EZStartUser” Account

7.1. With administrative authorities, create a general user named “EZStartUser” with full administrative capabilities. Create password for the account when applicable. Specific user names and associated passwords can be substituted for this account. Users must have administrative authorities to use EZStart/ EZChrom *Elite*.

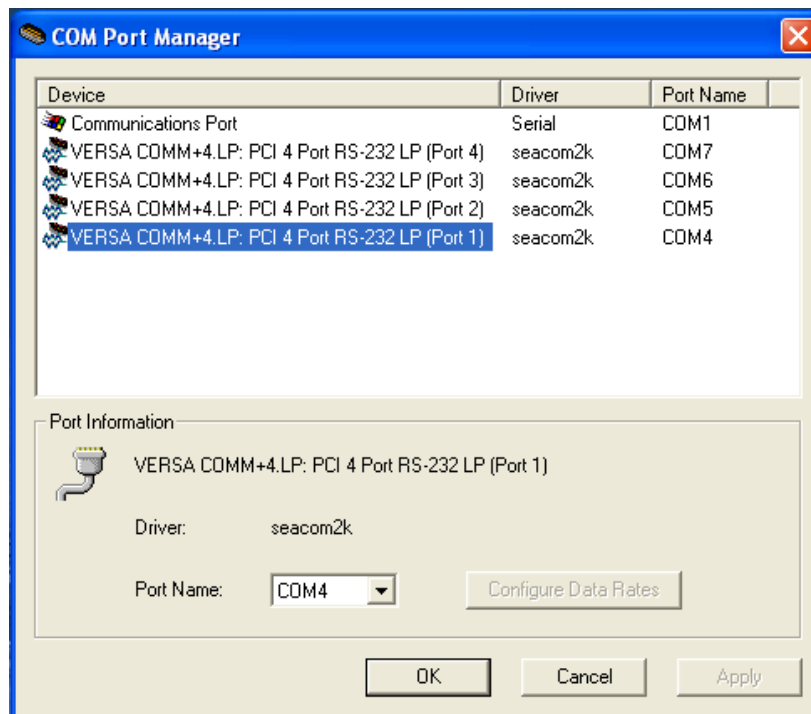
8. Create EZStart (EZChrom *Elite*) Shortcuts

8.1. In the case of EZStart, make shortcuts on Desktop for:
Start/Programs/Chromatography/EZStart Config
And
Start/Programs/Chromatography/EZStart.

In the case of EZChrom *Elite*, make only one shortcut on the desktop for:
Start/Programs/Chromatography/EZChrom Elite.

9. Identify Installed Communication Ports

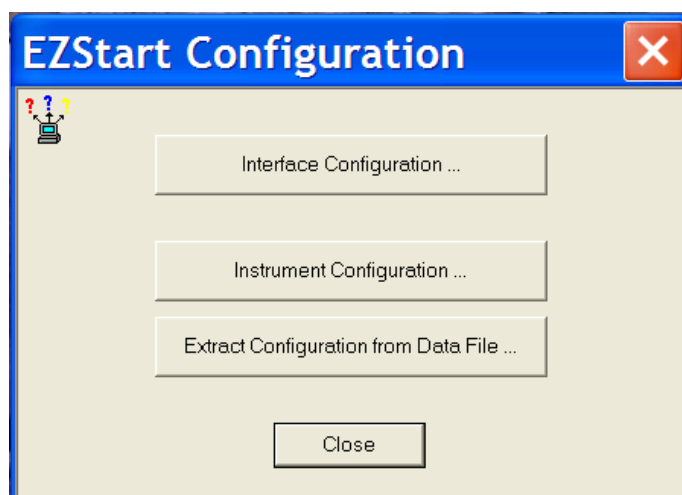
9.1. Under Windows “Start” menu, Select SeaCom/Port Manager.



