User's Guide

ASPEC® 4060 Single Syringe Pump
ASPEC® 4260 Dual Syringe Pump

GILSON®

TABLE OF CONTENTS

SAFETY

IN THIS CHAPTER:

Read this chapter before installing and operating the instrument.

Only trained technical personnel in a laboratory environment may use the instrument for non-medical, liquid handling purposes. For safe and correct use of the instrument, operating and service personnel must follow all instructions contained in this guide when installing, cleaning, and maintaining the instrument. All safety precautions must be observed during all phases of operation, service, and repair of the instrument.

Failure to comply with these precautions or with warnings described in the user's guide violates safety standards of design, manufacture, and intended use of the instrument. Gilson assumes no liability for customers failing to comply with these requirements.

This instrument complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this instrument may not cause harmful interference, and (2) this instrument must accept any interference received, including interference that may cause undesired operation.

Shielded cables must be used with the instrument to ensure compliance with the FCC Class A limits.

The instrument has been certified to safety standards required in Canada, Europe, and the United States. Refer to the rear panel label on the instrument and the Declaration of Conformity document for the current standards to which the instrument has been found compliant.

Electronic and Hazard Symbols

The following electrical and hazard symbols may appear on the instrument or in this document:

SYMBOL	EXPLANATION
	Direct Current
	Alternating Current
	Protective Conductor Terminal
|	Electrical Power ON
O	Electrical power OFF
	Caution
	Caution, Risk of Electric Shock
	Caution, Hot Surface

Safety Notices

The following safety notices may appear in this document:

⚠WARNING	**WARNING indicates a potentially hazardous situation which, if not avoided, may result in serious injury**
⚠CAUTION	**CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury**
NOTICE	**NOTICE indicates a potentially hazardous situation which, if not avoided, may result in equipment damage**

Electrical Hazards

Unless specifically instructed, do not remove any protective covers. Ensure that the rear panel is accessible. Detach all sources of voltage from the instrument before service, repair, or exchange of parts.

Use only the grounded AC cord provided. Ungrounded power cords can result in electrical shock and serious personal injury. Faulty or frayed power cords must be immediately replaced with one of the same type and rating. Please contact Gilson regarding a damaged power cord.

NOTICE **Use only approved fuses with the specified current rating. The instrument must be operated within the voltage specified on the rear panel of the instrument.**

Stacking Bracket

The supplied stacking bracket must be used to prevent tipping when stacking two ASPEC® 4260 Dual Syringe Pumps. Do not stack more than one pump on top of another pump. The stacking bracket stabilizes the pump stack by anchoring it to the ASPEC® 274.

Chemical Hazards

Any chemicals used for analysis should be handled according to good laboratory practices. Chemicals should be stored, used, and disposed of in accordance with the manufacturer's specifications, as well as local and national regulations. Potentially hazardous chemicals and dangerous liquids can be used with the instrument. Use care when handling chemicals and solvents. Ensure proper ventilation and wear appropriate personal protective equipment (PPE), such as safety glasses, gloves, etc.

Be sure to follow guidance about exposure to hazardous levels of toxic substances as outlined in any applicable Safety Data Sheet (SDS), or any documentation provided by local governing bodies such as The Health Protection Agency (United Kingdom) or The Occupational Safety and Health Administration (United States).

Replacement Parts

Be sure to use only replacement parts mentioned in this user's guide. Do not repair or change parts which are not listed in this user's guide. If it is necessary to change parts not listed, please contact your Gilson-authorized representative.

Chapter 1

INTRODUCTION

IN THIS CHAPTER:

Description

The ASPEC® 4060 Single Syringe Pump and ASPEC® 4260 Dual Syringe Pump when paired with a ASPEC® 241, ASPEC® 271, or ASPEC® 274, can automate liquid handling procedures and solid phase extraction (SPE) using positive pressure elution in cartridge-based applications.

The ASPEC 4060 Syringe Pump is equipped with a user-selectable, small- or large-capacity syringe, a valve for directing liquid from reservoir or probe or air from an external gas source, and an independent pressure-sensing module that monitors pressure on the fluid path that can be used to handle error conditions, such as high cartridge pressure or clogged liquid lines. An SPE air push can be performed on SPE cartridges using the syringe or an external gas source.

The ASPEC 4260 Syringe Pump is equipped with up to two syringes that are user-selectable, can be the same or different, and can be a small- or large-capacity. Two valves direct liquid from reservoirs or up to two probes, or direct air from an external gas source. Two independent pressure-sensing modules monitor pressure on the fluid paths and can be used to handle error conditions, such as high cartridge pressure or clogged liquid lines. An SPE air push can be performed on SPE cartridges using the syringes or an external gas source. When two ASPEC 4260 Syringe Pumps are used with an ASPEC 274 up to four fluid paths can be controlled and monitored independently, which allows for a high throughput configuration capable of processing up to four samples in parallel.

The following configurations are supported:

- ASPEC® 241 System with ASPEC 4060 Syringe Pump
- ASPEC 271 with ASPEC 4060 Syringe Pump
- ASPEC 271 with ASPEC 4260 Syringe Pump
- ASPEC 274 with two ASPEC 4260 Syringe Pumps

Figure 1
ASPEC® 274 with Two ASPEC® 4260 Dual Syringe Pumps

Unpacking

The syringe pump(s) are delivered with most major components already assembled. Keep the original container and packing assembly in case the syringe pump(s) must be returned to the factory.

To unpack each syringe pump:

1. Open the box and then remove the envelope inside.
2. Lift the syringe pump and foam inserts out of the box and then remove the foam inserts.
3. Remove the cardboard insert containing the accessories and the power supply.

Standard Equipment

Once the syringe pump and the accessories have been unpacked, you should have the following:

- ASPEC 4060 Syringe Pump or one or two ASPEC 4260 Syringe Pumps
- Accessory kit that includes:
  - Power cords
  - USB cable
  - Valve key
  - Vent tubing
- Power supply

DOCUMENTATION

The following documents are included with the syringe pump:

- Declaration of Conformity
- Hazardous Materials Declaration (China RoHS)
- Installation Qualification (IQ) procedure
- Items Included Checklist
- Quality Control (QC) checklist
- Setup Overview

This user's guide (and other ASPEC system user's guides), plumbing diagrams, and IQ procedure documents are provided with the ASPEC 241, ASPEC 271, or ASPEC 274.

Accessories

REQUIRED

Some accessories are required, but are ordered separately:

- Plumbing package
- Syringes

OPTIONAL

The following optional accessories are available:

- Air/gas plumbing package
- SPE gas pressure regulator
- 25 mL Transfer Tubing Hook

Customer Service

Gilson and its worldwide network of representatives provide customers with the following types of assistance: sales, technical support, applications, and instrument repair.

If you need assistance, please visit **www.gilson.com/contact.html** for contact options. To help us serve you quickly and efficiently, please refer to Repair and Return Policies on page 55.

Technical Specifications

Please be aware of the following before operating the instrument.

NOTE **Changes or modifications to the instrument not expressly approved by Gilson could void the factory-authorized warranty.**

This instrument complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this instrument may not cause harmful interference, and (2) this instrument must accept any interference received, including interference that may cause undesired operation.

Shielded cables must be used with the instrument to ensure compliance with the FCC Class A limits.

ASPEC® 4060 Single and ASPEC® 4260 Dual Syringe Pumps

Technical Specification	Definition
Communication	USB
Dimensions (W x D x H)	**ASPEC 4060 Syringe Pump** 14.6 x 17.1 x 29.5 cm (5.8 x 6.7 x 11.6 in.) **ASPEC 4260 Syringe Pump** 22.6 x 17.1 x 29.5 cm (8.9 x 6.7 x 11.6 in.)
Environmental Conditions	Indoor use Altitude: up to 2000 m Temperature range: 5°C–40°C Humidity: Maximum relative humidity 80% for temperatures up to 31° C, decreasing linearly to 50% relative humidity at 40°C
Front Panel	Indicator lights for power and error
Liquid Contact Materials* *For more information, refer to the **Liquid Contact Materials** appendix.	**Description** / **Material** Syringe: Glass, PTFE, Ekonol Syringe Valve: PEEK, Ceramic, PTFE

ASPEC® 4060 SINGLE AND ASPEC® 4260 DUAL SYRINGE PUMPS TECHNICAL SPECIFICATIONS (CONTINUED ON PAGE 13)

ASPEC® 4060 Single and ASPEC® 4260 Dual Syringe Pumps

<table>
<tr><th>Technical Specification</th><th colspan="3">Definition</th></tr>
<tr><td rowspan="7">Maximum Syringe Flow Rate</td><td>Syringe Size</td><td>Recommended Maximum Flow Rate for Water</td><td>Maximum Flow Rate</td></tr>
<tr><td>250 µL</td><td>10 mL/min</td><td>15 mL/min</td></tr>
<tr><td>500 µL</td><td>20 mL/min</td><td>30 mL/min</td></tr>
<tr><td>1 mL</td><td>40 mL/min</td><td>60 mL/min</td></tr>
<tr><td>5 mL</td><td>100 mL/min</td><td>120 mL/min</td></tr>
<tr><td>10 mL</td><td>100 mL/min</td><td>240 mL/min</td></tr>
<tr><td>25 mL</td><td>100 mL/min</td><td>240 mL/min</td></tr>
<tr><td>Power Requirements</td><td colspan="3">ASPEC 4060 Syringe Pump
Voltage: 24V DC
Current Rating: 1A, 24W
ASPEC 4260 Syringe Pump
Voltage: 24V DC
Current Rating: 2A, 48W
External Power Supply
Voltage Input
Frequency: 50 to 60 Hz
Voltage: 100–240V AC
Voltage Output
Voltage: 24V DC
Current Rating: 2.5A, 60W</td></tr>
<tr><td>Syringe Capacity</td><td colspan="3">250 µL, 500 µL, 1 mL, 5 mL, 10 mL, or 25 mL</td></tr>
<tr><td>Software Control</td><td colspan="3">PC control via USB and TRILUTION® LH Software</td></tr>
<tr><td>Volumetric Accuracy*
*Contact techsupport@gilson.com to learn what methods and conditions were used to obtain the values.</td><td colspan="3">±2% (10%–90% syringe capacity, water)</td></tr>
<tr><td>Weight</td><td colspan="3">ASPEC 4060 Syringe Pump
4.7 kg (10.4 lbs.)
ASPEC 4260 Syringe Pump
7.6 kg (16.7 lbs.)</td></tr>
</table>

Chapter 2

INSTALLATION

IN THIS CHAPTER:

Syringe Installation

⚠CAUTION To prevent injury, when operating the syringe pump, keep hands clear of syringe to avoid risk of personal injury by pinching.

250 µL and 500 µL Syringes

The 250 µL and 500 µL syringes are supplied with a cover seal to ensure an airtight fit between the syringe and the valve.

Before mounting one of the smaller syringes (250 µL, 500 µL and 1 mL), manually prime it. Place its open end in the pump reservoir and use the piston to aspirate the liquid. This manual prime is not necessary for the 5 mL, 10 mL, and 25 mL syringes.

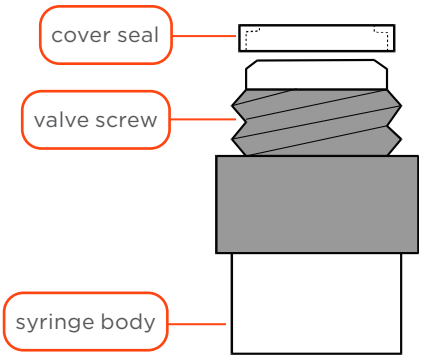


Figure 2
Cover Seal on Syringe

All Syringes

The piston operating rod will be shipped in the down position. If the rod is not in the down position, refer to the instructions for replacing a syringe on page 39. Those instructions include how to lower the rod.

The following procedure is important for correct syringe piston alignment. Improper alignment may cause premature piston failure.

