

CANNON® PolyVISC® SPS
Solution Preparation System

PolyVISC® SPS
Operators Manual



***PolyVISC® SPS
Operators Manual***

Cannon Instrument Company®
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State College, PA 16803

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Contents

Overview.....	1
Related Documents.....	1
Specifications / Compliances	2
Notes/Cautions/Warnings.....	4
Safety Precautions.....	4
Unpacking and Installation	7
Unpack and Inspect	7
Setup the Solution Preparation System.....	9
Physical Arrangements.....	9
Communication Cables Setup.....	10
Solvent Hose Setup	13
Install SPS software	15
SPS Software Configuration	16
Configure hardware	16
Configure Method	18
Equations.....	21
Configure Advanced Settings	22
Using the Label Printer	23
Preparing Solutions	24
Initial Preparation	24
Checking the Solvent Level.....	24
Filling the Titrator.....	24
Turning on the Balance	24
Preparing a Solution	25
Saving Solution Preparation Data.....	26
Recalling Solution Data	27
Working with TITRONIC Piston Burettes	27

Specifications	28
Warranty	30
Products limited warranty.....	30
Reagent and chemical warranty.....	30
Returning a product to CANNON.....	31
Required information.....	31
Hazardous materials	31
Shipping notification.....	32
Replacement Parts List	33

List of Figures

Figure 1 — Arrangement of solution preparation system	9
Figure 2 — Communication setup: single titrator system.....	11
Figure 3 — Communication setup: dual titrator system (Titronic 300).....	11
Figure 4 — Universal Titrator Communication Setup – single titrator	12
Figure 5 — Universal Titronic Cable Connection Setup – dual titrators.....	12
Figure 6 — Hose setup: single titrator system	14
Figure 7 — Hose setup: dual titrator system	14
Figure 8 — Hardware configuration window	16
Figure 9 — Method configuration window	18
Figure 10 — Advanced settings configuration window	22
Figure 11 — SPS main window	25

List of Tables

Table 1 — Related documents.....	1
Table 2 — Mettler Toledo XS204 Precision Balance*	2
Table 3 — TITRONIC® 300 Piston Burette*	2

Table 4 — TITRONIC® universal Piston Burette*	3
Table 5 — PolyVISC® SPS Models	7
Table 6 — Packing list	8
Table 7 — Tools and materials required	10
Table 8 — Tools and materials required	13
Table 9 — Hardware settings	17
Table 10 — Method settings	18
Table 11 — Advanced settings	22
Table 12 — Mettler Toledo XS204 Precision Balance*	28
Table 13 — TITRONIC® 300 Piston Burette*	29
Table 14 — TITRONIC® universal Piston Burette*	29
Table 15 — PolyVISC SPS replacement parts	33



Overview

Cannon Instrument Company designed the solution preparation system to prepare highly accurate solutions for use with the PolyVISC. This system consists of a titrator for dispensing solvent, a scale for measuring the prepared solution, and the CANNON SPS software on a Windows® PC for managing the operation. Using a gravimetric method of measurement, the SPS achieves an accurate concentration measurement within $\pm 0.02\%$ of the desired results.

The gravimetric method of solution preparation is unaffected by temperature, giving it an inherent advantage over volumetric techniques that may not compensate for variations in solvent density at different temperatures. Common solvents, such as acetone, change density with temperature. For example, from 20 °C to 25 °C, the density of acetone decreases 0.76%. If not compensated for, this variation in density affects the accuracy of volumetric measurements and introduces significant error into the sample preparation process. Because gravimetric techniques measure the solvent by weight rather than volume, they are unaffected by modest temperature changes and provide accurate, temperature-independent results.

Related Documents

Table 1 — Related documents

Title	Reference Number
Plastics – Polyamides – Determination of viscosity number	ISO 307
Standard Test Method for Dilute Solution Viscosity of Ethylene Polymers	ASTM D1601
Standard Test Method for Intrinsic Viscosity of Cellulose	ASTM D1795
Standard Test Method for Determining Inherent Viscosity of Poly(Ethylene Terephthalate) (PET) by Glass Capillary Viscometer	ASTM D4603
Standard Test Methods for Determination of Solution Viscosities of Polyamide (PA)	ASTM D789
Standard Practice for Dissolving Polymer Materials	ASTM D5226

Specifications / Compliances

Table 2 — Mettler Toledo XS204 Precision Balance*

Specifications	Details
Model	XS204
Maximum capacity	220 g
Readability	0.1 mg
Power supply	100 to 240 VAC, 50/60 Hz, 30 VA
Operating conditions	5 °C to 40 °C, max. relative humidity 80% at 31 °C linearly decreasing to 50% at 40 °C , non-condensing, Installation Category II, Pollution Degree 2
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC)

* Specifications provided for convenience. Refer to manufacturer's specifications and Declaration of Conformance for official specifications.

Table 3 — TITRONIC® 300 Piston Burette*

Specifications	Details
Model	TITRONIC® 300
Cylinder	20 mL DURAN®, 50 mL DURAN®
Accuracy	0.15%
Precision	0.05%
Power supply	90 to 240 VAC, 50/60 Hz, 30 VA
Operating conditions	10 °C to 40 °C, max. relative humidity 80% at 31 °C linearly decreasing to 50% at 40 °C , non-condensing, Installation Category II, Pollution Degree 2
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC)

* Specifications provided for convenience. Refer to manufacturer's specifications and Declaration of Conformance for official specifications.

Table 4 — TITRONIC® universal Piston Burette*

Specifications	Details
Model	TITRONIC® universal
Cylinder	20 mL DURAN®, 50 mL DURAN®
Accuracy	0.15%
Precision	0.05%
Power supply	115/230 VAC, 50/60 Hz, 18 VA
Operating conditions	10 °C to 40 °C, max. relative humidity 80% at 31 °C linearly decreasing to 50% at 40 °C , non-condensing, Installation Category II, Pollution Degree 2
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC)

* Specifications provided for convenience. Refer to manufacturer’s specifications and Declaration of Conformance for official specifications.