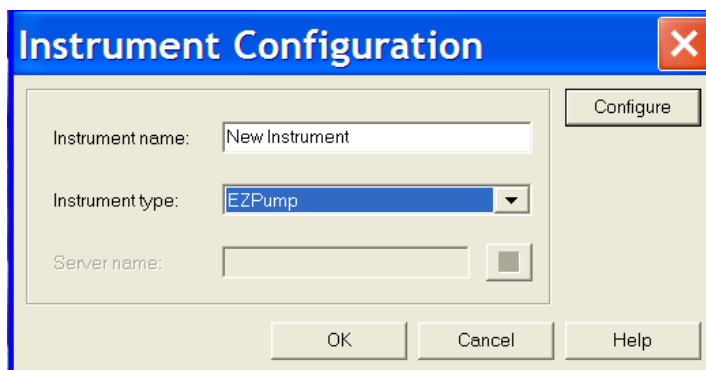
- 9.2. Identify and record the serial communication ports installed. Associate the original equipment com port with the detector and the next four consecutive com ports with the pumps, starting with pump A through the final pump D. The EZPump driver requires all pump com ports be sequential. If less than four pumps are utilized, identify and record remaining ports as "Not Installed".

10. EZStart (EZChrom *Elite*) Instrument Configuration

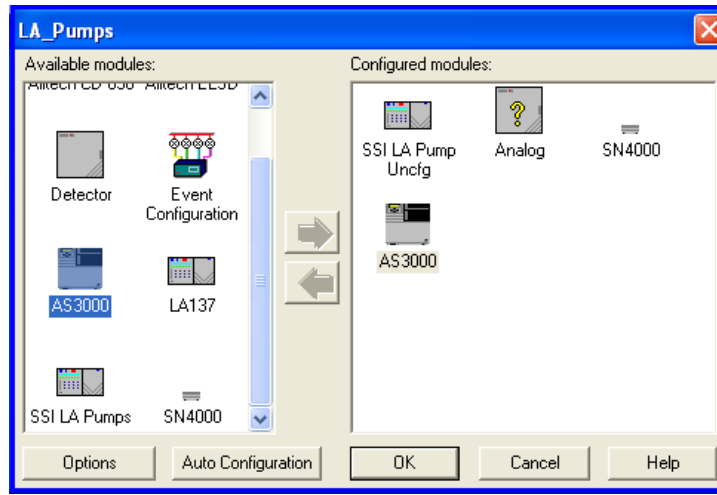
- 10.1. Activate EZStart Config (EZChrom Elite) shortcut.
10.1.1. EZStart Configuration sequence (See below for EZChrom *Elite*):
10.1.1.1. Select Instrument Configuration.



- 10.1.1.2. Enter instrument name and select EZPump instrument type from the drop-down table.



- 10.1.1.3. Select modules by double-clicking icons in left pane. Selected modules will appear in the right pane.



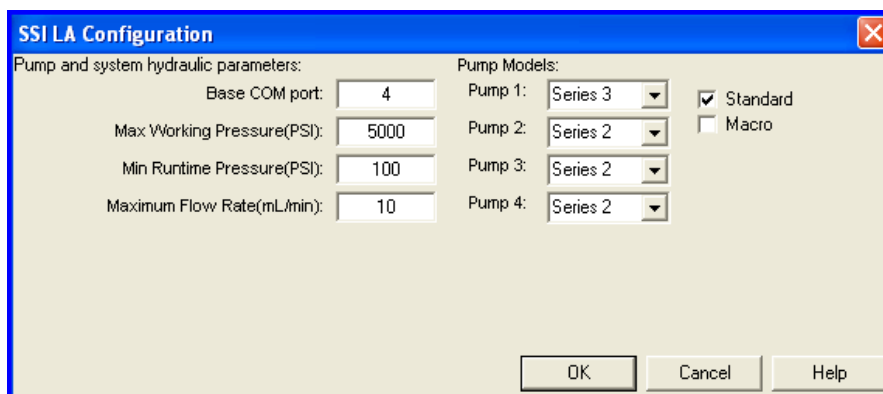
- 10.1.1.4. Configure each module selected by double-clicking each icon. For demonstration purposes, the SSI LA Pump is selected in this application.