1. Remove the valve from the front panel by removing the two securing valve screws.
2. Lubricate the piston with an alcohol-based solvent (methanol, for example) to reduce piston seal friction during syringe installation.
3. Remove the cap covering port 0 and then loosely screw the syringe into the valve. Do not fully tighten.
4. Loosely attach the valve to the syringe pump with the supplied screws.
5. Pull down the piston so it comes into contact with the piston operating rod, and firmly tighten the piston holding screw.
6. Fully tighten the valve screws to secure the valve.
7. Fully tighten the syringe to the valve.

Remember or note the size of the syringe installed for later software configuration.

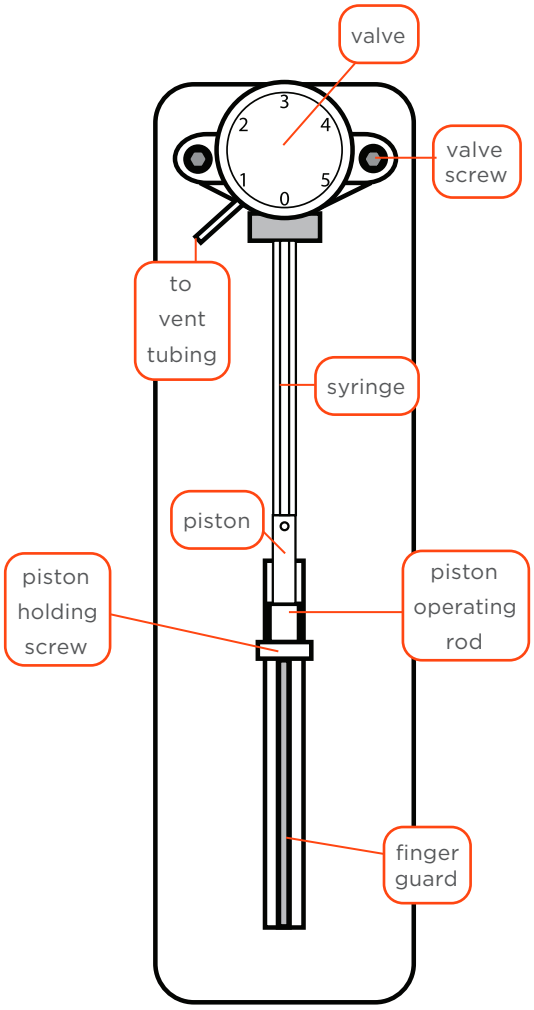


Figure 3
Syringe Installation

Plumbing Connections

ASPEC 241 or ASPEC 271 with ASPEC 4060 Single Syringe Pump

Before making the plumbing connections, locate the plumbing package (ordered separately).

The plumbing package contains:

- Solvent inlet tubing
- Transfer tubing
- Pressure sensor to valve tubing assembly
- Pump to probe tubing assembly

If the air push will be performed with air/gas (not syringe), locate the air/gas plumbing package (ordered separately, part number 2644703) that contains tubing and fittings. Instructions for **Air/Gas Configuration** begin on page 18.

Instructions for **No Air/Gas Configuration** begin on page 21.

For instructions to make plumbing connections for **ASPEC 271 with ASPEC 4260 Syringe Pump**, refer to the instructions beginning on page 24.

For instructions to make plumbing connections for **ASPEC 274 with Two ASPEC 4260 Syringe Pumps**, refer to the instructions beginning on page 30.

Refer to the diagram and table for instructions to make the plumbing connections for an air/gas configuration.

AIR/GAS CONFIGURATION

Refer to the diagram and table for instructions to make the plumbing connections for an air/gas configuration.

Plumbing Connections for ASPEC 241 or ASPEC 271 with ASPEC 4060 Syringe Pump Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection	Diagram
	Pressure sensor to valve tubing (part number 4996752)		
Port 1 to pressure sensor OUT	4.5 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	Connect one end to port 1 on the syringe pump and the other end to pressure sensor OUT.	
	Solvent inlet tubing (part number 499484021)		
Port 2 from reservoir	40 inches of Teflon® tubing (0.085″ ID x 1/8″ OD)	Connect the end of the tubing with the fitting attached to port 2 on the syringe pump. Place the other end in a reservoir.	
	ASPEC 241/ASPEC 271 Air/Gas Plumbing Package (part number 2644703)		
Port 3 to gas	Polyurethane tubing (5/64″ ID x 1/8″ OD)	Install the nut and ferrule to one end of the tubing and connect it to port 3 on the syringe pump. Connect the other end of the tubing to the SPE gas pressure regulator (part number 25051376). Refer to **Air/Gas Supply Connections on page 20**.	
	Vent tubing (part number F4420577)		
Vent to waste	FEP tubing	Connect one end directly to the vent and place the other end in a suitable receptacle. The valve releases liquid through the waste outlet if the pressure inside the valve is too high.	

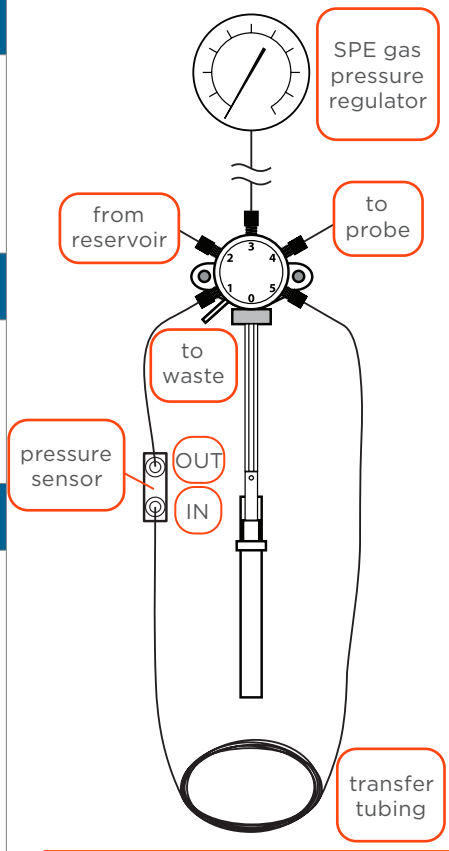
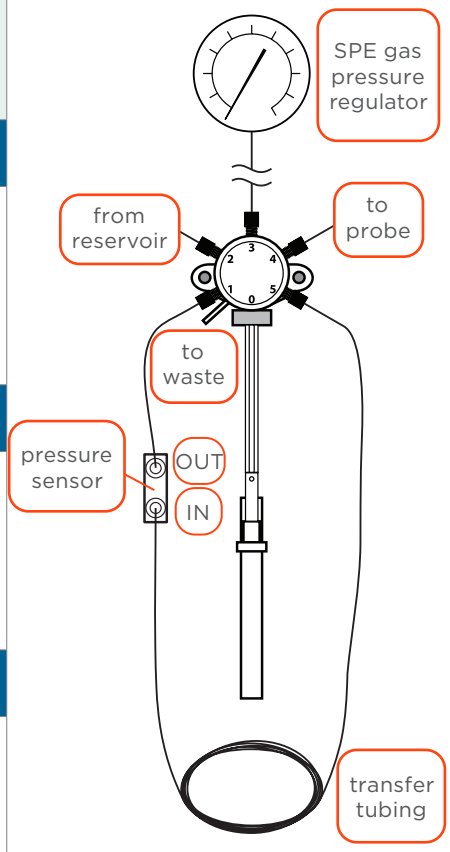


Figure 4
Plumbing Connections for Air/Gas Configuration (with SPE Gas Pressure Regulator)

PLUMBING CONNECTIONS FOR ASPEC 241 OR ASPEC 271 WITH ASPEC 4060 SYRINGE PUMP
AIR/GAS CONFIGURATION (WITH SPE GAS PRESSURE REGULATOR)
CONTINUED ON PAGE 19

Plumbing Connections for ASPEC 241 or ASPEC 271 with ASPEC 4060 Syringe Pump Air/Gas Configuration (with SPE Gas Pressure Regulator)

<table>
<tr><th>Valve</th><th>Tubing</th><th>Connection</th><th>Diagram</th></tr>
<tr><td></td><td colspan="2">Pump to probe tubing
(part number 49967722)</td><td></td></tr>
<tr><td>Port 4 to probe</td><td>72 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)</td><td>Connect the end with the nut and ferrule to port 4 and connect the end with the headless nut to the probe.</td><td></td></tr>
<tr><td rowspan="8">Port 5 to pressure sensor IN</td><td>NOTE</td><td>It is recommended to store the excess transfer tubing in the compartment under the syringe pump.</td><td rowspan="8"> 
</td></tr>
<tr><td colspan="2">5 mL transfer tubing
(part number 499671142)</td></tr>
<tr><td>101 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)</td><td>Connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.</td></tr>
<tr><td colspan="2">10 mL transfer tubing
(part number 499672282)</td></tr>
<tr><td>202 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)</td><td>Connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.</td></tr>
<tr><td colspan="2">25 mL transfer tubing
(part number 4996757021)</td></tr>
<tr><td>505 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)</td><td>Connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.</td></tr>
<tr><td colspan="2">For smaller syringe size, use the following transfer tubing:
600 µL transfer tubing
(part number 49942607)
1.1 mL transfer tubing
(part number 499424013)</td></tr>
</table>

Air/Gas Supply Connections

The following steps describe how to connect the air/gas tubing.

The tubing shown is blue polyurethane (5/64" ID x 1/8" OD). Fittings are Upchurch P-331 nut (part number 490410332) and Upchurch P-359 ferrule (part number 49041027).

1. Install the nut and ferrule on one end of the tubing.
2. Connect the other end to the pressure regulator.

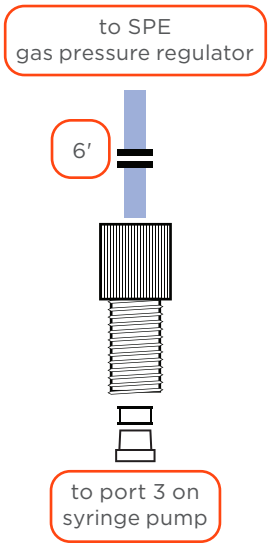


Figure 5
Air/Gas Supply Connections

Installing the SPE Gas Pressure Regulator

The SPE gas pressure regulator (part number 25051376, ordered separately) includes the following:

- Double cable clamp
- Hex nut
- Lock washer
- Pressure regulator with attached bracket
- Truss head screw

To install the pressure regulator:

1. Attach the double cable clamp to the bracket using the screw, hex nut, and washer.
2. Attach the double cable clamp to the cable support rod on the ASPEC 241 or ASPEC 271.
3. Use the appropriate tubing and fittings to connect the gas pressure regulator to your gas supply.

NO AIR/GAS CONFIGURATION

Refer to the diagram and table for instructions to make the plumbing connections for a no air/gas configuration.

NOTE **Ports 3, 4, and 5 are not used when there is no air/gas connected. The syringe pump is shipped with a plug in each port. Leave the plug installed in all unused ports.**

Plumbing Connections for ASPEC 241 or ASPEC 271 with ASPEC 4060 Syringe Pump No Air/Gas Configuration

Valve	Tubing	Connection	Diagram
	Pressure sensor to valve tubing (part number 4996752)		
Port 1 to pressure sensor OUT	4.5 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	Connect one end to port 1 on the syringe pump and the other end to pressure sensor OUT.	