Notes/Cautions/Warnings

Notes, caution, and warnings are used in the manual to call an operator's attention to important details prior to performing a procedure or step. Read and follow these important instructions. Failure to observe these instructions may void warranties, compromise operator safety, and/or result in damage to the equipment.



Notes provide more information about the content that follows.



Cautions alert the operator to conditions that may damage equipment.



Warnings alert the operator to conditions that may cause injury.

Safety Precautions

Please observe the following general safety precautions for proper and safe operation of the equipment.

- Only qualified personnel should operate the CANNON SPS.
- Make sure that you read and understand all operating instructions and safety precautions listed in this manual before installing or operating your unit. If you have questions regarding instrument operation or documentation, contact Cannon Instrument Company.
- Do not deviate from the installation, operation, or maintenance procedures described in this manual. Improper use of the instrument may result in a hazardous situation and may void the manufacturer's warranty.
- Handle and transport the unit with care. Sudden jolts or impacts may cause damage to components.
- Observe all warning labels. Never remove warning labels.
- Never operate damaged or leaking equipment.

- Unless procedures specify otherwise, always turn off the unit and disconnect the mains cable from the power source before performing service or maintenance procedures, or before moving the unit.
- Refer all service and repairs to qualified personnel.

The ~MAINS symbol indicates the connections for the AC power supply. The AC power input must match the electrical specifications of the instrument.

~MAINS

Never operate the equipment with a damaged MAINS AC power cable.

Use only the manufacturer-supplied MAINS AC power cable. This cable must be inserted into a receptacle with a protective earth ground.

(O) The (O) symbol indicates the OFF position for the electrical switches for your unit.

Unpacking and Installation

Unpack and Inspect

Unpack and inspect all CANNON PolyVISC SPS components and accessories as soon as you receive them.



Caution: Many components are fragile. Use caution when moving and handling the SPS and accessories.

1. Carefully unpack the entire contents of the shipment.
2. Referring to the packaging list, verify that all materials were received.
3. Inspect materials for defects and shipping damage. Contact your CANNON representative to resolve any issues.

Table 5 — PolyVISC® SPS Models

Description	Catalog Number
Single titrator with balance	9724-Z61
Single titrator, no balance	9724-Z64
Single titrator, no balance, manual mode only	9724-Z65
Dual titrator with balance	9724-Z66
Dual titrator, no balance	9724-Z67

Table 6 — Packing list

Description	Quantity by Catalog Number					Part Number
	Z61	Z64	Z65	Z66	Z67	
TITRONIC® 300 Piston Burette	1	1	1	2	2	67.0475
Dispensing tube, single tip (included with titrator)	1	1	1	2	2	N/A
Titrator cable	1	1	1	1	1	67.0461
Mettler Toledo XS204 Precision Balance	1	0	0	1	0	67.0555
PolyVISC® SPS Software	1	1	1	1	1	67.9997
PolyVISC® SPS Operator's Manual	1	1	1	1	1	67.9995
Dispenser assembly, single tip	1	1	0	0	0	67.0450
Dispenser assembly, dual tip	0	0	0	1	1	67.1026
Balance cable	1	1	0	1	1	67.0459
Serial cable gender changer	1	1	0	1	1	67.0467
Top glass plate, single solvent	1	1	0	0	0	67.0470
Top glass plate, dual solvent	0	0	0	1	1	67.0471
Dispensing tube, dual tip	0	0	0	1	1	67.1025
Titrator to titrator cable	0	0	0	1	1	67.1027
Solvent filter, 20 Micron	1	1	0	2	2	65.0047
StaticMaster Bar	1	1	0	1	1	67.1029

Setup the Solution Preparation System

Physical Arrangements

The typical arrangement of the complete system requires the controlling computer, electronic titrators, and balance to be daisy-chained together in one work area. Figure 1 shows an arrangement with 2 titrators.

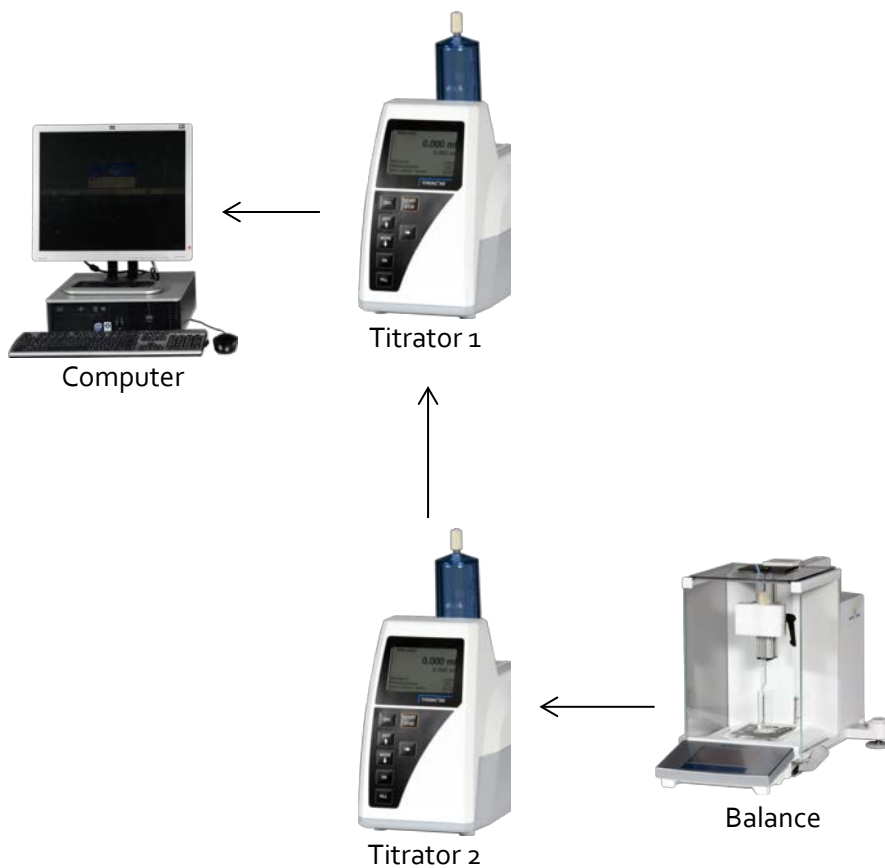


Figure 1 — Arrangement of solution preparation system

Communication Cables Setup

No special tools are required to connect the communication cables between the instruments. However, some tools may be required to install the serial card into a computer.