- 10.1.1.5. Enter the pump type for the text box labeled “Pump 1” and check the appropriate check box labeled Standard, Macro, or Micro. Note that only the head types that apply to the pump model are available after initial selection. EZPump requires that pumps equipped with pressure detection must be configured as Pump 1.

- 10.1.1.6. Enter the remaining pump types in the corresponding text boxes. Leave pumps which are not installed as “None”. Pumps must be in sequential order starting with pump 1 leaving no blanks (“None”) between installed pumps.

- 10.1.1.7. Enter the port number for the first PCI expansion port (determined and recorded in the SeaLevel Port Manager above) into the text box labeled “Base COM Port”.

- 10.1.1.8. Enter the Max Working Pressure, Min runtime Pressure, and Maximum Flow Rate in the final three text boxes.



10.1.1.9. Save the configuration by pressing the “OK” button.

10.1.1.10. Configure remaining modules. (See EZStart/ EZChrom *Elite* manual for your additional hardware configuration).

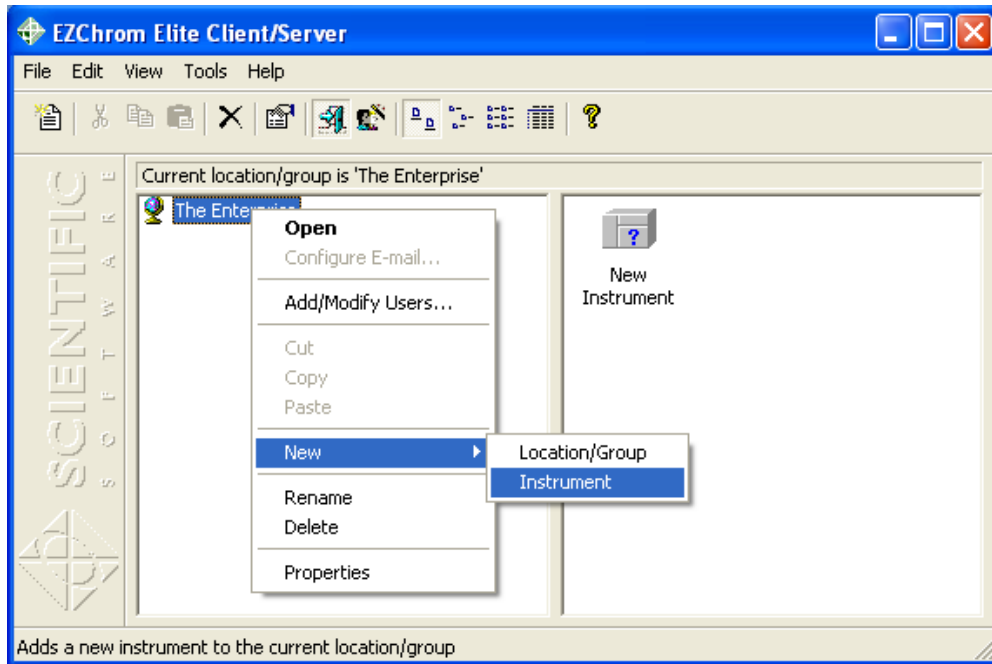
10.1.1.11. Upon completion, press the “OK” button on each screen to save the EZPump configuration.