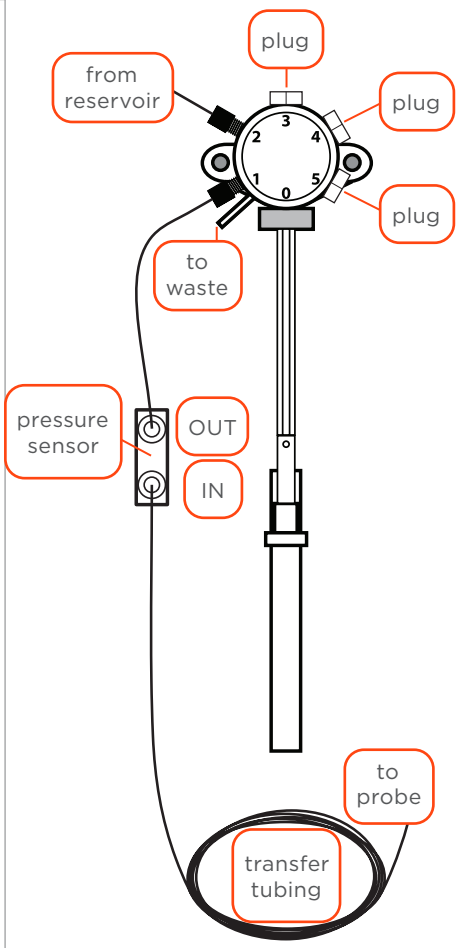
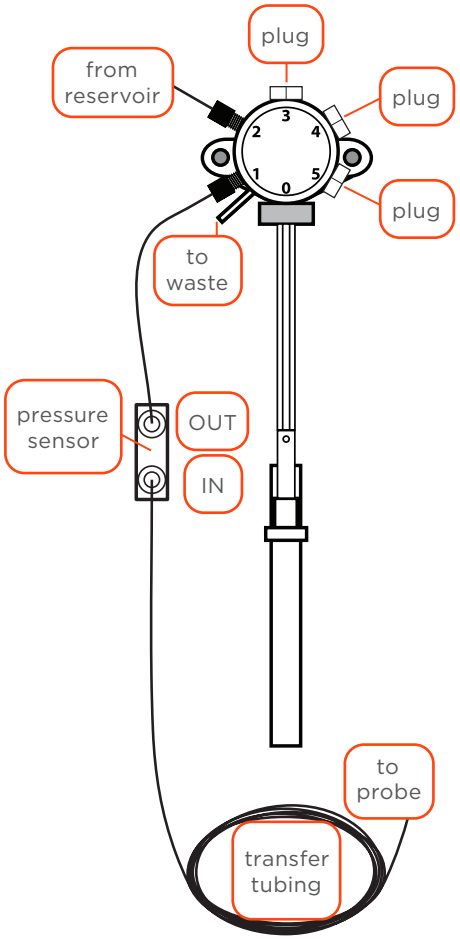


Figure 6
Plumbing Connections for No Air/Gas Configuration

PLUMBING CONNECTIONS FOR ASPEC 241 OR ASPEC 271 WITH ASPEC 4060 SYRINGE PUMP
NO AIR/GAS CONFIGURATION
CONTINUED ON PAGE 22

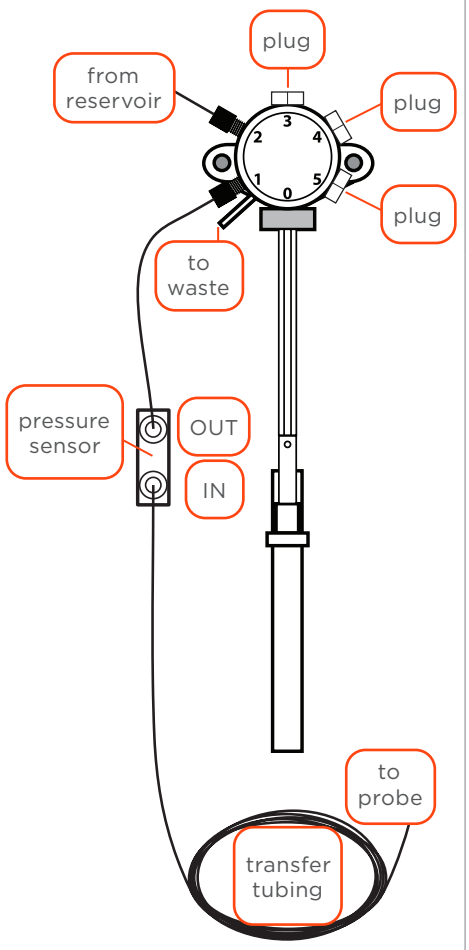
Plumbing Connections for ASPEC 241 or ASPEC 271 with ASPEC 4060 Syringe Pump No Air/Gas Configuration

Valve	Tubing	Connection	Diagram
Pressure sensor IN to probe	**NOTE**	**The transfer tubing is coiled. To connect one end of the tubing to the probe, the clips that hold the tubing will need to be cut. After the connection to the probe has been made, it is recommended to re-coil the transfer tubing and place the excess tubing in the compartment under the syringe pump.**	
	5 mL transfer tubing (part number 499671142)		
	101 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	Connect one end to pressure sensor IN and the other end to the probe.	
	10 mL transfer tubing (part number 499672282)		
	202 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	Connect one end to pressure sensor IN and the other end to the probe	
	25 mL transfer tubing (part number 4996757021)		
	505 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	Connect one end to pressure sensor IN and the other end to the probe	
	For smaller syringe size, use the following transfer tubing: 600 µL transfer tubing (part number 49942607) 1.1 mL transfer tubing (part number 499424013)		

PLUMBING CONNECTIONS FOR ASPEC 241 OR ASPEC 271 WITH ASPEC 4060 SYRINGE PUMP NO AIR/GAS CONFIGURATION
CONTINUED ON PAGE 23

Plumbing Connections for ASPEC 241 or ASPEC 271 with ASPEC 4060 Syringe Pump No Air/Gas Configuration

Valve	Tubing	Connection	Diagram
	Solvent inlet tubing (part number 499484021)		
Port 2 from reservoir	40 inches of Teflon® tubing (0.085″ ID x 1/8″ OD)	Connect the end of the tubing with the fitting attached to port 2 on the syringe pump. Place the other end in a reservoir.	
	Vent tubing (part number F4420577)		
Vent to waste	FEP tubing	Connect one end directly to the vent and place the other end in a suitable receptacle. The valve releases liquid through the waste outlet if the pressure inside the valve is too high.	



ASPEC 271 with ASPEC 4260 Syringe Pump

Before making the plumbing connections, locate the plumbing package (ordered separately).

The plumbing package contains:

- Solvent inlet tubing
- Transfer tubing
- Pressure sensor to valve tubing assembly
- Pump to probe tubing assembly

If the air push will be performed with air/gas (not syringe), locate the air/gas plumbing package (ordered separately) that contains tubing and fittings. Instructions for **Air/Gas Configuration** begin on page 25.

Instructions for **No Air/Gas Configuration** begin on page 28.

For instructions to make plumbing connections for a **ASPEC 241 or ASPEC 271 with ASPEC 4060 Single Syringe Pump**, refer to the instructions beginning on page 17.

For instructions to make plumbing connections for a **ASPEC 274 with Two ASPEC 4260 Syringe Pumps** refer to the instructions beginning on page 30.

AIR/GAS CONFIGURATION

Refer to the diagram and table for instructions to make the plumbing connections for an air/gas configuration.

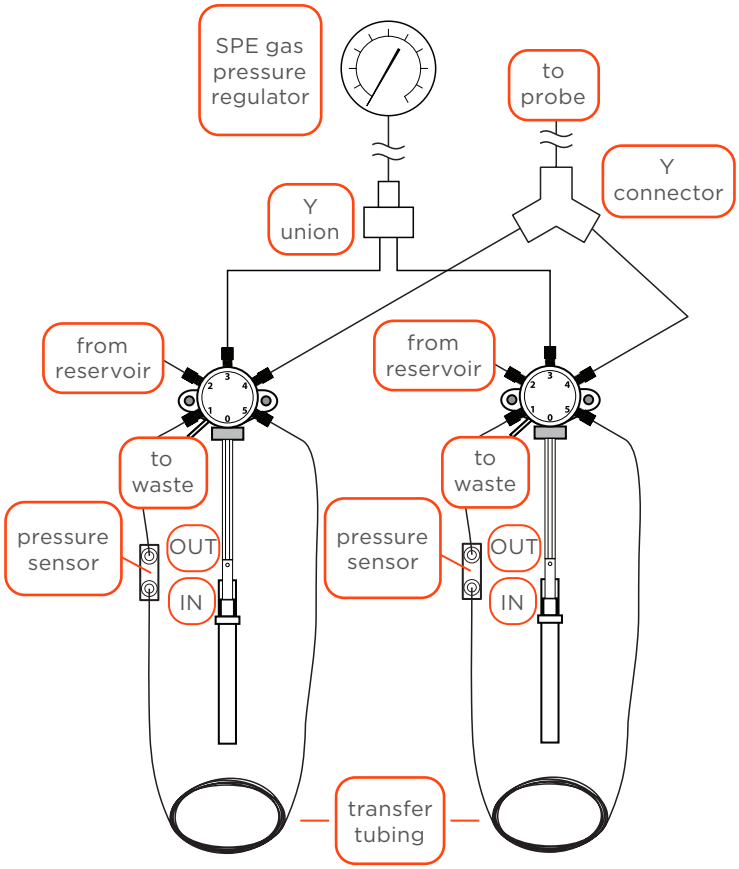


Figure 7
Plumbing Connections for Air/Gas Configuration (with SPE Gas Pressure Regulator)

Plumbing Connections for ASPEC 271 with ASPEC 4260 Syringe Pump Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection
	Pressure sensor to valve tubing (part number 4996752)	
Port 1 to pressure sensor OUT	4.5 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 1 on the syringe pump and the other end to pressure sensor OUT.
	Solvent inlet tubing (part number 499484021)	
Port 2 from reservoir	40 inches of Teflon® tubing (0.085″ ID x 1/8″ OD)	Connect the end of the tubing with the fitting attached to port 2 on the syringe pump. Place the other end in a reservoir.

PLUMBING CONNECTIONS FOR ASPEC 271 WITH ASPEC 4260 SYRINGE PUMP AIR/GAS CONFIGURATION (WITH SPE GAS PRESSURE REGULATOR) CONTINUED ON PAGE 26

Plumbing Connections for ASPEC 271 with ASPEC 4260 Syringe Pump Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection
	ASPEC 271 with ASPEC 4260 Syringe Pump Air/Gas Plumbing Package (part number 2644709)	
Port 3 to Y union to gas	Polyurethane tubing (5/64″ ID x 1/8″ OD)	For each valve, connect the blue polyurethane tubing (with fittings attached) to port 3 on the syringe pump. Connect the remaining end of the blue polyurethane tubing to SPE gas pressure regulator (part number 25051376). Refer to **Air/Gas Supply Connections** on page 25 for installation instructions.
	Dual Adapter Kit, ASPEC 271 (part number 2644708)	
Port 4 to Y connector	24 inches of Teflon® FEP tubing labeled “Dual Adapt” (0.062″ ID x 1/8″ OD)	There are two lengths of tubing with fittings attached. For each valve, connect one end to port 4 on the syringe pump and connect the other end to the Y connector.
	NOTE	**It is recommended to store the excess transfer tubing in the compartments under the syringe pump.**
Port 5 to pressure sensor IN	5 mL transfer tubing (part number 499671142)	
	101 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.
	10 mL transfer tubing (part number 499672282)	
	202 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.
	25 mL transfer tubing (part number 4996757021)	
	505 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.
	For smaller syringe size, use the following transfer tubing: 600 µL transfer tubing (part number 49942607) or 1.1 mL transfer tubing (part number 499424013)	

PLUMBING CONNECTIONS FOR ASPEC 271 WITH ASPEC 4260 SYRINGE PUMP AIR/GAS CONFIGURATION (WITH SPE GAS PRESSURE REGULATOR) CONTINUED ON PAGE 27

Plumbing Connections for ASPEC 271 with ASPEC 4260 Syringe Pump Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection
	Pump to probe tubing (part number 49967722)	
Y connector to probe	72 inches of Teflon® FEP tubing (0.062" ID X 1/8" OD)	Connect the end with the nut and ferrule to the Y connector and connect the end with the headless nut to the probe.
Y union to gas	Polyurethane tubing (5/64" ID x 1/8" OD)	Refer to Air/Gas Supply Connections on page 27.
	Vent tubing (part number F4420577)	
Vent to waste	FEP tubing	Connect one end directly to the vent and place the other end in a suitable receptacle. The valve releases liquid through the waste outlet if the pressure inside the valve is too high.

Air/Gas Supply Connections

The following steps describe how to connect the air/gas tubing.

The tubing and Y unions are already assembled.

The tubing shown is blue polyurethane (5/64" ID x 1/8" OD). Fittings are Upchurch P-331 nut (part number 490410332) and Upchurch P-359 ferrule (part number 49041027).