Table 7 — Tools and materials required

Part	Description
Computer	Windows® XP/7/8 PC
Titration(s)	TITRONIC® 300 Piston Burette.
Balance	Mettler Toledo XS204 Precision Balance
Serial card	PCI serial card with two, 9-pin serial connections
Titration cable	Serial cable—DB9 to Mini-DIN-4: connects PC to titration #1
Titration to titration cable	Serial cable— Mini-DIN-4 to Mini-DIN-4: connects titration #1 to titration #2
Balance cable	Serial cable—DB9 to Mini-DIN-4: Connects titration to balance

To connect the communication cables:

1. If necessary, install the serial card into the computer.
2. Connect the DB9 on the titration cable to the serial port on the computer.
3. Connect the Mini-DIN-4 on the titration cable to the RS1 port on titration #1.
4. If a second titration is to be used, connect the titration to titration cable to the RS2 port on titration #1 and RS1 port on titration #2.
5. Connect the Mini-DIN-4 on the balance cable to the RS2 port on either titration #1 (single titration system) or titration #2 (dual titration system).
6. Connect the serial cable gender changer to the serial port on the balance.
7. Connect the DB9 on the balance cable to the balance.

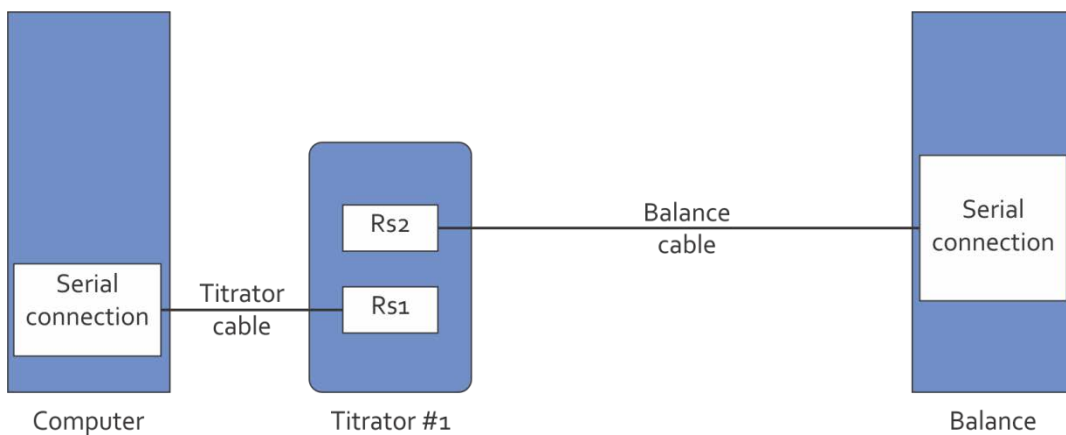


Figure 2 — Communication setup: single titrator system

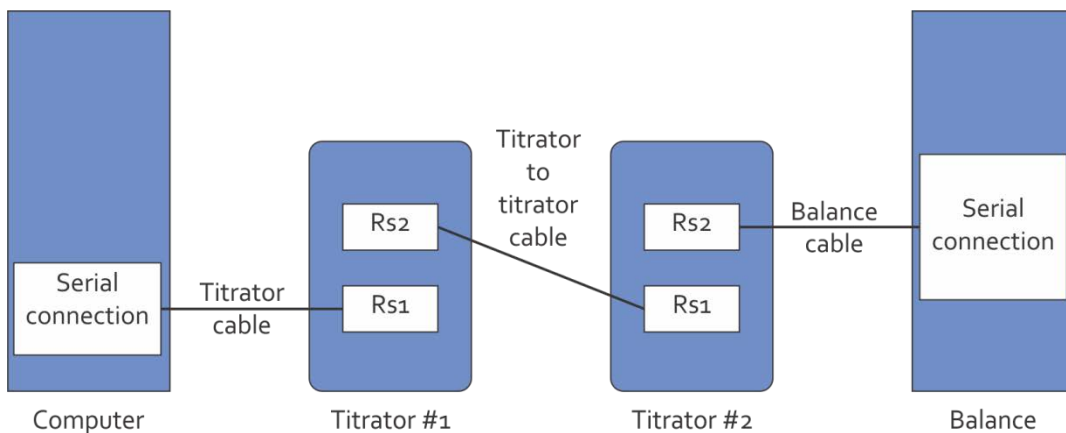


Figure 3 — Communication setup: dual titrator system (Titronic 300)



Note: On Titronic Universal titrators, the RS1 port is on top Refer to Figure 4 and Figure 5.