10.1.2. EZChrom *Elite* Configuration sequence:

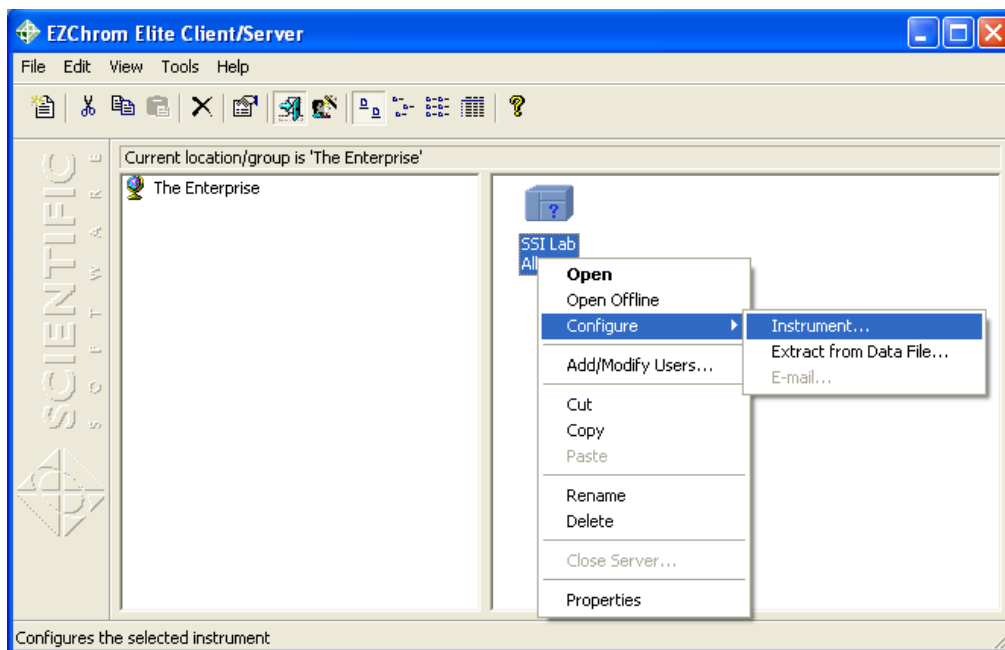
10.1.2.1. Start EZChrom *Elite*.

10.1.2.2. Select Instrument Configuration.

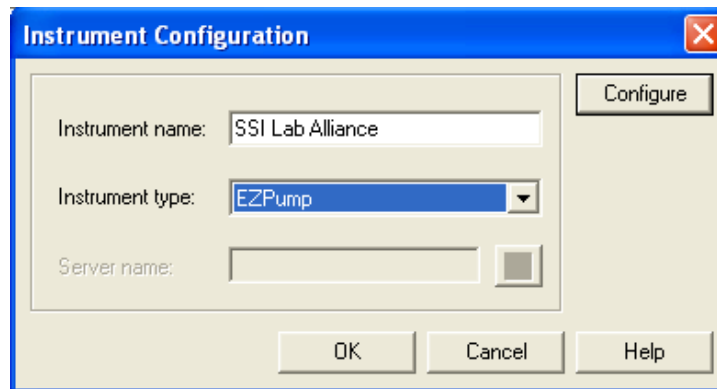
10.1.2.3. Right click the “Enterprise” icon in the left pane then select New/Instrument to create a new instrument in the right pane. Rename the Instrument to “SSI LabAlliance” or an appropriate name.



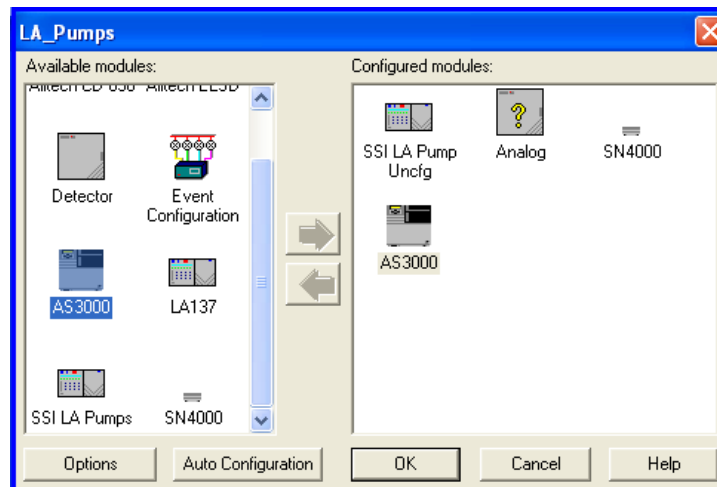
10.1.2.4. Configure the new instrument by right clicking on the SSI LabAlliance icon and selecting Configure/Instrument.