Installing the SPE Gas Pressure Regulator

The SPE gas pressure regulator (part number 25051376, ordered separately) includes the following:

- pressure regulator with attached bracket
- truss head screw
- hex nut
- lock washer
- double cable clamp

To install the pressure regulator:

1. Attach the double cable clamp to the bracket using the screw, hex nut, and washer.
2. Attach the double cable clamp to the cable support rod on the ASPEC 271.
3. Use the appropriate tubing and fittings to connect the gas pressure regulator to your gas supply.

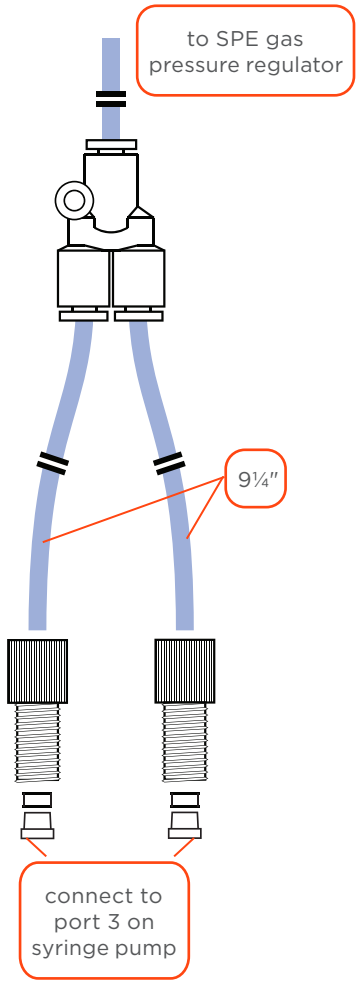


Figure 8
Air/Gas Supply Connections for ASPEC® 271 with ASPEC® 4260 Dual Syringe Pump

NO AIR/GAS CONFIGURATION

Refer to the diagram and table for instructions to make the plumbing connections for a no air/gas configuration.

NOTE

Ports 3, 4, and 5 are not used when there is no air/gas connected. The syringe pump is shipped with a plug in each port. Leave the plug installed in all unused ports.

The Y connector referenced is included in Dual Adapter Kit, ASPEC 271 (part number 2644708).

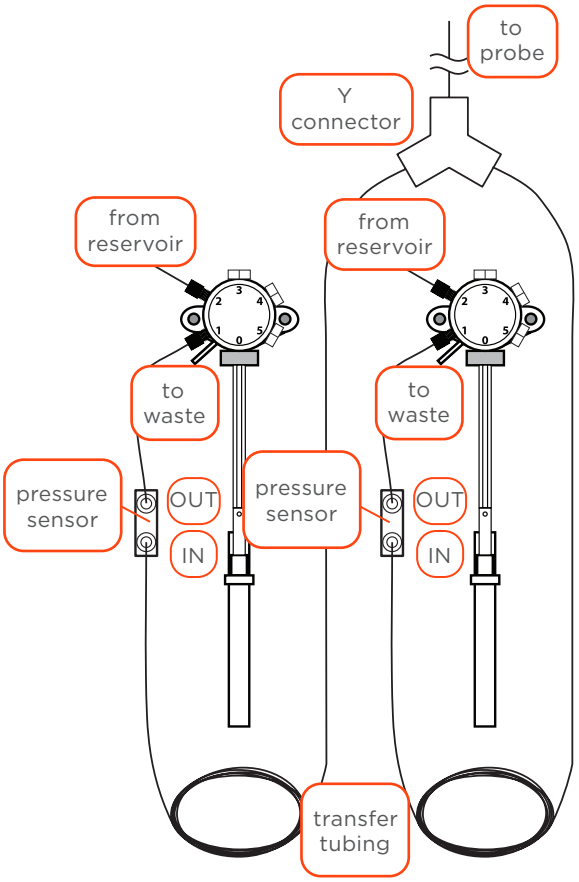


Figure 9
No Air/Gas Configuration

Plumbing Connections for ASPEC 271 with ASPEC 4260 Syringe Pump No Air/Gas Configuration

Valve	Tubing	Connection
	Pressure Sensor to Valve Tubing (part number 4996752)	
Port 1 to pressure sensor OUT	4.5 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 1 on the syringe pump and the other end to pressure sensor OUT.

PLUMBING CONNECTIONS FOR ASPEC 271 WITH ASPEC 4260 SYRINGE PUMP
NO AIR/GAS CONFIGURATION
CONTINUED ON PAGE 29

Plumbing Connections for ASPEC 271 with ASPEC 4260 Syringe Pump
No Air/Gas Configuration

Valve	Tubing	Connection
Pressure sensor IN to Y connector	**NOTE**	**The transfer tubing is coiled. To connect one end of the tubing to the probe, the clips that hold the tubing will need to be cut. After the connection to the probe has been made, it is recommended to re-coil the transfer tubing and place the excess tubing in the compartment under the syringe pump.**
	5 mL Transfer Tubing (part number 499671142)	
	101 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to pressure sensor IN and the other end to the Y connector.
	10 mL Transfer Tubing (part number 499672282)	
	202 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to pressure sensor IN and the other end to the Y connector.
	25 mL Transfer Tubing (part number 4996757021)	
	505 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to pressure sensor IN and the other end to the Y connector.
	For smaller syringe size, use the following transfer tubing: 600 µL transfer tubing (part number 49942607) 1.1 mL transfer tubing (part number 499424013)	
	Solvent Inlet Tubing (part number 499484021)	
Port 2 from reservoir	40 inches of Teflon® tubing (0.085″ ID x 1/8″ OD)	For each valve, connect the end of the tubing with the fitting attached to port 2 on the syringe pump. Place the other end in a reservoir.
	Pump to Probe Tubing (part number 49967722)	
Y connector to probe	72 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	Connect the end with the nut and ferrule to the Y connector and connect the end with the headless nut to the probe.
	Vent Tubing (part number F4420577)	
Vent to waste	FEP tubing	Connect one end directly to the vent and place the other end in a suitable receptacle. The valve releases liquid through the waste outlet if the pressure inside the valve is too high.

ASPEC 274 with Two ASPEC 4260 Syringe Pumps

Before making the plumbing connections, locate the plumbing package (ordered separately).

The plumbing package contains:

- Solvent inlet tubing
- Transfer tubing
- Pressure sensor to valve tubing assembly
- Pump to probe tubing assembly

If the air push will be performed with air/gas (not syringe), locate the air/gas plumbing package (ordered separately) that contains tubing and fittings. Instructions for **Air/Gas Configuration** begin on page 31.

Instructions for **No Air/Gas Configuration** begin on page 35.

For instructions to make plumbing connections for **ASPEC 241 or ASPEC 271 with ASPEC 4060 Single Syringe Pump**, refer to the instructions beginning on page 17.

For instructions to make plumbing connections for **ASPEC 271 with ASPEC 4260 Syringe Pump**, refer to the instructions beginning on page 24.

AIR/GAS CONFIGURATION

Refer to the diagram and table for instructions to make the plumbing connections for an air/gas configuration.

Plumbing Connections for ASPEC 274 with Two ASPEC 4260 Syringe Pumps Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection	Diagram
	Pressure sensor to valve tubing (part number 4996752)		
Port 1 to pressure sensor OUT	4.5 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 1 on the syringe pump and the other end to pressure sensor OUT.	
	Solvent inlet tubing (part number 499484021)		
Port 2 from reservoir	40 inches of Teflon® tubing (0.085″ ID x 1/8″ OD)	For each valve, connect the end of the tubing with the fitting attached to port 2 on the syringe pump. Place the other end in a reservoir.	

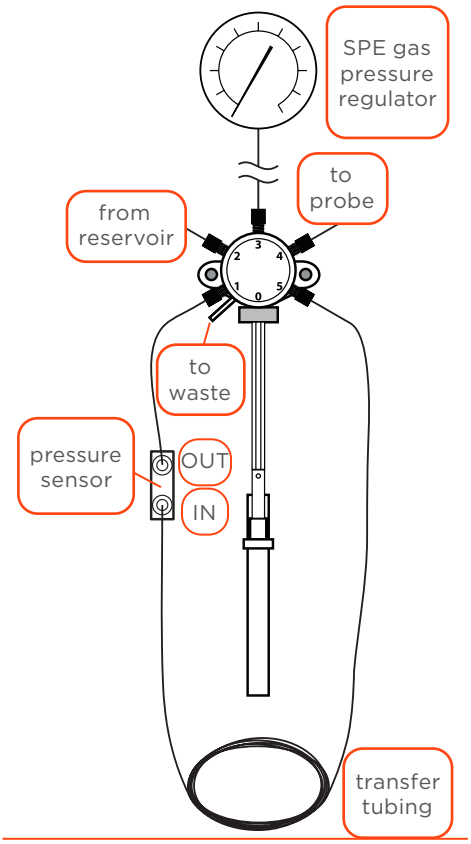
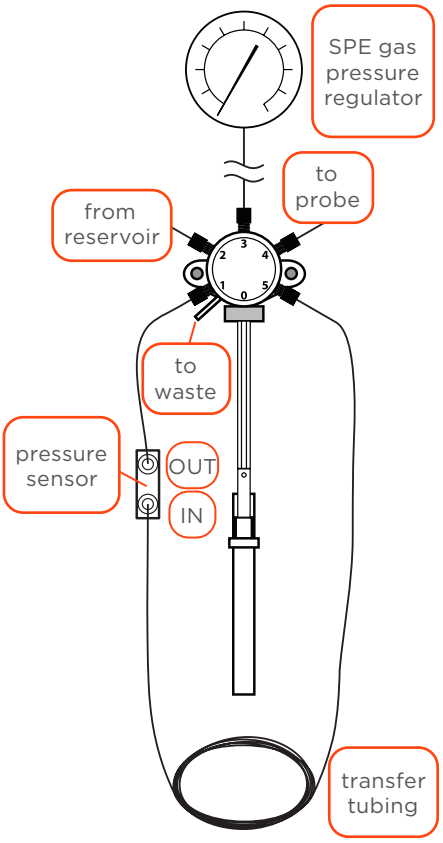


Figure 10
Plumbing Connections for Air/Gas Configuration (with SPE Gas Pressure Regulator)

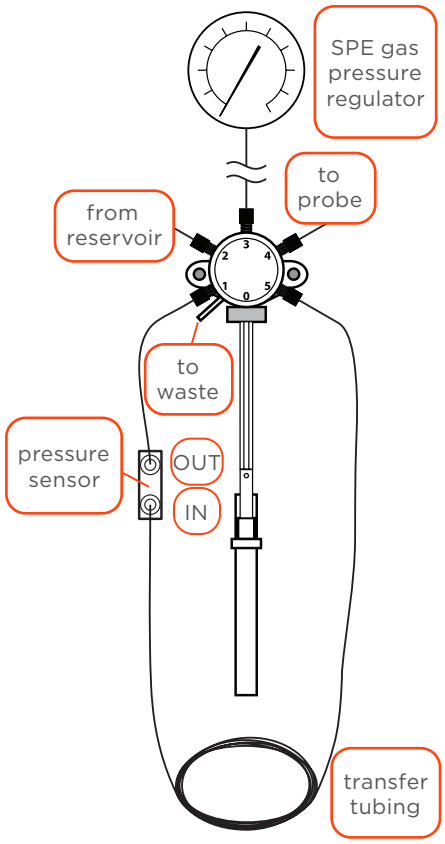
PLUMBING CONNECTIONS FOR ASPEC 274 WITH TWO ASPEC 4260 SYRINGE PUMPS AIR/GAS CONFIGURATION (WITH SPE GAS PRESSURE REGULATOR) CONTINUED ON PAGE 32

Plumbing Connections for ASPEC 274 with Two ASPEC 4260 Syringe Pumps Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection	Diagram
	ASPEC 274 Air/Gas Plumbing Package (part number 2644707)		
Port 3 to gas	Polyurethane tubing (5/64″ ID x 1/8″ OD)	For each valve, connect the blue polyurethane tubing (with fittings attached) to port 3 on the syringe pump. Connect the other end of the tubing to the SPE gas pressure regulator (part number 25051376).	
	Vent tubing (part number F4420577)		
Vent to waste	FEP tubing	For each valve, connect one end directly to the vent and place the other end in a suitable receptacle. The valve releases liquid through the waste outlet if the pressure inside the valve is too high.	
	Pump to probe tubing (part number 49967722)		
Port 4 to probe	72 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect the end with the nut and ferrule to port 4 and connect the end with the headless nut to the probe.	