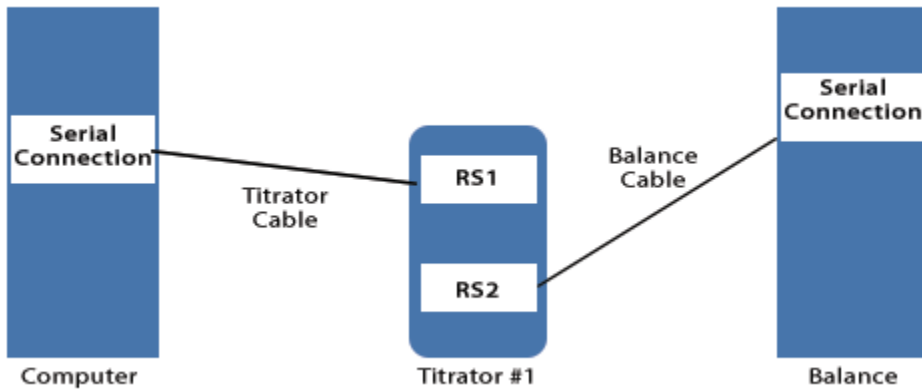


Figure 4 — Universal Titrator Communication Setup – single titrator

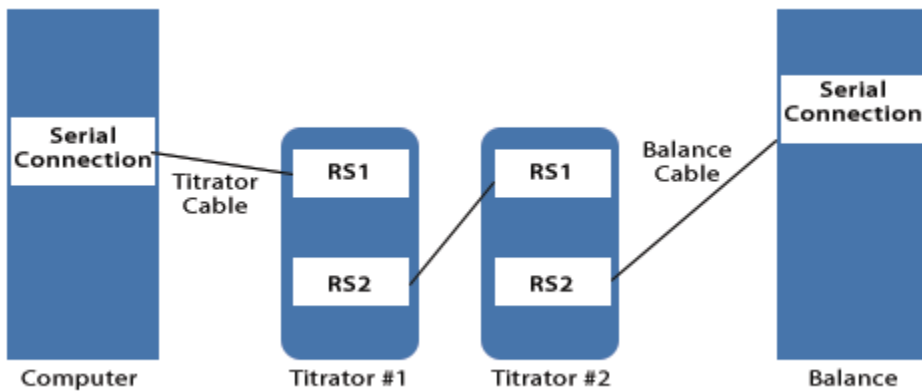


Figure 5 — Universal Titronic Cable Connection Setup – dual titrators

Solvent Hose Setup

Table 8 — Tools and materials required

Part	Description
Titration(s)	TITRONIC® 300 Piston Burette.
Balance	Mettler Toledo XS204 Precision Balance
Top plate	Replacement plate for top of balance with fittings to mount the dispenser assembly
Dispenser assembly	Mounts to top plate and holds the dispensing tube
Dispensing tube	Glass tube that dispenses the measured solvent
Solvent filter	20 micron filter
Solvent hoses	Solvent safe hosing
StaticMaster Bar	Antistatic strip

To connect the solvent hoses:

1. Attach the dispenser assembly to the top glass plate.
2. Carefully remove the glass panel on the top of the balance cage and replace it with the provided top glass plate and dispenser assembly.
3. Install the dispensing tube into the dispenser assembly.
4. Attach a solvent filter onto the end of each solvent fill hose.
5. Insert the solvent fill hose with filter into the solvent container so that the filter is just touching the bottom of the solvent container.
6. Connect the open end of the solvent fill hose to port 1 on the titrator.
7. Connect a solvent hose from the top of the burette to port 2 on the titrator.
8. Connect a solvent hose from port 3 on the titrator to the dispensing tube.
9. Place the StaticMaster Bar on the metal scale of the balance.

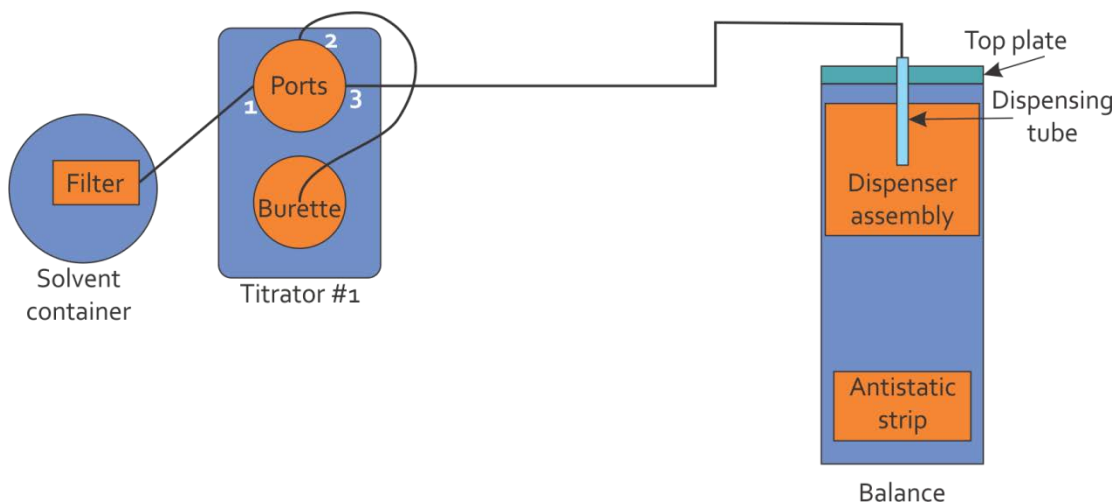


Figure 6 — Hose setup: single titrator system

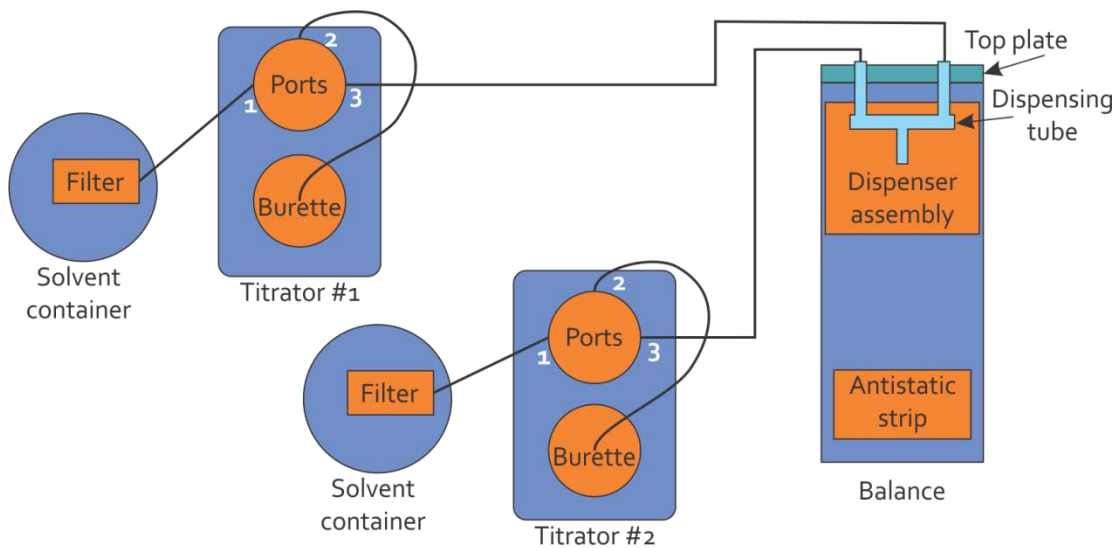


Figure 7 — Hose setup: dual titrator system



Note: Dual titrator systems require two P61.5085 fittings and two P61.5086 fittings.

