

ASXPRESS® PLUS

Rapid Sample Introduction System Quick Installation Guide

Manual Part Number 32-0402-048 Rev0



ASXPRESS PLUS Quick Installation Guide

You can and should arrange for expert installation of the ASXPRESS PLUS Rapid Sample Introduction System. Installation services from CETAC or an authorized provider ensure that the autosampler is properly prepared and that the installation is customized for your application.

If you are doing the installation yourself, this guide will show you how to connect the ASXPRESS PLUS Rapid Sample Introduction System to a Teledyne CETAC autosampler. If your autosampler is not new, the autosampler may need additional preparation as described in the *ASXPRESS PLUS Operator's Manual*, which is available on the software CD or from www.teledynecetac.com. Also note that many applications may require modifications to the rinse pump arrangement or to timing parameters, also described in the *Operator's Manual* or in the appropriate application guide.

Photos in this guide show different, representative models of the autosampler and other parts of the ASXPRESS PLUS system. Your autosampler and ASXPRESS PLUS may look different.

This guide is for use by qualified chemists or laboratory technicians who are familiar with electrical and chemical safety precautions. **See the ASXPRESS PLUS Operator's Manual for notices and safety information.**

1. Unpack the ASXPRESS PLUS components and the Teledyne CETAC autosampler.

Inspect all packaging materials for damage that may have occurred during shipment.

Refer to the packing lists included with both the ASXPRESS PLUS and autosampler to ensure that all components have been received.

Keep the original packaging for use in case the product ever needs to be returned or shipped to another location.

2. Install the ASX Dashboard software onto the host computer from the included CD.

You will need administrator access on your PC to install the software.

If you need instructions on how to install the software, see the *ASXPRESS PLUS Operator's Manual*.

3 Prepare the autosampler:

- a. Install the Z-drive assembly on the autosampler.

The Z-drive assembly is different for each model of autosampler. The ASX-560 Z-drive is shown here.

- b. Check whether your autosampler needs a firmware upgrade or pump speed adjustment. See the *Operator's Manual* for more information.



- c Connect the autosampler's rinse station to the source of rinse solution and to a waste container.

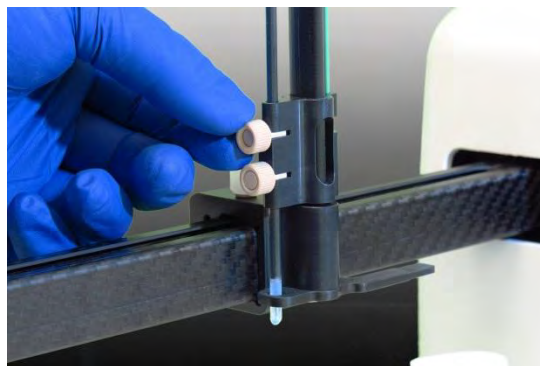
For an overview of gravity drain configurations, see the diagrams beginning on page 13. For pumped drain configurations, see the ASXpress plus Operator's Manual or the autosampler Operator's Manual.

- d Connect the power supply to the autosampler, and to the mains power source. **Do not turn on the autosampler at this time.**

- e Install the sample probe onto the autosampler Z-drive assembly.

For aqueous/coolant applications, use only a "Double Blue Band" 1.0 mm I.D. sample probe with the ASXPRESS PLUS system. For oils applications, use a stainless steel filtered sample probe.

The Z-drive assembly is different for each model of autosampler. The ASX-560 is shown here.



4 Connect the ASXPRESS PLUS electronics module:

- a Position the ASXPRESS PLUS electronics module.

Find a spot where the system will be out of the way but visible, and where it can conveniently be connected to the valve/pump module, autosampler, PC, and power outlets.