PLUMBING CONNECTIONS FOR ASPEC 274 WITH TWO ASPEC 4260 SYRINGE PUMPS AIR/GAS CONFIGURATION (WITH SPE GAS PRESSURE REGULATOR)
CONTINUED ON PAGE 33

Plumbing Connections for ASPEC 274 with Two ASPEC 4260 Syringe Pumps Air/Gas Configuration (with SPE Gas Pressure Regulator)

Valve	Tubing	Connection	Diagram
Port 5 to pressure sensor IN	**NOTE**	**It is recommended to store the excess transfer tubing in the compartment under the syringe pump.**	
	5 mL transfer tubing (part number 499671142)		
	101 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.	
	10 mL transfer tubing (part number 499672282)		
	202 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.	
	25 mL transfer tubing (part number 4996757021)		
	505 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to port 5 on the syringe pump and the other end to pressure sensor IN.	
	For smaller syringe size, use the following transfer tubing: 600 µL transfer tubing (part number 49942607) 1.1 mL transfer tubing (part number 499424013)		

Air/Gas Supply Connections

The following steps describe how to connect the air/gas tubing.

The tubing and Y unions are already assembled.

Tubing shown is blue polyurethane (5/64" ID x 1/8" OD). Fittings are Upchurch P-331 nut (part number 490410332) and Upchurch P-359 ferrule (part number 49041027). Tubing lengths indicated assume that the two ASPEC 4260 Syringe Pumps are stacked.

Installing the SPE Gas Pressure Regulator

The SPE gas pressure regulator (part number 25051376, ordered separately) includes the following:

- pressure regulator with attached bracket
- truss head screw
- hex nut
- lock washer
- double cable clamp

To install the pressure regulator:

1. Attach the double cable clamp to the bracket using the screw, hex nut, and washer.
2. Attach the double cable clamp to the cable support rod on the ASPEC 274.
3. Use the appropriate tubing and fittings to connect the gas pressure regulator to your gas supply.

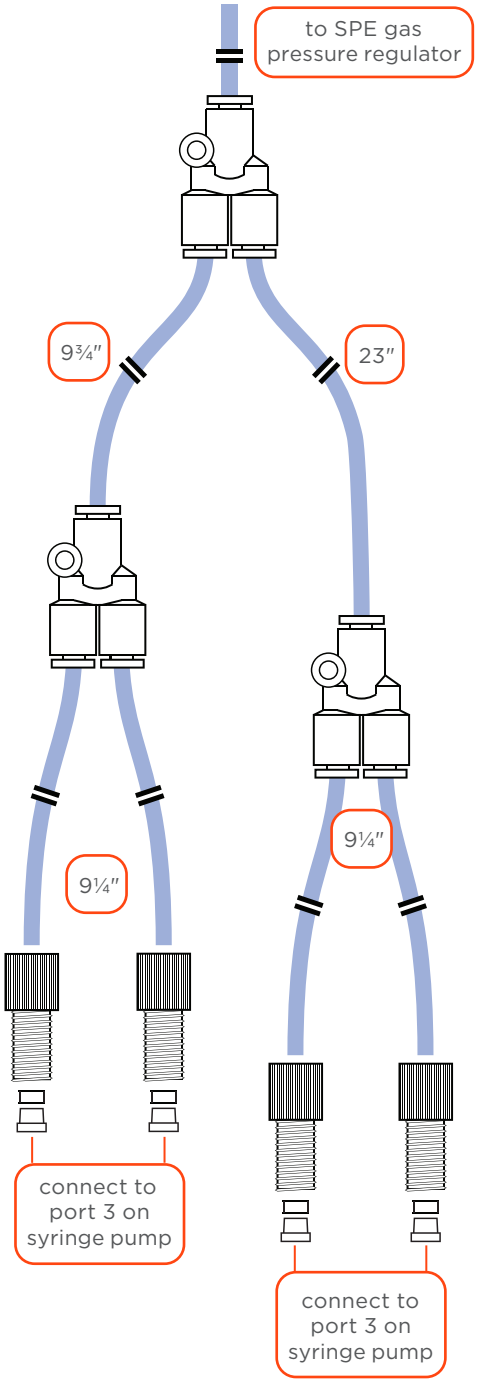


Figure 11
Air/Gas Supply Connections for ASPEC® 274 System

NO AIR/GAS CONFIGURATION

Refer to the diagram and table for instructions to make the plumbing connections for a no air/gas configuration.

NOTE **Ports 3, 4, and 5 are not used when there is no air/gas connected. The syringe pump is shipped with a plug in each port. Leave the plug installed in all unused ports.**

Plumbing Connections for ASPEC 274 with Two ASPEC 4260 Syringe Pumps No Air/Gas Configuration

Valve	Tubing	Connection	Diagram
	Pressure sensor to valve tubing (part number 4996752)		
Port 1 to pressure sensor OUT	4.5 inches of Teflon® FEP tubing (0.062" ID x 1/8" OD)	For each valve, connect one end to port 1 on the syringe pump and the other end to pressure sensor OUT.	

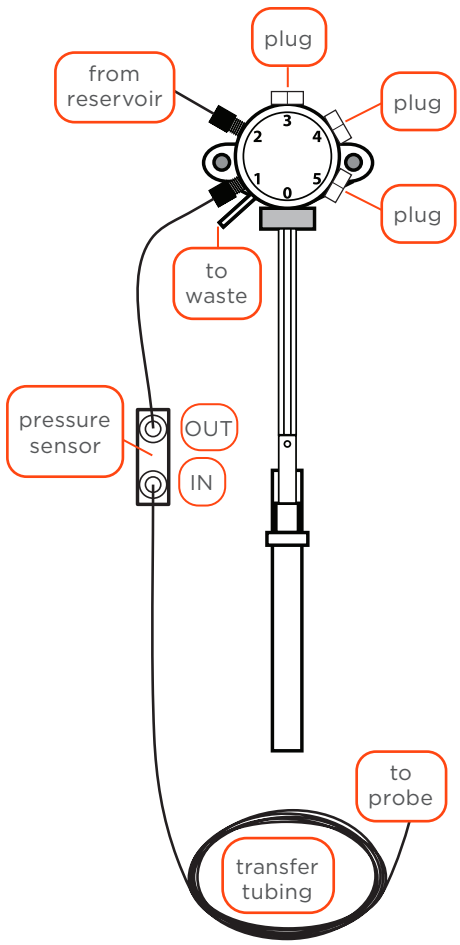
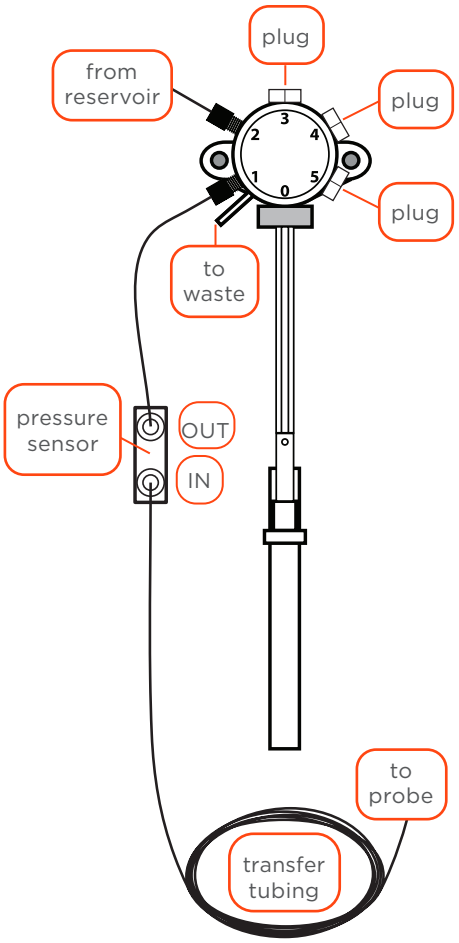


Figure 12
No Air/Gas Configuration

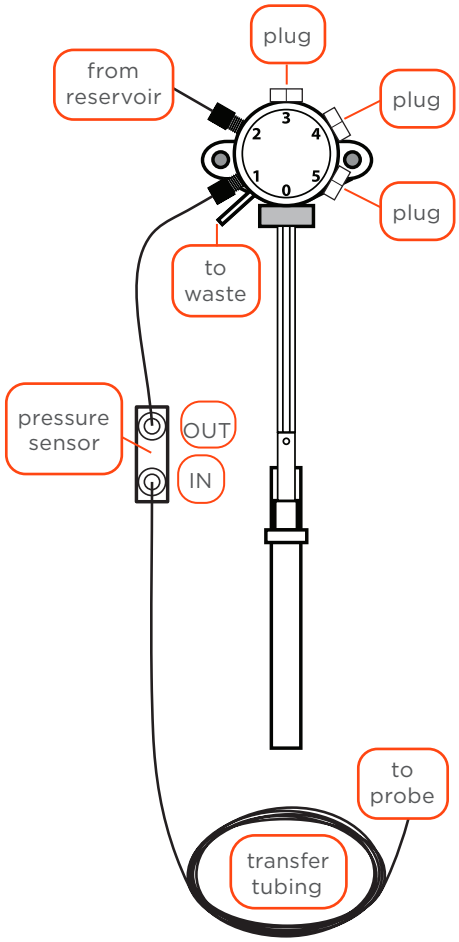
PLUMBING CONNECTIONS FOR ASPEC 274 WITH TWO ASPEC 4260 SYRINGE PUMPS
NO AIR/GAS CONFIGURATION
CONTINUED ON PAGE 36

Plumbing Connections for ASPEC 274 with Two ASPEC 4260 Syringe Pumps
No Air/Gas Configuration

Valve	Tubing	Connection	Diagram
NOTE	**The transfer tubing is coiled. To connect one end of the tubing to the probe, the clips that hold the tubing will need to be cut. After the connection to the probe has been made, it is recommended to re-coil the transfer tubing and place the excess tubing in the compartment under the syringe pump.**		
Pressure sensor IN to probe	5 mL transfer tubing (part number 499671142)		
	101 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to pressure sensor IN and the other end to the probe.	
	10 mL transfer tubing (part number 499672282)		
	202 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to pressure sensor IN and the other end to the probe	
	25 mL transfer tubing (part number 4996757021)		
	505 inches of Teflon® FEP tubing (0.062″ ID x 1/8″ OD)	For each valve, connect one end to pressure sensor IN and the other end to the probe	
	For smaller syringe size, use the following transfer tubing: 600 µL transfer tubing (part number 49942607) 1.1 mL transfer tubing (part number 499424013)		

PLUMBING CONNECTIONS FOR ASPEC 274 WITH TWO ASPEC 4260 SYRINGE PUMPS
NO AIR/GAS CONFIGURATION
CONTINUED ON PAGE 37

Plumbing Connections for ASPEC 274 with Two ASPEC 4260 Syringe Pumps No Air/Gas Configuration

Valve	Tubing	Connection	Diagram
	Solvent inlet tubing (part number 499484021)		
Port 2 from reservoir	40 inches of Teflon® tubing (0.085″ ID x 1/8″ OD)	For each valve, connect the end of the tubing with the fitting attached to port 2 on the syringe pump. Place the other end in a reservoir.	
	Vent tubing (part number F4420577)		
Vent to waste	FEP tubing	For each valve, connect one end directly to the vent and place the other end in a suitable receptacle. The valve releases liquid through the waste outlet if the pressure inside the valve is too high.	

Stacking Bracket Installation

The supplied stacking bracket kit (part number 31030017) must be used to prevent tipping when stacking two ASPEC 4260 Syringe Pumps. Do not stack more than one pump on top of another pump. The stacking bracket stabilizes the pump stack by anchoring it to the ASPEC 274.