Install SPS software



Note: If you purchased a computer from Cannon Instrument Company, the SPS software will be pre-installed at the factory.

Software installation simply loads the program onto the computer and creates shortcuts. No configuration settings are entered during software installation.

To install the SPS software:

1. Place the installation CD-ROM in your computer disk drive.
2. If the Autorun installation procedure begins, follow the screen prompts to complete the installation.

If the installation does not begin automatically:

- a. Open the **Start Menu**.
 - b. Select **Run** from the options.
 - c. Type *<drive letter>/Setup.exe* in the **Open:** field. Click **OK**.
 - d. Follow the screen prompts.
3. To start the software program, double-click the SPS icon on your Windows® Desktop.



SPS Software Configuration

Before attempting to prepare solutions, you must set the configuration options for the PolyVISC SPS software. Software configuration options only need to be set when the SPS system is initially installed and when changes are made to the system, for example, when a different balance is used or when different solvents are used.



Note: This chapter provides instructions for software configuration. For instructions on hardware/communication configuration of the titration unit and/or your balance, consult the appendix and/or supplementary documentation provided with your equipment. Make sure that the computer, the balance, and the titrator are connected to an appropriate power source and are operational before completing the configuration options described below.

Configure hardware

To configure the software for your balance and titrator:

1. Start the SPS software.
2. Select **Configure > Hardware**.

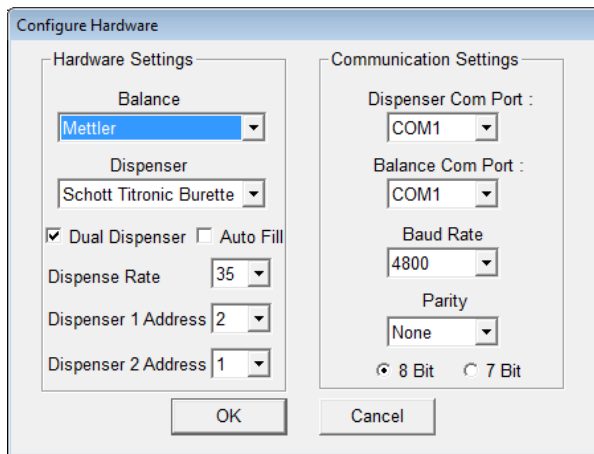


Figure 8 — Hardware configuration window

3. Adjust the settings appropriately for your system.

Table 9 — Hardware settings

Setting	Range	Description
Hardware Settings		
Balance	AND HR, Manual, Mettler	
Dispenser	Schott Titronic Burette	
Dual Dispenser	Check box	Check if dual titrators are used.
Auto Fill	Check box	
Dispenser rate	20, 25, 30, 35, 40, 45, 50	mL / min
Dispenser 1 Address Dispenser 2 Address	1, 2	Address 1 is typically assigned to titrator #1."Dispenser 1" or "Dispenser 2" refers to the name assigned to a titrator. This name is referenced in the configuration method.
Communication Settings		
Dispenser Com Port	Com 1 through 6	Communications port to which the system is connected
Balance Com Port	Com 1 through 6	Communications port to which the system is connected
Baud Rate	600, 1200, 2400, 4800 , 9600	
Parity	None , add, even	Must match the baud rate, parity, and bit of titrator #1.
8 Bit / 7 Bit	Radio buttons	

4. Click **OK** to save your changes.

Configure Method

To configure the software for your balance and titrator:

1. Start the SPS software.
2. Select **Configure > Method**.

The screenshot shows the 'Configure Method' dialog box with the following settings:

- Concentration:** Target: 1; Units: g / mL Solution; Units in Percent: unchecked.
- Vial Volume:** Minimum: 2 (mL); Target: 5 (mL); Maximum: 10 (mL).
- Polymer:** Density: 1 (g/mL); Purity: 100 (%).
- Export:** Blank: ; ARV Factor: 1.
- Solvent 1:** Single Dose: unchecked; Titration: checked; Solvent Name: Solvent 1; Initial Dose: 99.5 (%); Incremental Dose: 0.01 (mL); Prep Density: 1 (g/mL); Test Density: 1 (g/mL); Percentage: 100 (%).
- Solvent 2:** Single Dose: unchecked; Titration: checked; Solvent Name: Solvent 2; Initial Dose: 99.5 (%); Incremental Dose: 0.01 (mL); Prep Density: 1 (g/mL); Test Density: 1 (g/mL); Percentage: 0 (%).

Buttons at the bottom: New, Save, Load, Cancel. Text at bottom right: Dual titrators only.

Figure 9 — Method configuration window

3. Adjust the settings appropriately for your system.

Table 10 — Method settings

Setting	Range	Description
Concentration		
Target	0 to 100 with 4 decimal precision	Numeric range for the target concentration
g / g Solvent g / g Solution g / mL Solution	Radio buttons	Selects test method (weight-to-weight, weight-to-volume, etc.)
Units in Percent	Check box	Divides target value by 100
Dissolution Volume Change		(active only for g/mL Solution)

Table 10 — Method settings

Setting	Range	Description
Zero Vm [0] Additive Vi [1] Packing Factor <i>range</i>	Radio buttons	Zero sets the packing factor to [0]: the solution volume is unaffected by the addition of the polymer. Additive sets the packing factor to [1]: the solution volume is the sum of the solvent and polymer volumes. Packing Factor: the factor by which the volume of the polymer affects the volume of the solution when dissolved in the solvent.
Use Label Printer	Check box	
Vial Volume		
Minimum (mL)	0 to 250 with 2 decimal precision	Minimum amount of solution to be prepared
Target (mL)	0 to 250 with 2 decimal precision	Target amount of solution to be prepared
Maximum (mL)	0 to 250 with 2 decimal precision	Maximum amount of solution to be prepared
Polymer		
Density (g/mL)	0 to 9.9999 with 4 decimal precision	Density of polymer at test temperature
Purity (%)	0 to 100 with 2 decimal precision	Percent purity of polymer solute (impurities are treated as insoluble)
Export		
Blank		
ARV Factor		
Solvent 1/Solvent 2		
Single Dose Titration	Radio buttons	Single Dose dispenses solvent in a single dose.