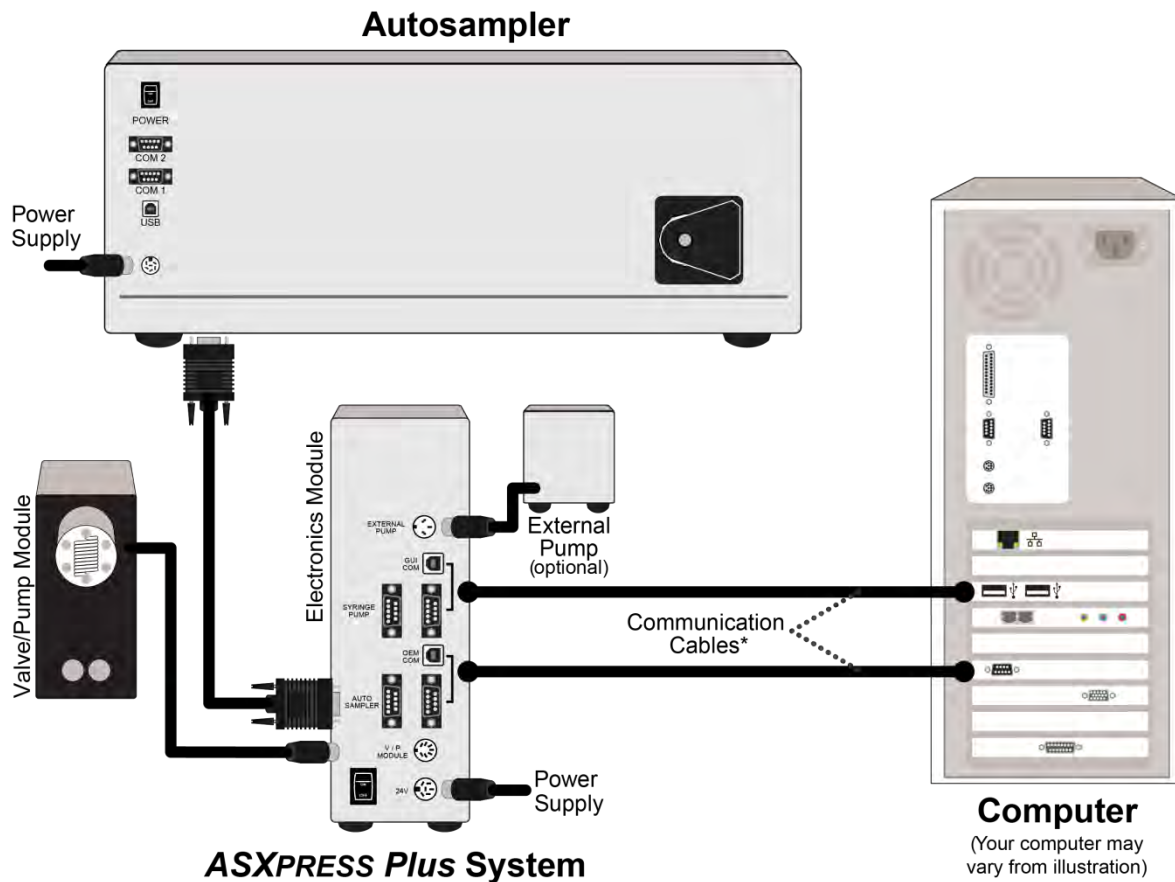
Keep the autosampler as near the ICP nebulizer as is possible.



WARNING: See the ASXPRESS PLUS Operator's Manual for electrical safety precautions.

- b Connect the host computer, the ASXPRESS PLUS electronics module, the valve/pump module, and the autosampler as shown.

Leave the autosampler and ASXPRESS PLUS electronics module power switches OFF.



* There are *two* connections between the computer and the electronics module: GUI COM (for configuring the electronics module) and OEM COM (for sending autosampler commands). An RS-232C serial connection or USB connection may be used for these connections.

A serial cable connects the AUTOSAMPLER port on the ASXPRESS PLUS electronics module to the COM 1 port on the autosampler.

The external pump is optional. Refer to the ASXPRESS PLUS Operator's Manual for more information.

5 Prepare and position the ASXPRESS PLUS valve/pump module:

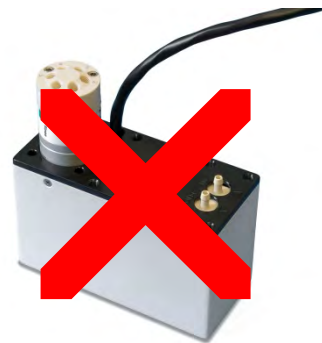
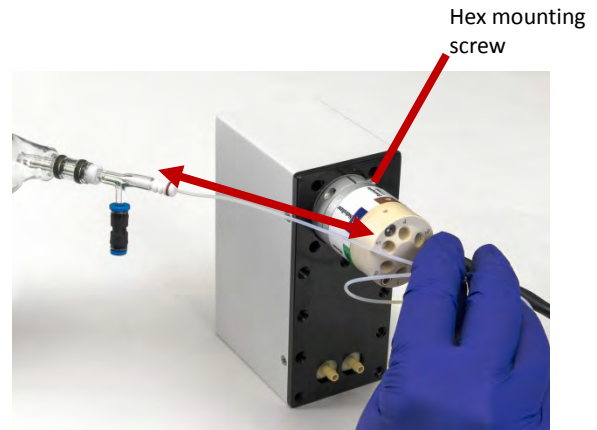
a Remove the protective cover from the 6-port valve. Remove the caps from the two vacuum ports.

b Position the valve/pump module.