The following items will be included with the stacking bracket kit:

- L-bracket
- Two Phillips screws
- Four rubber spacers (pre-installed)
- One metal spacer

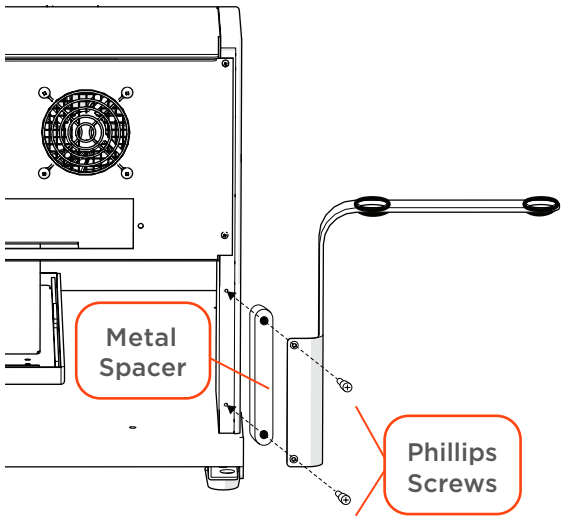
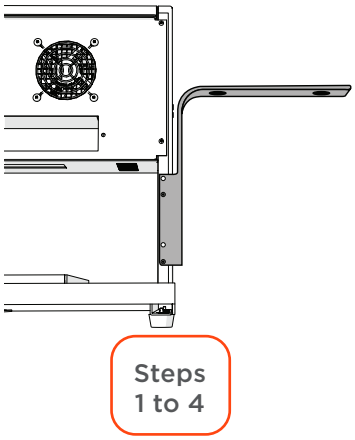


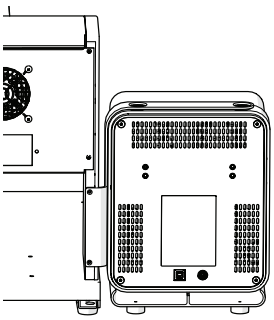
Figure 13
Stacking Bracket and Components (Rear View)

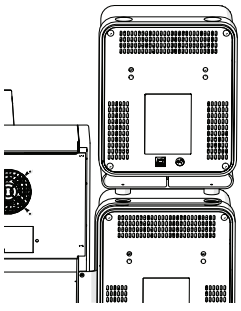
To install the stacking bracket:

1. Thread a Phillips screw through the top hole in the L-bracket and through the 0.175" metal spacer.
2. Insert the screw and threaded components into the top hole of the left support on the ASPEC 274. Loosely tighten the top screw.
3. Insert the other screw through the L-bracket into the bottom hole of the left support on the ASPEC 274. Fully tighten the screw.
4. Fully tighten the top screw.
5. Slide one of the ASPEC 4260 Syringe Pump under the installed bracket.



6. Set the second ASPEC 4260 Syringe Pump on top of the first, threading the back support feet through the holes on the L-bracket.





Rear Panel Connections

Rear Panel Diagram

1. USB device port
2. Power receptacle

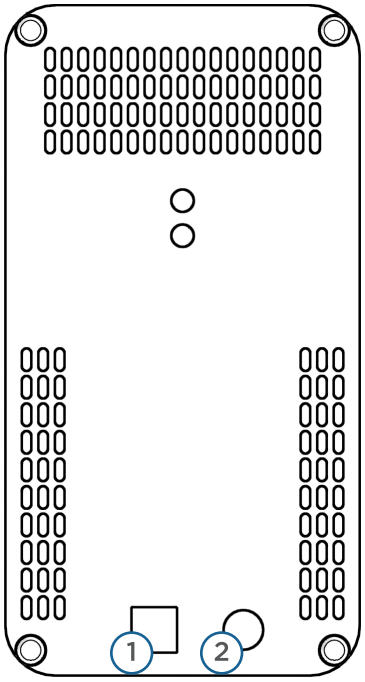


Figure 14
Rear Panel Diagram
- ASPEC® 4060 Single Syringe Pump

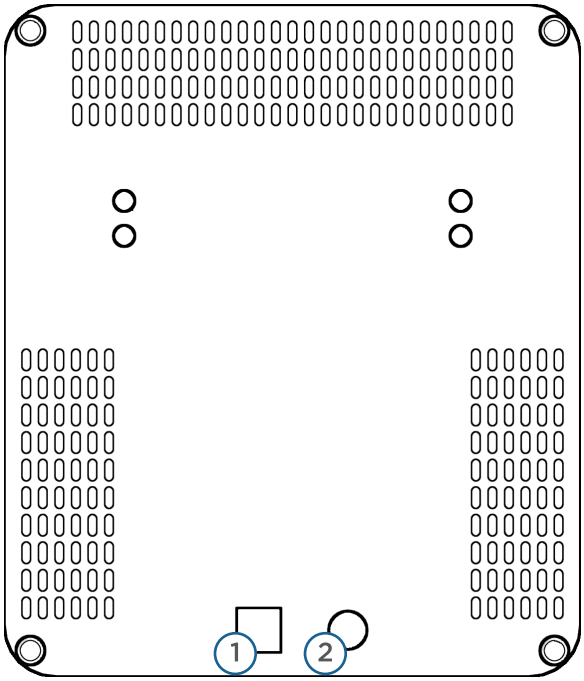


Figure 15
Rear Panel Diagram
- ASPEC® 4260 Dual Syringe Pump

USB Device Port

The syringe pump communicates with a standard PC via USB.

To make the USB connection between the syringe pump and the controlling device (PC), use the USB cable (part number 32000012) supplied in the accessory kit. Use the end with the “A-type” (flat) connector to connect to the controlling device and use the end with the “B-type” (square) connector to connect to the syringe pump.

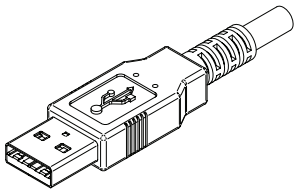


Figure 16
USB Cable
with “A-Type” Connector

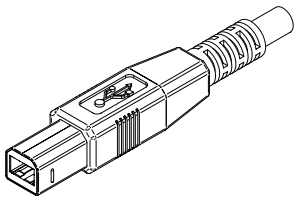


Figure 17
USB Cable
with “B-Type” Connector

Power Connection

Use the power cord on the external power supply to make the connection between the power receptacle on the syringe pump and the external power supply.

The connection from the external power supply to the syringe pump uses a connector with a locking collar. Check the alignment of the pins and then push it in until it clicks and locks in place. To disconnect, pull back on the locking collar and then disconnect the cable from the rear panel of the syringe pump.

Locate the appropriate power cord for your line voltage and then make the connection between the external power supply and the AC power source.

Chapter 3

OPERATION

IN THIS CHAPTER:

TRILUTION® LH Software provides control of the ASPEC® 4060 Single Syringe Pump and ASPEC® 4260 Dual Syringe Pumps. For more information about TRILUTION LH, refer to its user's guide and the documentation supplied with the software.

Front Panel

The front panel includes a power indicator light and an error indicator light.

1. **Power Indicator Light**
2. **Error Indicator Light**

Power Indicator Light

The green indicator becomes lit when power to the syringe pump is switched on.

Error Indicator Light

The red indicator light flashes when an error has been encountered.

Side Panel

The side panel includes the power switch.

3. **Power Switch**

Power Switch

| indicates that the electrical power is switched on.

O indicates that the electrical power is switched off.

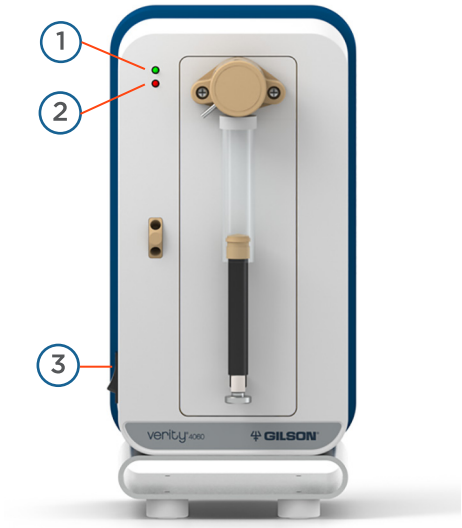


Figure 18
Front/Side Panel Diagram
- ASPEC® 4060 Single Syringe Pump

Figure 19
Front/Side Panel Diagram
- ASPEC® 4260 Dual Syringe Pump

Start Up

To start the syringe pump, turn on power to the syringe pump using the switch on the side panel.

- The power indicator light on the syringe pump front panel illuminates.
- The syringe pump initializes. It stops with the valve set to the outlet (transfer tubing) position.

Prime the Syringe Pump

It is recommended to prime the syringe pump with liquid before using it the first time, or if it has not been used for some time.

The following procedures use TRILUTION LH.

1. Open a method with a VERITY 4060 Syringe Pump or VERITY 4260 Syringe Pump in the configuration.
2. Select **Run**.
3. Add the method to the sample list.
4. Select the **Manual Control** tab.
5. Select the method from the drop-down list of methods and then select **Go**. The instruments will initialize.
6. If using a VERITY 4260 Syringe Pump select the syringe(s) that will be used (Left Syringe and/or Right Syringe).
7. Enter a value for **Prime Flow** Rate. This is the speed at which reservoir fluid moves into and out of the syringe.

NOTICE	TRILUTION LH does not validate any values or check for safe movement in manual control. Verify entries before selecting any buttons.

8. Select **Prime** to start priming.
9. Select **Stop Prime** to end priming.

Chapter 4

MAINTENANCE

IN THIS CHAPTER:

When performing the maintenance described in this chapter, use good laboratory practice, including, but not limited to, wearing protective clothing and preparing the maintenance space for service. After completing the maintenance operation, verify the safe and good working order of the part and instrument.

Helpful Hints

To keep the syringe pump at peak performance, Gilson recommends the following:

- Change or clean the piston seals and tubing regularly to maintain maximum performance.
- Do not cycle the syringe pump without fluid. Doing this causes excessive piston seal wear.
- Flush the syringe pump daily with distilled or deionized water. On a weekly basis, flush with a 10% solution of bleach or weak detergent.
- If bubbles remain in the syringes after priming, clean the syringes with alcohol.
- Check periodically to ensure that all fittings are tight.
- Check that each syringe is tight in the syringe pump valve.
- Clean the valve if the system has not been used for a while.
- Allow fluids to equilibrate to room temperature before running them through the system; cold fluids may cause leakage.

Cleaning

Exterior

The instrument should be cleaned occasionally using a dry, clean cloth. Or, if necessary, use a cloth dipped in soapy water. If liquid is accidentally spilled on the instrument, wipe it using a dry, clean cloth.

Syringe

Clean a syringe when some or all of the following occurs:

- Corrosive or hazardous liquids have been pumped
- Possible back flow of liquids into the waste tubing
- Leakage
- Aspiration of samples or reagents into the syringe

To clean a syringe, follow the procedures below and use the diagram as a reference.

REMOVE THE SYRINGE

The following procedures use TRILUTION® LH Software.

1. Open a method with a VERITY 4060 Syringe Pump or VERITY 4260 Syringe Pump in the configuration.
2. Select **Run**.
3. Add a method to the sample list.
4. Select the **Manual Control** tab.
5. Select a method from the drop-down list of methods and then select **Go**. The instruments will initialize.
6. If using a VERITY 4260 Syringe Pump select the syringe(s) that will be removed (Left Syringe and/or Right Syringe).
7. Disconnect the syringe piston from the piston operating rod by unscrewing the piston holding screw on the underside of the rod.
8. Select **Lower Syringe**.
9. After the syringe has been lowered, unscrew and remove the syringe from the valve.