10.1.2.5. Select EZPump from the dropdown list for instrument type and press the configure button.



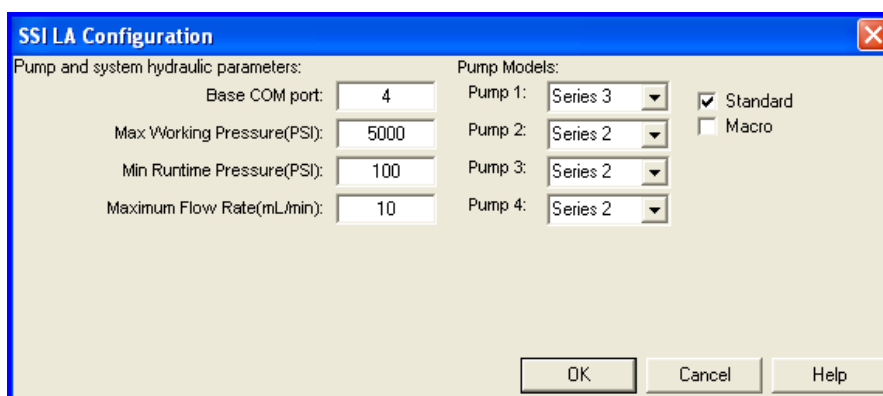
10.1.2.6. Select modules by double-clicking icons in left pane. Selected modules will appear in the right pane.



10.1.2.7. Configure each module selected by double-clicking each icon. For demonstration purposes, the SSI LA Pump is selected in this application.

10.1.2.8. Enter the pump type for the text box labeled "Pump 1" and check the appropriate check box labeled Standard, Macro, or Micro. Note that only the head types that apply to the pump model are available after initial selection. EZPump requires that pumps equipped with pressure detection must be configured as Pump 1.

- 10.1.2.9. Enter the remaining pump types in the corresponding text boxes. Leave pumps which are not installed as “None”. Pumps must be in sequential order starting with pump 1 leaving no blanks (“None”) between installed pumps.
- 10.1.2.10. Enter the port number for the first PCI expansion port (determined and recorded in the SeaLevel Port Manager above) into the text box labeled “Base COM Port”.
- 10.1.2.11. Enter the Max Working Pressure, Min runtime Pressure, and Maximum Flow Rate in the final three text boxes. Please note that flow and pressure are limited to the pump model selection in SST head type. Choosing PEEK pump materials will require lower pressures (see pump manual).



SSI LA Configuration

Pump and system hydraulic parameters:

Base COM port: 4

Max Working Pressure(PSI): 5000

Min Runtime Pressure(PSI): 100

Maximum Flow Rate(mL/min): 10

Pump Models:

Pump 1: Series 3

Pump 2: Series 2

Pump 3: Series 2

Pump 4: Series 2

Standard

Macro

OK Cancel Help

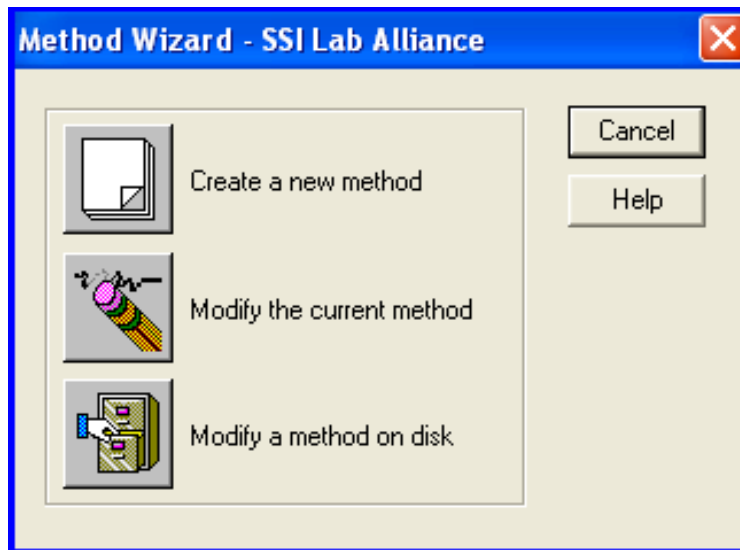
- 10.1.2.12. Save the configuration by pressing the “OK” button.
- 10.1.2.13. Configure remaining modules. (See EZStart/ EZChrom *Elite* manual for your additional hardware configuration).
- 10.1.2.14. Upon completion, press the “OK” button on each screen to save the EZChrom *Elite* configuration.

11. Start EZStart (EZChrom *Elite*)**11.1. Select EZStart icon (previously created in desktop).**

11.1.1. The first window on start-up is the Instrument Wizard. Select "Create or modify method".

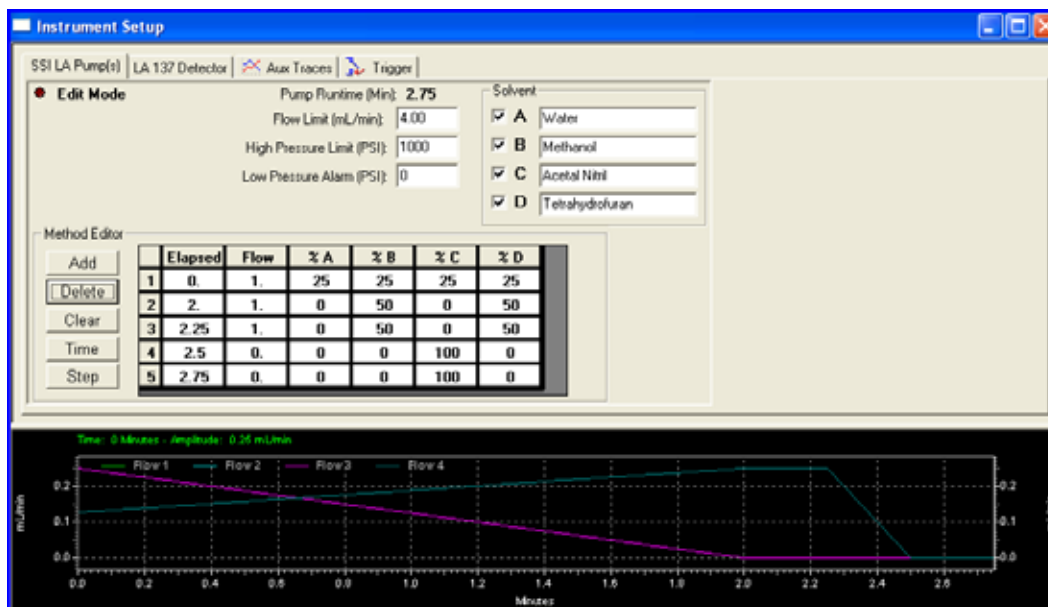


11.1.2. Select "Create a new method".



- 11.1.3. Enter the method flow limit in the text box labeled “Flow Limit (mL/min)”.
- 11.1.4. Enter the method high-pressure limit in the text box labeled “High Pressure Limit (PSI)”.
- 11.1.5. Enter the method low-pressure limit in the text box labeled “Low Pressure Alarm (PSI)”.
- 11.1.6. Enter the solvent descriptions for pumps A through D.
- 11.1.7. Use the “Add” pushbutton to enter a new row (new method step). Enter the elapsed time and corresponding flow rate, and flow distribution percentages for each pump. Note that each new row adds a default time of 0.1 minutes to the elapsed time. To insert the row before the last method step, simply edit the elapsed time value to a value less than the value of the row to be inserted above. The table will automatically sort the rows in the proper elapsed time sequence.