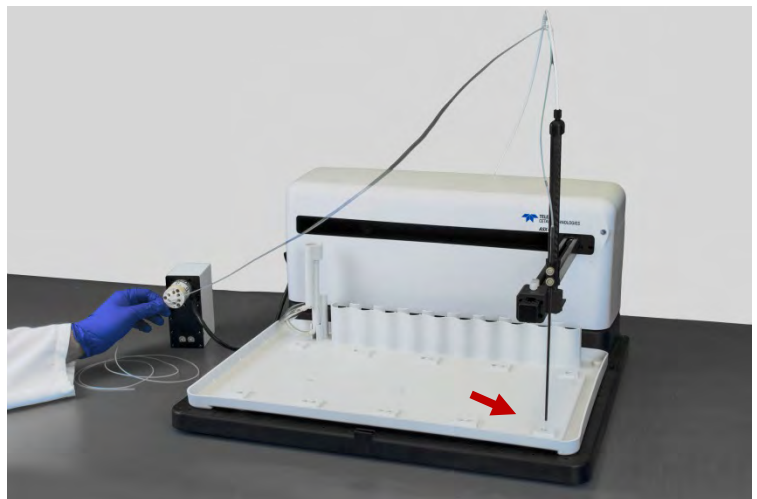
Loosen the valve mounting hex screw but do not remove it. Once it is loosened you will be able to orient the valve so that port #5 is turned towards the nebulizer to minimize tubing distance. When the valve is in position, tighten the mounting screw.

Keep valve port #5 (blue) as close to the ICP nebulizer as possible. This may require adjusting vertical and horizontal placement of the valve/pump module, the orientation of the valve, or the orientation of the spray chamber. If necessary, use the CETAC Articulating Mounting System (part number SP6572).

The module should rest on either end, but not on its back.



c Determine the length of the sample transfer tubing you need, and cut it to size. This is most easily determined by attaching the probe to the autosampler and, with the power turned off, moving the arm of the autosampler to the farthest sample position from the valve/pump module.



- d Attach the sample probe to port #2 (gray).

If you are unfamiliar with attaching the nuts and ferrules, please refer to the instructions on page 10 of this guide.

If installing with an enclosure, connect the trimmed tubing from the sample probe to the inside bulkhead using the nut and ferrule provided. Then attach tubing from the outside bulkhead to port #2 on the valve.

These fittings should only be finger tight—do not use tools. Overtightening can damage the fittings and the valve.

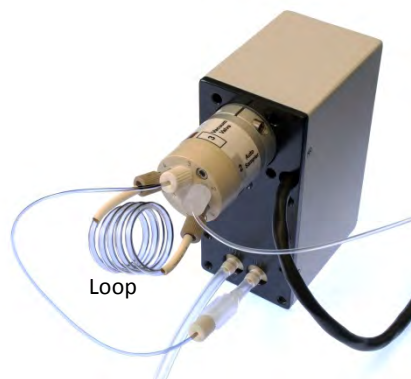
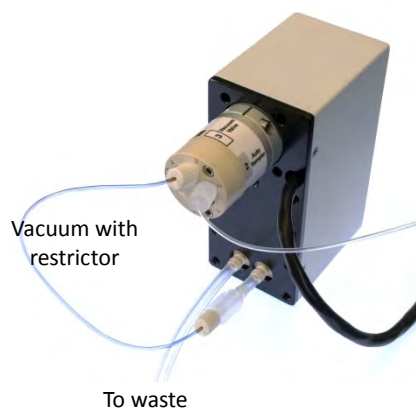
- e Find the restrictor line and connect one of its white fittings to the clear plastic coupler. Then attach the short piece of Tygon tubing to the IN port of the valve/pump module and the other white fitting to port #3 on the valve.

- f Connect one end of the 60" length of 1/8" Tygon tubing to the OUT port of the vacuum pump and place the other end into a waste container. Ensure that the tubing is not submerged below liquid level in the waste as it can affect performance of the system.

Shorten tubing as needed.

- g Attach the sample loop between ports #1 and #4 on the 6-port valve.

Experiment with the loop size to determine the optimal size for your application, balancing sample size, sampling rate, and integration time. Loops of varying sizes are available. See the *ASXPRESS PLUS Accessories and Supplies Catalog* for a list of sample loop sizes.



6 Connect to the ICP-MS:

- a Prepare a carrier/rinse solution that is matrix-matched to your samples. A carrier/rinse solution bottle is provided with the ASXPRESS PLUS.