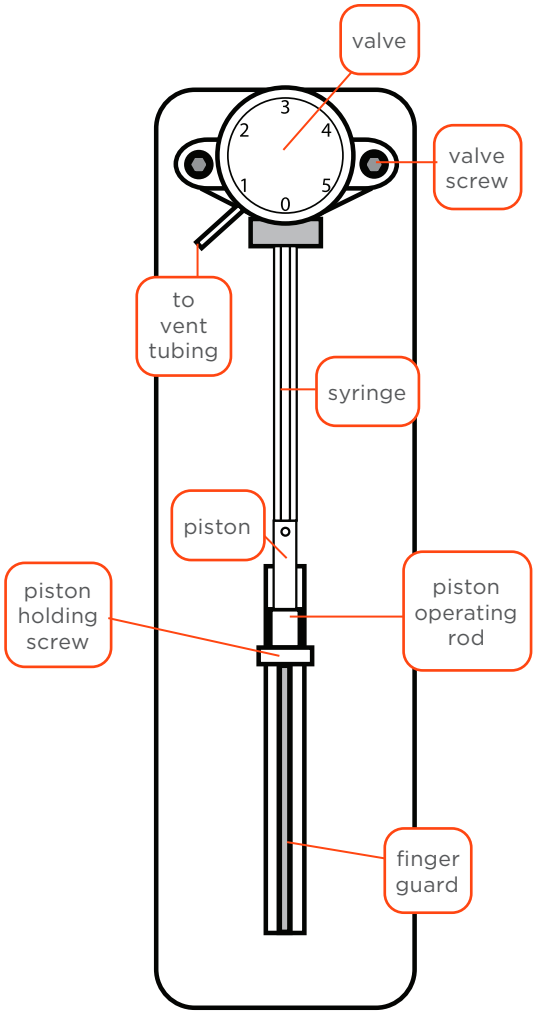


Figure 20
Syringe Installation

CLEAN THE SYRINGE

After the syringe has been removed, it can be cleaned:

1. Place the syringe in a beaker containing methanol, and then aspirate and dispense several volumes of methanol through the syringe.
2. Place the syringe in a beaker containing distilled or deionized water, and then aspirate and dispense several volumes of water through the syringe.
3. Hold the syringe housing in one hand. Clean the syringe using a non-abrasive cloth dampened with alcohol. Remove the piston and clean the piston with a non-abrasive cloth dampened with alcohol.
4. Dry the syringe and piston using a clean, lint-free cloth.

REINSTALL THE SYRINGE

When the syringe is clean, reinstall it:

1. Fully tighten the syringe into the valve.
2. Select **Raise Syringe**.
3. Firmly tighten the piston holding screw to secure the syringe piston.

Valve

Clean the syringe pump valve with a nonabrasive cloth after any of the following situations have occurred:

- Corrosive or hazardous liquids have been pumped
- Possible back flow of liquids into the waste tubing
- Leakage
- System has not been used for a while

If the valve sticks, first try using the valve key (part number F123674) to turn the valve axle to possibly free the valve.

REMOVE THE VALVE

To clean the valve, first remove it from the syringe pump:

1. Disconnect all tubing from the valve.
2. Disconnect the syringe from the valve. Refer to the procedure for replacing the syringe on page 46.
3. Remove the two screws securing the valve to the syringe pump and then remove the valve.

DISASSEMBLE THE VALVE

1. Hold the valve body firmly in one hand. Using a 17 mm open-ended wrench, turn the valve axle guide counterclockwise and separate the two halves.
2. Pull the valve axle away from the valve main body.
3. Separate the ceramic stator from the ceramic rotor.

> **NOTE** Do not remove the ceramic stator from the valve main body.

4. Tap the valve axle guide against a solid level surface to remove the spring and PTFE end piece.

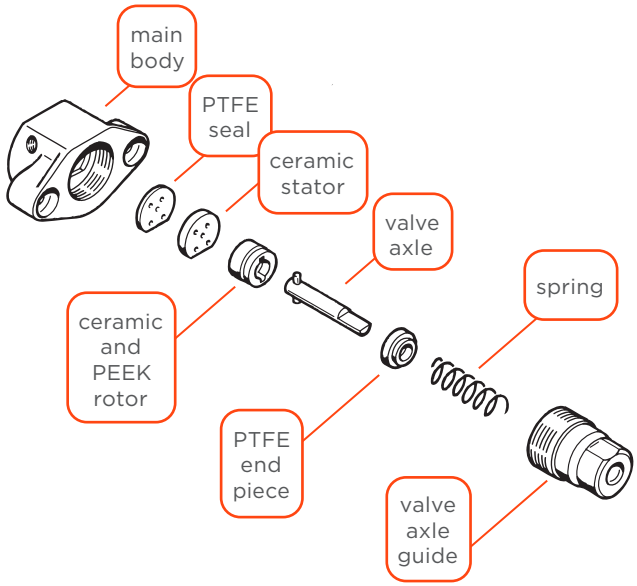


Figure 21
Valve (Disassembled)

CLEAN AND REINSTALL THE VALVE

1. Clean the disassembled parts of the valve using a non-abrasive cloth dampened with alcohol or by autoclaving.
2. Dry the components using a clean, lint-free cloth.
3. Reassemble the valve parts by reversing the above procedure.
4. Fully tighten the valve screws to secure the valve on the syringe pump.
5. Reinstall the syringe. Refer to the procedure for installing a new syringe on page 49.
6. Reconnect all tubing.

Part Replacement

Refer to the instructions in this section to replace the:

- Syringe on page 49
- Valve on page 50
- Tubing on page 49

Tubing

It is important to keep all tubing clean and free of crimps. Tubing that has become dirty, blocked, or crimped can result in poor accuracy and precision, or loss of air gap.

Replace both the transfer tubing and inlet tubing as needed. Refer to the **Parts and Accessories** appendix starting on page 57 for part numbers for replacement tubing. For tubing installation procedures, refer to **Plumbing Connections** starting on page 17.

Syringe

If necessary, refer to the diagram at right while performing the procedures below.

REMOVE THE SYRINGE

The following procedures use TRILUTION LH.

1. Open a method with a VERITY 4060 Syringe Pump or VERITY 4260 Syringe Pump in the configuration.
2. Select **Run**.
3. Add a method to the sample list.
4. Select the **Manual Control** tab.
5. Select a method from the drop-down list of methods and then select **Go**. The instruments will initialize.
6. If using a VERITY 4260 Syringe Pump select the syringe(s) that will be removed (Left Syringe and/or Right Syringe).
7. Disconnect the syringe piston from the piston operating rod by unscrewing the piston holding screw on the underside of the rod.
8. Select **Lower Syringe**.
9. After the syringe has been lowered, unscrew and remove the syringe from the valve.

INSTALL THE NEW SYRINGE

1. Fully tighten the syringe into the valve.
2. Select **Raise Syringe**.
3. Firmly tighten the piston holding screw to secure the syringe piston.

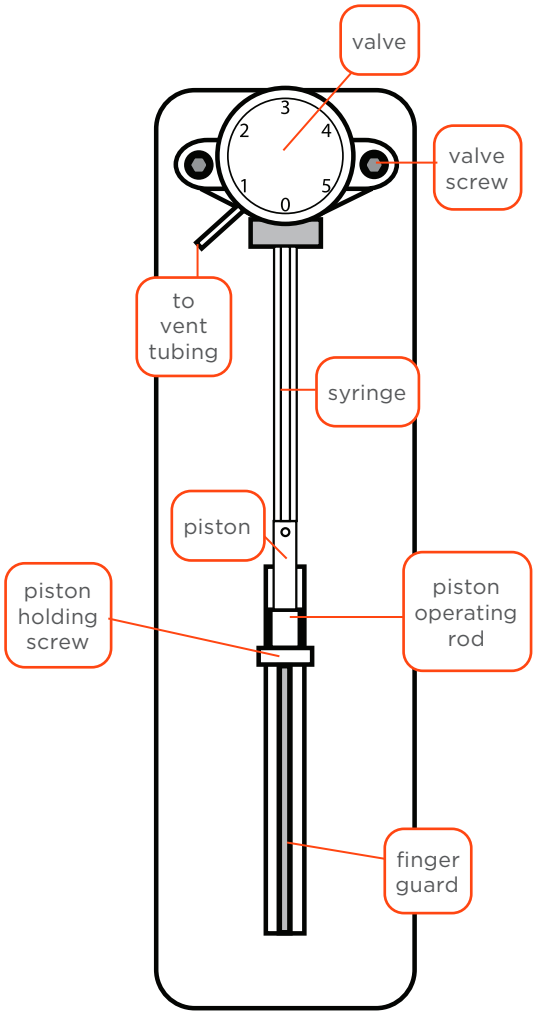


Figure 22
Syringe Installation

Valve

To replace a valve on the syringe pump, follow the instructions below. If necessary, refer to the syringe pump diagram at right.

1. Disconnect the inlet, transfer, and vent tubing from the valve.
2. Disconnect the syringe from the syringe pump. Refer to the procedure for replacing the syringe on page 49.
3. Remove the two screws securing the valve to the syringe pump and then remove the valve.
4. Position the replacement valve and then fully tighten the valve screws to secure it.
5. Reinstall the syringe. Refer to the procedure for installing a new syringe on page 49.
6. Reconnect all tubing.

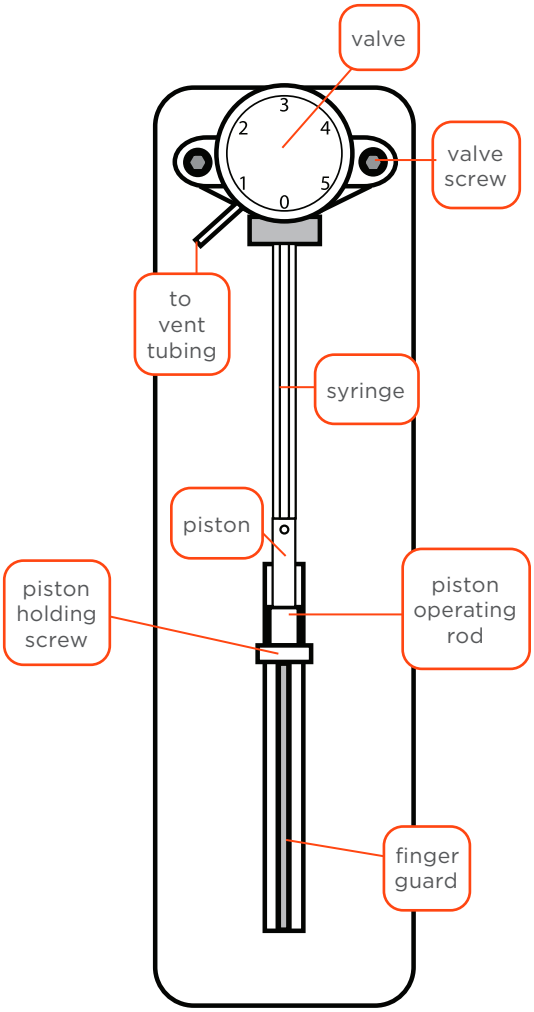


Figure 23
Syringe Installation

Chapter 5

TROUBLESHOOTING

IN THIS CHAPTER:

Mechanical

PROBLEM	SOLUTION
Valve does not fit on the syringe pump	Valve axle not properly aligned with the motor drive; ensure that the flat on the axle is aligned with the drive slot on the motor
Valve moves during aspirate or dispense	Valve mounting screw not tight; check that the mounting screws, syringe, and syringe mounting screw are all tight
Valve sticks	Clean the valve (refer to the instructions on page 48)

Electrical

PROBLEM	SOLUTION
Syringe pump does not respond	Make sure power is turned on Check cabling connections Try a different AC outlet Restart the PC

Hydraulic

PROBLEM	SOLUTION
Liquid leakage	Make certain all fittings are tight
Liquid leaving by the vent	If tubing is kinked or blocked, replace tubing Ensure that the inlet tubing is clear Dirt may be trapped between the ceramic surfaces; clean the valve (instructions on page 48)
Instrument will not draw in solvent	Make certain all fittings are tight Check valve fitting threads on the syringe pump and replace if damaged
No fluid being dispensed	Make sure the syringe is tight within the valve fitting If tubing is kinked or blocked, replace defective tubing Replace the syringe pump valve if damaged
Air gap breaks up	When aspirating a liquid, if the air gap breaks up, check to see if the tubing is the correct size Reduce aspirate flow rate Increase volume of air gap Clean or replace any dirty tubing

HYDRAULIC CONTINUED ON PAGE 53

PROBLEM	SOLUTION
Syringe bubbles	Make sure that all fittings are tight and air-free Make sure the syringe is tightened into the valve Clean the syringe if dirty (instructions on page 46) If any of the valve fittings are damaged, replace the valve
Fluid leak	Allow solvents to warm to room temperature before using Clean valve (instructions on page 48) Replace the syringe piston seal
Incorrect aspirating and dispensing	Check for leaks on all fittings Tighten or replace fittings on inlet and transfer tubing as needed Replace the valve if damaged Clean or replace transfer tubing
Syringe stalls	If the syringe stalls, inspect the tubing and valve for a blockage If the syringe stalls due to an accelerated aspirate or dispense rate, reduce the rate in the software
Poor accuracy	Clean or replace any dirty tubing Replace the syringe piston seal if the aspirate and dispense speeds are too fast, slow down the speeds to adapt to the tubing and probe type

Error Codes and Messages

To obtain the error code and message, view the log file produced during the run in TRILUTION LH:

To display the log file produced during a run:

1. Access the **Run Results** by selecting **Liquid Handling | Utilities | Run Results** or by selecting **Results** in the Application window.
2. Locate the run for which you want to view the log.
3. Select **View Log** or right-click on the **Run** and then select **View Log**. The file appears in a text editor box.