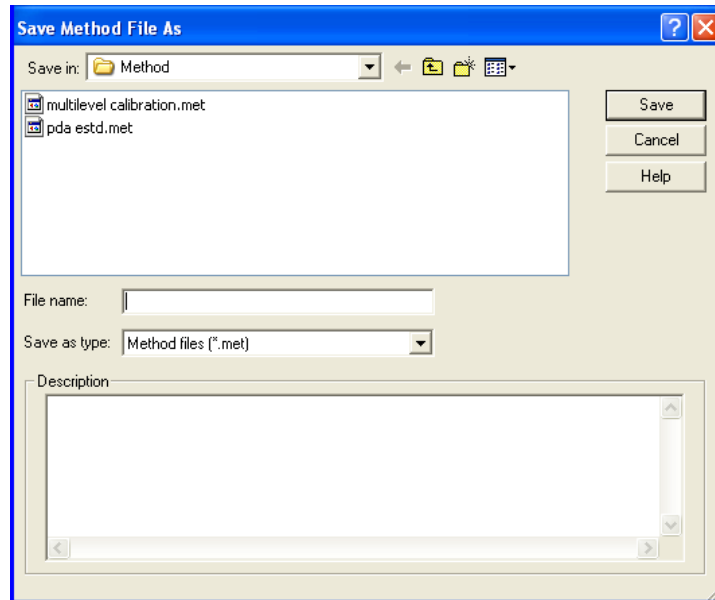
When entering flow percentages, enter data from the last pump (Pump D) to first. The four pump percentage cells are linked to sum to 100%. Entering data in the manner described automatically inserts the resulting difference in the previous pump.



- 11.1.7.1. 11.1.8 Create method for other installed modules (See EZStart/ EZChrom *Elite* manual for your additional hardware configuration).

11.2. Save Method.

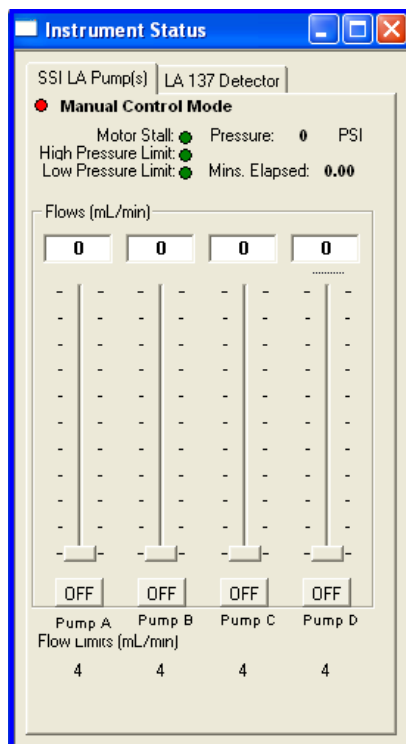
11.2.1. From the main menu, select “Method\ Save”



11.2.2. Enter file name and save.

11.3. Instrument Status.

11.3.1. Select “Control\ Instrument Status” from the main menu. The instrument status screen permits a user to visualize the pump status and change operating parameters.



11.3.2. Mode Indicator.

The status screen is equipped with an indicator to show the control status. The states indicated are:

11.3.2.1. Manual Control Mode.

Manual control mode is indicated by a flashing-red indicator.

11.3.2.2. Method Running.

Method running mode is indicated by a green-flashing indicator. During the method running mode, data inputs are disabled.

11.3.2.3. Fault Mode Indication

The mode indicator flashes red and displays the label “REDUCE PRESSURE TO CLEAR” when the pressure is greater than the high-pressure limit.