Table 10 — Method settings

Setting	Range	Description
		Titration dispenses an initial dose and then dispenses incremental doses until the target amount of solvent is achieved.
Solvent Name	Text field	Label for solvent
Initial Dose (%)	0 to 100 with 2 decimal precision	Percent of target amount of solvent to dispense initially when using titration
Incremental Dose (mL)	0 to 99.99 with 2 decimal precision	Amount of solvent to add in incremental doses when using titration
Prep Density (g/mL)	.001 to 1000 with 3 decimal precision	Density of solvent at preparation temperature
Test Density (g/mL)	.001 to 1000 with 3 decimal precision	Density of solvent at test temperature
Percentage (%)	0 to 100 with 2 decimal precision	Percent of the solvents used relative to the total solvent used. Set to 100% for single solvent system

Equations

$$\text{Actual concentration } \left(\frac{\text{g}}{\text{mL}} \right) = \frac{(\text{polymer mass} \times \text{polymer purity})}{\left(\frac{\text{solvent mass}}{(\text{solvent test density})} \right) + \left(\frac{\text{polymer mass} \times \text{polymer purity} \times \text{packing factor}}{\text{polymer density}} \right)}$$

$$\text{Actual density } \left(\frac{\text{g}}{\text{mL}} \right) = \frac{(\text{polymer mass} \times \text{polymer purity}) + \text{solvent mass}}{\left(\frac{\text{solvent mass}}{(\text{solvent test density})} \right) + \left(\frac{\text{polymer mass} \times \text{polymer purity} \times \text{packing factor}}{\text{polymer density}} \right)}$$

$$\text{Actual concentration } \left(\frac{\text{g}}{\text{g}} \text{ solution} \right) = \frac{(\text{polymer mass} \times \text{polymer purity})}{\text{solvent mass} + (\text{polymer mass} \times \text{polymer purity})}$$

$$\text{Actual density } \left(\frac{\text{g}}{\text{g}} \text{ solution} \right) = \frac{(\text{polymer mass} \times \text{polymer purity}) + \text{solvent mass}}{\left(\frac{\text{solvent mass}}{(\text{solvent test density})} \right) + \left(\frac{\text{polymer mass} \times \text{polymer purity}}{\text{polymer density}} \right)}$$

$$\text{Actual concentration } \left(\frac{\text{g}}{\text{g}} \text{ solvent} \right) = \frac{(\text{polymer mass} \times \text{polymer purity})}{\text{solvent mass}}$$

$$\text{Actual density } \left(\frac{\text{g}}{\text{g}} \text{ solvent} \right) = \frac{(\text{polymer mass} \times \text{polymer purity}) + \text{solvent mass}}{\left(\frac{\text{solvent mass}}{(\text{solvent test density})} \right) + \left(\frac{\text{polymer mass} \times \text{polymer purity}}{\text{polymer density}} \right)}$$

Configure Advanced Settings

To configure the advanced settings:

1. Start the SPS software.
2. Select **Configure > Advanced Settings**.

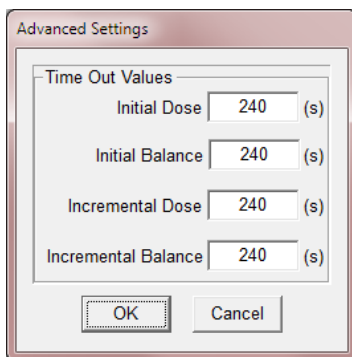


Figure 10 — Advanced settings configuration window

3. Adjust the settings appropriately for your system.

Table 11 — Advanced settings

Setting	Description
Time Out Values	
Initial Dose (s)	Maximum time period acceptable for administration of the initial dose of solvent to the sample vial
Initial Balance (s)	Maximum time period acceptable for a communication response to the controlling software from the balance.
Incremental Dose (s)	Maximum time period acceptable for the administration of the incremental dose of solvent to the sample vial during the titration cycle.
Increment Balance (s)	Maximum time period acceptable for a communication response to the controlling software from the balance during the titration cycle.

4. Click **OK** to save your changes.

Using the Label Printer

Immediately following solution preparation, the SPS can print solution data to any Windows® compatible label printer. To configure the label printer to print solution data, ensure that the printer is properly connected to your computer, and that it appears in the Printers list in the Windows® Control Panel.

When selecting a solution preparation method, make certain that the **Use Label Printer** check box is checked. When the solution has been prepared, the Windows® print window will open automatically. Select the label printer from the drop-down list, and use the spin controls to choose the desired number of labels to be printed for the solution. Then click OK to close the Print window and print the solution label.



Preparing Solutions

The SPS sample preparation process is a semi-automatic process that uses a sophisticated computer program to calculate and dispense quantities of solvent to prepare the desired concentration of solution. The user is responsible for adding solute to the sample vial in the correct proportions when prompted by the computer.

Initial Preparation

Checking the Solvent Level

Visually inspect the solvent container to ensure that adequate solvent is available to prepare the solution. Refill the solvent container if necessary.



Caution: The rinse/fill procedure is important when changing types of solvents or changing bottles of solvent with slightly different densities. It is the user's responsibility to verify compatibility of solvents.