Refer to the table below for a list of the error codes and messages.

ERROR	ERROR TEXT	ERROR	ERROR TEXT
0	No Error	26	Invalid Valve Position
10	Unknown Command	27	Invalid Syringe Pump Volume
11	Invalid NV-RAM Address	28	Invalid Valve Move Speed
12	Emergency Stop Activated	29	Invalid Syringe Pump Flow Rate
13	Bad Parameter Entered	30	Invalid Valve Type
16	Character Limit	31	Invalid Syringe Size
18	Valve Park Location	32	Invalid Valve Selection
19	Syringe Pump Park Location	33	Invalid Syringe Pump Selection
20	Valve Unhomed	34	Missing Valve Encoder
21	Syringe Pump Unhomed	35	Missing Syringe Pump Encoder
22	Valve Moving	36	Set Pressure Offset to Zero
23	Syringe Pump Moving	37	Other Syringe Module in Error
24	Valve Stall	38	Minimum volume is x.xxx uL
25	Syringe Pump Stall	88	Error Unknown

Repair and Return Policies

Refer to the following information and then contact your local Gilson representative. Specific contact information can be found at **www.gilson.com**.

Before Calling Us

Your local Gilson representative will be able to serve you more efficiently if you have the following information:

- Serial number and model number of the instruments involved.
  - The serial number is located on the right side of the syringe pump.
- Installation procedure you used.
- List of concise symptoms.
- List of operating procedures and conditions you were using when the problem arose.
- List of all instruments in the configuration and the connections to those instruments.
- List of other electrical connections in the room.

Warranty Repair

For information about warranty repair or replacement, refer to our website (https://www.gilson.com/default/terms-and-conditions-service-contract-usa.html).

Non-Warranty Repair

For out-of-warranty repairs, contact your local Gilson representative who will discuss service options with you and can assist in making arrangements to return the equipment, if necessary.

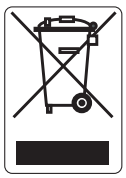
Return Procedure

Contact your local Gilson representative to obtain authorization before returning any Gilson equipment. To return a piece of equipment:

- Carefully pack the unit to prevent damage in transit. Check with your local Gilson representative regarding proper method of shipment. No responsibility is assumed by Gilson or your local Gilson representative for damage caused by improperly packaged instruments. Indicate the authorization on the carton and on the packing slip.
- Always insure for the replacement value of the unit.
- Include a description of symptoms, your name, address, phone number, and purchase order to cover repair costs, return and shipping charges, if your institution requires it.

Unit End-of-Life

For more information about where you can drop off your waste equipment for recycling, contact your local dealer from whom you originally purchased the product or contact your local council. By doing so, you will help conserve natural resources and ensure that your waste equipment is recycled in a manner that protects human health and the environment.



Appendix A

PARTS AND ACCESSORIES

IN THIS CHAPTER:

ASPEC® Systems

ASPEC® 241 System

PART NUMBER	DESCRIPTION
26150006	ASPEC 241,SINGLE 4060,W/Z-DRIVE ASPEC 241

ASPEC® 271 with ASPEC® 4060 Single Syringe Pump

PART NUMBER	DESCRIPTION
2614007	ASPEC 271,SINGLE 4060,W/Z-DRIVE ASPEC 271 with ASPEC 4060 Syringe Pump

ASPEC® 271 with ASPEC® 4260 Dual Syringe Pump

PART NUMBER	DESCRIPTION
2614008	ASPEC 271,DUAL 4260,W/Z-DRIVE ASPEC 271 with ASPEC 4260 Syringe Pump

ASPEC® 274 with Two ASPEC® 4260 Dual Syringe Pumps

PART NUMBER	DESCRIPTION
2614010	ASPEC 274,TWO DUAL 4260, W/Z-DRIVE ASPEC 274 with two ASPEC 4260 Syringe Pumps

Syringes

PART NUMBER	DESCRIPTION
25025342	SYRINGE,250 uL 250 µL Syringe
25025347	SYRINGE,500 uL 500 µL Syringe
25025343	SYRINGE,1 mL 1 mL Syringe
25025344	SYRINGE,5 mL 5 mL Syringe
25025345	SYRINGE,10ML 10 mL Syringe
25025346	SYRINGE,25 mL 25 mL Syringe

Piston Seals

PART NUMBER	DESCRIPTION
F4015063	SEAL,PISTON,250UL (5/PK) Piston Seal for 250 µL Syringe (pkg of 5)
F4015064	SEAL,PISTON,500UL (5/PK) Piston Seal for 500 µL Syringe (pkg of 5)
F4015065	SEAL,PISTON,1ML (5/PK) Piston Seal for 1 mL Syringe (pkg of 5)
F4015066	SEAL,PISTON,5ML Piston Seal for 5 mL Syringe
F4015067	SEAL,PISTON,10ML Piston Seal for 10 mL Syringe
F4015068	PISTON NOZZLE,25ML Piston Seal for 25 mL Syringe

Valve and Valve Parts

PART NUMBER	DESCRIPTION
F4015040	ASY,6-WAY VALVE,4X60 Syringe Valve Assembly

VALVE AND VALVE PARTS CONTINUED ON PAGE 59

PART NUMBER	DESCRIPTION
F4015044	ROTOR,6-WAY VALVE Rotor
F4015045	SEAL,6-WAY VALVE Seal
F4015046	STATOR,6-WAY VALVE Stator
F123674	CALIBRATION KEY FOR PIPETMAN F Valve Key
49041019	PLUG,1/4-28,ETFE (P-311) Plug for Unused Ports
2502534811	THUMBSCREW,402 SYRINGE PISTON Stainless Steel Thumbscrew for Syringe Piston

Tubing

Inlet

PART NUMBER	DESCRIPTION
499484021	TUBING,FEP,2MM,SOLVENT INLET (S-2608) Inlet Tubing Assembly

Vent

PART NUMBER	DESCRIPTION
F4420577	TUBING,FEP,3MMx4MMx1 MTR Vent Tubing

Plumbing Packages

PART NUMBER	DESCRIPTION
2644700	KIT,ASPEC 241/271 5ML PLUMBING Plumbing Package, ASPEC 241/ASPEC 271, 5 mL
2644701	KIT,ASPEC 241/271 10ML PLUMBING Plumbing Package, ASPEC 241/ASPEC 271, 10 mL
2644702	KIT,ASPEC 241/271 25ML PLUMBING Plumbing Package, ASPEC 241/ASPEC 271, 25 mL

PART NUMBER	DESCRIPTION
2644703	KIT,ASPEC 241/271 AIR/GAS PLUMBING ASPEC 241/ASPEC 271, Air/Gas Plumbing Package
2644708	KIT,ASPEC 271 DUAL ADAPTER Dual Adapt Kit for Plumbing an ASPEC® 271 with an ASPEC 4260 Syringe Pump
2644709	KIT,ASPEC 271 AIR/GAS PLUMBING Air/Gas Plumbing Package for ASPEC 271 with ASPEC 4260 Syringe Pump
2644704	KIT,ASPEC 274 5ML PLUMBING Plumbing Package, ASPEC 274, 5 mL
2644705	KIT,ASPEC 274 10ML PLUMBING Plumbing Package, ASPEC 274, 10 mL
2644706	KIT,ASPEC 274 25ML PLUMBING Plumbing Package, ASPEC 274, 25 mL
2644707	KIT,ASPEC 274 AIR/GAS PLUMBING ASPEC 274 Air/Gas Plumbing Package

SPE Gas Pressure Regulator

PART NUMBER	DESCRIPTION
25051376	ASY,SPE 0-30 PSI PRESSURE REGULATOR SPE Gas Pressure Regulator Assembly 0–30 psi

Cables and Power Cords

PART NUMBER	DESCRIPTION
7080316106	POWER CORD-C13,EURO Power Cord, 220V
7080318107	POWER CORD-C13,US & JAPAN Power Cord, 110V
32000012	CABLE,USB 2.0,A-B MALE,BLACK,2M USB Cable

Appendix B

LIQUID CONTACT MATERIALS

The information provided in the following table is accurate to the best of our knowledge and belief, but is intended for general information only.

MATERIAL	DESCRIPTION
Ekonol	Ekonol has excellent solvent resistance with the exception of concentrated sulfuric acid and strong alkalis. The water absorption rate is low at 0.4% after 500 hours at 212° F. Ekonol Polyester is self-lubricating and provides excellent friction and wears properties. Ekonol Polyester is a very thermally stable polymer, making it easy to blend/fabricate with other high temperature materials. When combined with polytetrafluoroethylene (i.e., PTFE); it produces a composite material that has excellent temperature and wear resistance properties. The Ekonol Polyester/PTFE blend will not wear metal surfaces and resists self-wear better than any other PTFE composition. Applications for Ekonol Polyester/PTFE blends are varied and include packing sets, compressor ring sets, "0" ring seals, spring-loaded seals, lip seals, self-lubricating bearings and rotors or vanes of process pumps. Ekonol Polyester/PTFE works best under environmentally tough conditions where wear resistance, dimensional stability and corrosion resistance are critical.
FEP	Fluorinated ethylene propylene is another member of the fluorocarbon family with similar chemical properties. It is generally more rigid than PTFE, with somewhat increased tensile strength. It is typically more transparent than PTFE, slightly less porous, and less permeable to oxygen. FEP is not as subject to compressive creep at room temperature as PTFE, and because of its slightly higher coefficient of friction is easier to retain in a compression fitting.
PEEK	Considered relatively inert and biocompatible, polyetheretherketone tubing can withstand temperatures up to 100°C. Under the right circumstances, 0.005″–.020″ ID tubing can be used up to 5000 psi for a limited time, and 0.030″ to 3000 psi. Larger IDs are typically good to 500 psi. These limits will be substantially reduced at elevated temperatures and in contact with some solvents or acids. Its mechanical properties allow PEEK to be used instead of stainless in many situations and in some environments where stainless would be too reactive. However, PEEK can be somewhat absorptive of solvents and analytes, notably methylene chloride, DMSO, THF, and high concentrations of sulfuric and nitric acid. This tubing is highly prone to "kinking," or sealing off, if held in a sharp bend over time.
PTFE	Polytetrafluoroethylene is the generic name for the class of materials such as Teflon®. It offers superior chemical resistance but is limited in pressure and temperature capabilities. Because it's so easy to handle, it is often used in low pressure situations where stainless steel might cause adsorption. PTFE tubing is relatively porous, and compounds of low molecular weight can diffuse through the tubing wall.

FEP, PEEK, and PTFE descriptions provided by Valco Instruments Company Inc (**www.vici.com**).

Ekonol description provided by Saint-Gobain Coating Solutions (**www.coatingsolutions.saint-gobain.com**)