The mode indicator flashes red and displays the label “LOW PRESSURE DETECTED DURING RUN” when the pressure is less than the low-pressure limit.

- 11.3.3. LED Fault Indicators.
The pump status screen is equipped with three LED fault indicators.
- 11.3.3.1. Motor Stall.
Motor stall failure is indicated by a solid red LED indicator. This fault will automatically trigger manual mode. The method is not aborted. Operators must abort the method manually. To clear this alarm, the pump On/Off switch must be toggled for the affected pump.
- 11.3.3.2. High Pressure Limit
High-pressure limit failure is indicated by a solid red LED indicator. This fault will automatically trigger manual mode. The method is not aborted. Operators must abort the method manually. Reference the EZStart/ EZChrom *Elite* manual to run or abort a method/ sequence. To clear this alarm, the pump On/Off switch must be toggled for the affected pump. This pump occurs when internal pump limits are exceeded (EZStart Configuration), whereas, the mode indicators occur when method limits are exceeded.
- 11.3.3.3. Low Pressure Limit
Low-pressure limit failure is indicated by a solid red LED indicator. This fault will automatically trigger manual mode. The method is not aborted. Operators must abort the method manually. Reference the EZStart/ EZChrom *Elite* manual to run or abort a method/ sequence. To clear this alarm, the pump On/Off switch must be toggled for the affected pump. This pump occurs when internal pump limits are exceeded (EZStart Configuration), whereas, the mode indicators occur when method limits are exceeded.
- 11.3.4. Direct entry of pump flow rate.
Entering data directly into the pump flow text box sets the designated pump flow. Information is entered and sent by leaving the text box or double-clicking the mouse input. The status screen is enabled only in manual mode. During a method run mode, the flow text box is “grayed-out” permitting visual pump flow status but not permitting data entry.

11.3.5. Slider Flow Switch pump flow rate entry.
Pump flow can alternatively be set by moving the slider position. During a method run mode, the slider flow switch is removed not permitting data entry.

11.3.6. Pump On/ Off Pushbutton.
The Pump On/ Off pushbutton allows manual starting and stopping of the designated pump in the manual mode. During a method run mode, the Pump On/ Off pushbutton is "grayed-out" not permitting pump control.

Incorporated into the Pump On/ Off pushbutton is an actual pump status indicator. When the designated pump is actually running, the indicator will display a green background. When stopped, the background is the typical pushbutton color.

11.3.7. Elapsed Time.

11.4. Develop a new Sequence

Please refer to the appropriate sections of the EZStart or EZChrom *Elite* manual.

11.5. Run Method

Please refer to the appropriate sections of the EZStart or EZChrom *Elite* manual.

12. APPENDIX A

12.1. Frequently Asked Questions (FAQ)

1) Why do I see an error message "Open COM's didn't match pumps"?

EZChrom is unable to communicate with Pumps.

- Verify all cable connections with Setup Guide.
- Check configuration for both the ports (SeaLevel Port Manager) and EZStart Config.
- Test Com Port with Loopback Device.

2) Why do I get the message "file.ocx does not exist" or "file.dll does not exist" when starting EZStart/ EZChrom *Elite*?

This problem occurs when the version of the operating system does not contain all of the Active-X or DLL files required to run EZPump.

- Download vbrun60sp5.exe from the Microsoft support site and install.

3) Why does my status screen update take so long?

Status updates are the lowest priority functions of the EZPump driver and generally take 3-5 seconds depending on computer and device performance. If you are experiencing greater delays, then the communication is not working or the hardware is not sufficient (faster computer). Be sure to verify that the pump setup matches the configuration data. Changing firmware may require additional setup (see pump manual).

4) Why does the status screen initial update take several minutes, then the system seems to run normally.

If pump materials are PEEK construction, the default maximum flow and pressure must be reduced to be accepted by the pump (see pump manuals for maximum parameters). All default values are for SST materials.