Filling the Titrator

After the system configuration is complete (see previous chapter), you should rinse and fill the titration unit to prepare the unit for operation and flush out any previous solvent in the lines or pump. Follow the directions in the *Operating Instructions* for the titrator to prepare the unit for operation with the SPS software. Check for air bubbles in the solvent lines.

Turning on the Balance

Turn the power on for the balance. Make certain that it is operating normally.

Provide power to the computer and make certain that it is functioning normally. Then launch the SPS software by double-clicking the SPS icon on the Desktop.

Each step of the preparation process that involves operator interaction is displayed in the status window on the right side of the SPS window.

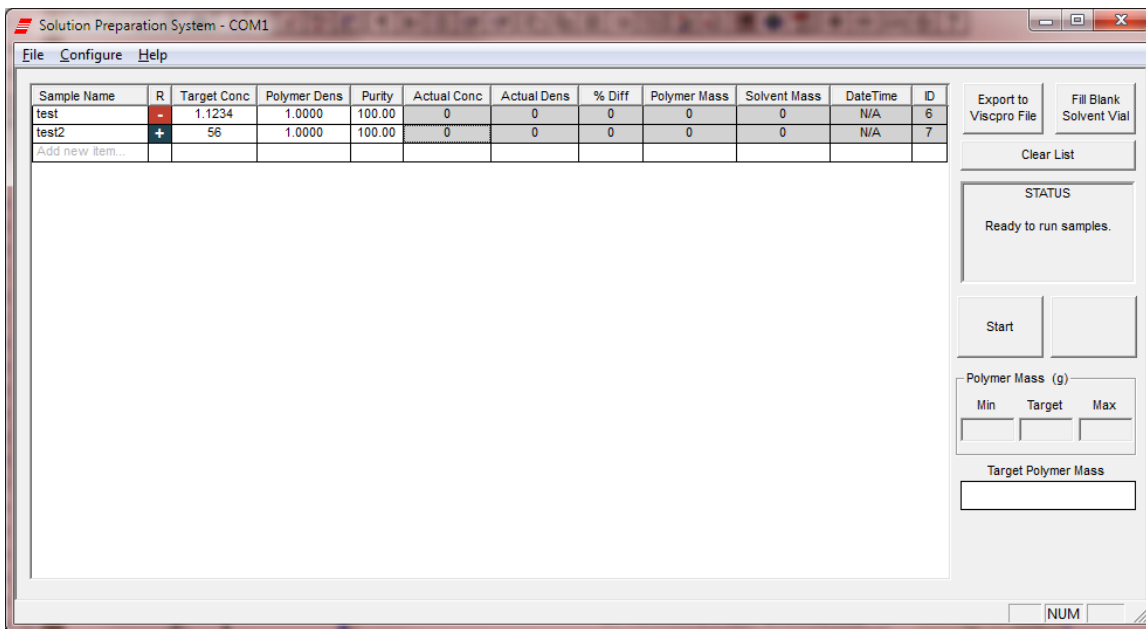


Figure 11 — SPS main window

Preparing a Solution

Follow the instructions below to prepare a solution using the currently-selected testing protocol (Single Dose or Titration method). To change the protocol, follow the instructions in the Configure Method section of the previous chapter.

To prepare a solution:

1. Enter the solution preparation information into the appropriate fields in the data table “Pick List” on the left side of the SPS Main Window. Required data includes the SampleName, TargetConc[entration], Polymer Density, and solute Purity (expressed as a percentage). Once the required information has been added, the SPS software will calculate the remaining values automatically.



Note: The software ignores the solute density if you enter a value of zero. The software effectively ignores the solute purity when it has a value of 100 percent.

2. To select solution preparation procedures to run, click the R column to display a “+”.
3. If this is the first sample that you are running, click the **Start** button. For any remaining solution, click the **OK** button.

4. Place an empty vial on the balance and press the re-zero/tare button on the balance.
5. When the balance reads 0.0, click the **Finished taring empty vial** button.
6. Add sample (solute) to the vial until the Target Solute Mass graphical indicator turns from red to green.



Note: There are marks on the indicator for minimum (Min), Target, and maximum (Max.) acceptable values.

7. When you have added the correct amount of solute, make certain that the vial is properly centered under the dispensing tube. Then click the **Finished Adding Solute** button. The SPS software will calculate the volume of solvent to dispense, and send that data to the dispenser. The dispenser will dispense the requested volume of solvent. At the conclusion of the procedure, the SPS software will query the balance for the final mass of the solution. When the SPS software receives the mass, it will calculate the g/g concentration, g/mL concentration, and the percent difference of the sample. These values will immediately be displayed in the Pick List. If the labelling option is enabled, an adhesive label will be printed for the new solution.
8. Following successful sample preparation, and after the balance has stabilized, the software will indicate that all samples have been prepared, or prompt you to tare the next sample in the preparation sequence (see step 4).
9. Remove the finished sample from the balance. Then remove any unwanted samples from the Chosen list.

Saving Solution Preparation Data

After your solution has been prepared, you must save the solution preparation information to a file if you wish to retain it. If you are using the miniPV or miniPV-HX Automatic Viscometer from CANNON, this file can be used to import solution concentration data directly into the VISCRO II database. Samples tested with the miniPV or miniPV-HX must be assigned the same numeric Sample ID as the SPS-generated Sample ID in order for the import to be successful.

To save the sample preparation information, including the calculated concentration values, click **File/Save** from the SPS Main Window. Select the desired destination directory using the controls in the **Save** window. Then input a unique filename for the data file in the File name: field and click **OK** to save the file.

Recalling Solution Data

You can recall solution data previously saved by loading the data from the saved file into the SPS software. To load saved data, click **File/Load** from the SPS Main Window. Select the desired destination directory using the controls in the Load ... window. Then input the desired file name in the File name: field and click **Open** to open the file.



Note: When data is recalled, new Sample ID information is automatically appended to ensure that solutions prepared with the previous sample specifications will be uniquely identified.