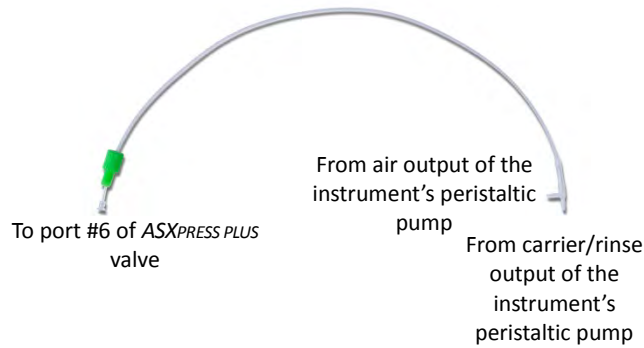
- b** Bubbles in the carrier/rinse solution help clean the tubing and reduce carryover. You can choose active or passive bubbling:

Active bubbling

Connect one channel of the instrument's peristaltic pump to the carrier/rinse solution bottle.

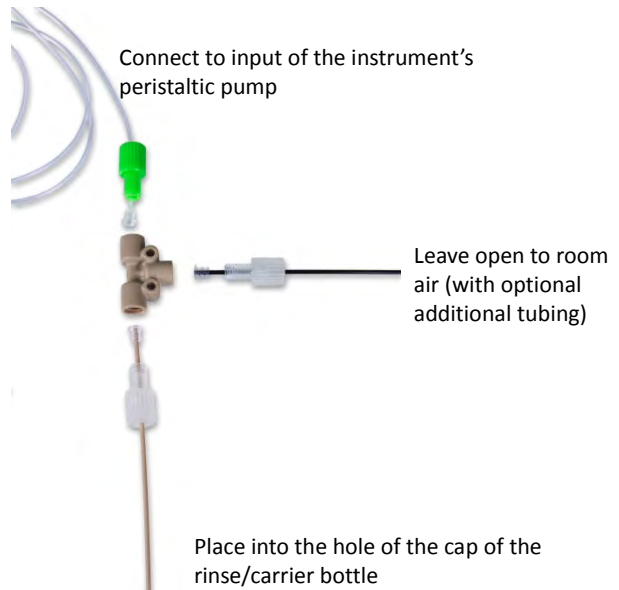
Leave another channel of the instrument's peristaltic pump open to room air.

Connect the two channels of the instrument's peristaltic pump to the tee of the rinse line assembly. Connect the other end of the rinse line to port 6 of the valve/pump module.



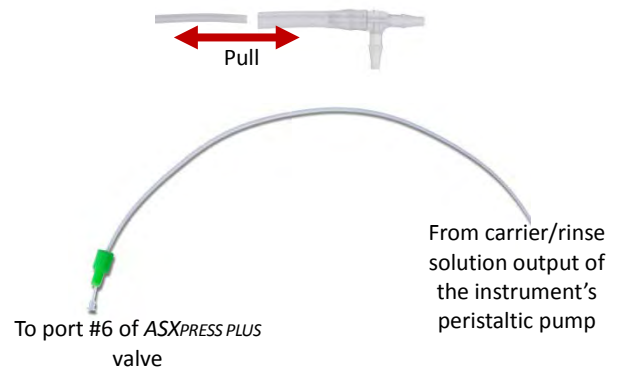
Passive bubbling

Assemble the passive bubbling tee as shown here.



It is recommended to attach a small piece (1/2 inch) of peri pump tubing to the end of the black PEEK tubing. This will help to prevent blockages in the line.

Remove the tee from the rinse line assembly, then connect the rinse line between the instrument and the valve/pump module.



- 7** Connect all drain tubing (3 tubes) to an appropriate waste container:
- Autosampler rinse station drain tubing
 - ASXPRESS PLUS vacuum pump discharge “output” tubing
 - Nebulizer/spray chamber drain tubing

Rinse station and spray chamber waste may be pumped into a waste container if necessary.

- 8** Join the nebulizer to port #5 (blue) on the ASXPRESS PLUS 6-port valve.

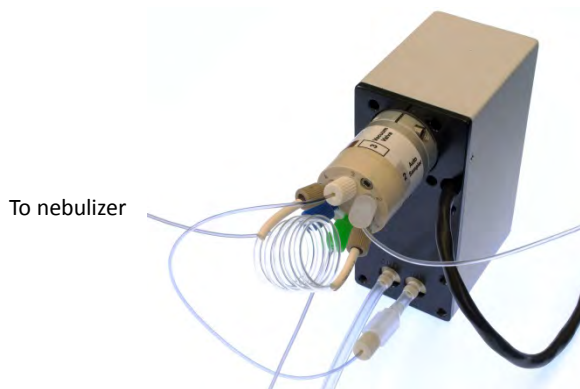
Use narrow-diameter tubing, especially if the sample uptake rate is low. To reduce carryover and ensure effective washout, use one continuous piece of tubing with no splices or kinks.