Working with TITRONIC Piston Burettes

To evacuate previous solvent residue and/or prepare the burette for operation with a new solvent, follow the Rinsing and Initial Filling instructions in the burette Operating Instructions. Note that the initial rinse requires a beaker with a minimum 100 mL capacity.

Additional information on burette operation is also available in the Operating Instructions, including installation, troubleshooting, maintenance, serial communication, and order information for replacement parts.



Specifications

Table 12 — Mettler Toledo XS204 Precision Balance*

Specifications	Details
Model	XS204
Maximum capacity	220 g
Readability	0.1 mg
Power supply	100 to 240 VAC, 50/60 Hz, 30 VA
Operating conditions	5 °C to 40 °C, max. relative humidity 80% at 31 °C linearly decreasing to 50% at 40 °C , non-condensing, Installation Category II, Pollution Degree 2
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC)

* Specifications provided for convenience. Refer to manufacturer's specifications and Declaration of Conformance for official specifications.

Table 13 — TITRONIC® 300 Piston Burette*

Specifications	Details
Model	TITRONIC® 300
Cylinder	20 mL DURAN®, 50 mL DURAN®
Accuracy	0.15%
Precision	0.05%
Power supply	90 to 240 VAC, 50/60 Hz, 30 VA
Operating conditions	10 °C to 40 °C, max. relative humidity 80% at 31 °C linearly decreasing to 50% at 40 °C , non-condensing, Installation Category II, Pollution Degree 2
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC)

* Specifications provided for convenience. Refer to manufacturer’s specifications and Declaration of Conformance for official specifications.

Table 14 — TITRONIC® universal Piston Burette*

Specifications	Details
Model	TITRONIC® universal
Cylinder	20 mL DURAN®, 50 mL DURAN®
Accuracy	0.15%
Precision	0.05%
Power supply	115/230 VAC, 50/60 Hz, 18 VA
Operating conditions	10 °C to 40 °C, max. relative humidity 80% at 31 °C linearly decreasing to 50% at 40 °C , non-condensing, Installation Category II, Pollution Degree 2
Compliance	CE Mark: EMC Directive (2004/108/EC); Low Voltage Directive (2006/95/EC)

* Specifications provided for convenience. Refer to manufacturer’s specifications and Declaration of Conformance for official specifications.



Warranty

Products limited warranty

In addition to other manufacturers' warranties, Cannon Instrument Company® ("the Company") warrants all products (other than reagents and chemicals) delivered to and retained by their original purchasers to be free from defect in material and workmanship for one year from the date of the Company's invoice to the purchaser. For a period of one year from the date of such invoice, the Company will correct, either by repair or replacement at the Company's sole election, any defect in material or workmanship (not including defects due to misuse, abuse, abnormal conditions or operation, accident or acts of God, or to service or modification of the product without prior authorization of the Company) without charge for parts and labor. The determination of whether any product has been subject to misuse or abuse will be made solely by the Company.

The Company shall not be liable for any special, incidental, or consequential damages, or any damage to plant, personnel, equipment or products, directly or indirectly resulting from the use or misuse of any product. Representations and warranties made by any person, including dealers and representatives of the Company, which are inconsistent, in conflict with, or in excess of the terms of this warranty shall not be binding upon the Company unless placed in writing and approved by an officer of the Company.

Reagent and chemical warranty

Cannon Instrument Company® ("the Company") warrants all reagents and chemicals sold by the Company and delivered to and retained by their original purchasers to conform to the weight, specifications and standards stated on the package. The Company will, at its sole option, either replace or refund the price (net of freight, handling charges and taxes), of any reagent or chemical sold by the Company which does not conform to such weight, specifications and standards upon the prompt return of the unused portion. Except for replacement or refund of the net price, the Company shall not be liable for any damages occurring as a consequence of the failure of any reagent or chemical sold by the Company to conform to the weight, specifications and standards stated on the package.

Returning a product to CANNON

Before returning a CANNON product for repair or service, make every attempt to identify the problem. If, after careful checking, the problem remains unidentified or unsolved, telephone Cannon Instrument Company (or the local service agent) to consult with a product specialist. If the specialist cannot recommend a simple solution or repair, CANNON will authorize the return of the product through the issuance of a Return Authorization number (RA).

CANNON Telephone Number 814-353-8000

CANNON Fax Number 814-353-8007

Products returned to CANNON must be carefully packed. Ship prepaid to the following address:

Cannon Instrument Company

ATTN: Return Authorization # _____

2139 High Tech Road

State College, PA 16803 USA

Please include the following:

Required information

- The Return Authorization number (RA).
- The name and telephone number of the person at your company to contact regarding the product.
- Shipping and billing instructions for the return of the product to your location.
- A detailed explanation of the reason for the return. If the product is not covered by warranty, the customer will be provided with an estimate of the repair costs and asked for approval before any repairs are made. The customer will be required to issue a purchase order for the cost of the repairs.

Hazardous materials

Stringent government regulations restrict the shipment of mercury. Please contact CANNON before returning a product that could possibly contain mercury.

Shipping notification

Products returned without prior notification (by either telephone or fax), or without Cannon's authorization, will not be accepted. The customer may be billed a testing fee if a product is returned to CANNON and found to be working properly.

Replacement Parts List

Table 15 — PolyVISC SPS replacement parts

Description	Part Number
TITRONIC® 300 Piston Burette	67.0475
Titration cable	67.0461
Mettler Toledo XS204 Precision Balance	67.0555
PolyVISC® SPS Software	67.9997
PolyVISC® SPS Operator's Manual	67.9995
Dispenser assembly, single tip	67.0450
Dispenser assembly, dual tip	67.1026
Balance cable	67.0459
Serial card (PCI/2-port)	93.6094
Top plate, single solvent	67.0470
Top plate, dual solvent	67.0471
Dispensing tube, dual tip	67.1025
Titration to titration cable	67.1027
Solvent filter, 20 Micron	65.0047
StaticMaster Bar	67.1029
FEP blue tubing 1/8"	81.2185
Ferrule 1/8"	61.5085
Female nut 1/4"	61.5086



CANNON Instrument Company®
2139 High Tech Road
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