Place a nut and ferrule on the ASXPRESS end of the tubing and the appropriate fitting on the nebulizer end of the tubing.

If you need to install the optional internal standard addition mixing tee, see page 11.

Cut the tubing to the shortest possible length.

Note: Ensure that tubing ends are not submerged below liquid level in the waste container, as this can impede flow and affect performance of the ASXPRESS PLUS system. Use caution to arrange drain tubing so that waste may gravity drain completely without trapping any liquid in the tubing.

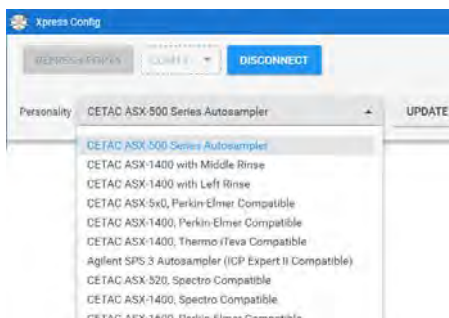
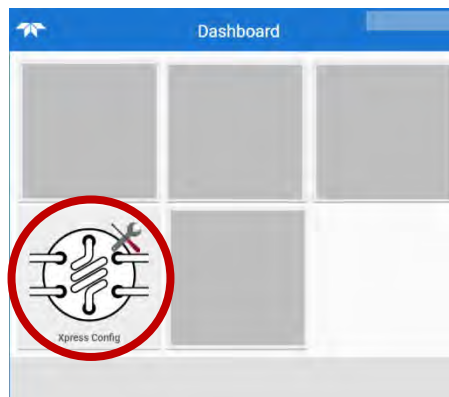


9 Test the ASXPRESS PLUS:

- a** Plug in the power cables and turn on the electronics module.

If you are using USB connections, the first time you turn on the electronics module, a driver will be installed and a COM port number will be assigned to each USB connection.

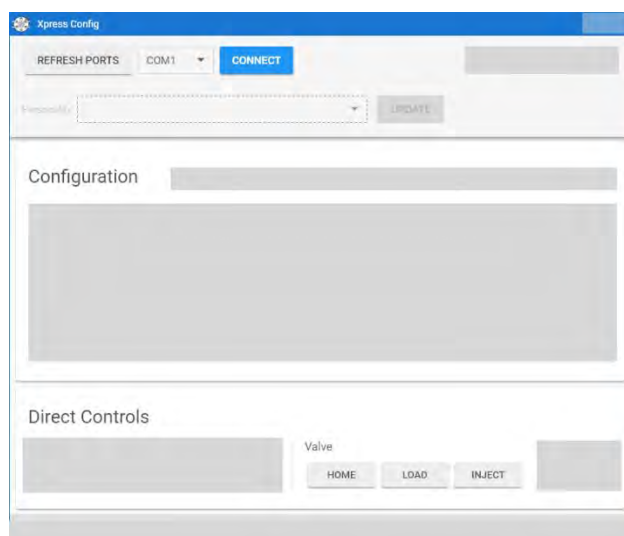
- b** Run the ASX Dashboard software.
- c** Open the Xpress Config tool.
- d** Select the COM port where the ASXPRESS PLUS was connected and click CONNECT.
- e** If needed, set the ASXPRESS PLUS personality to match the autosampler you are using. Power cycle the electronics module then click CONNECT.



- f Click HOME to home the valve then click LOAD and INJECT a few times.

If the valve does not seem to be in the correct position, see "If the 6-Port Valve Is In the Wrong Position (Re-Homing)" in the *ASXPRESS PLUS Operator's Manual*.

- 10** Refer to the *ASXPRESS PLUS Operator's Manual* for additional information on installation, setup and operation.



Developing a Method

This is an outline for method development which has worked well for many laboratories. Consult the *ASXPRESS PLUS Application Guide* for more information. If you need further assistance, email Teledyne CETAC at cetacservice@teledyne.com.

- 1 Determine the approximate volume of sample to be consumed during analysis and at what pump speed.
- 2 Choose a loop of appropriate size.
- 3 Adjust the *ASXPRESS PLUS* parameters to completely fill the loop. The loop should be overfilled slightly. This can be seen as some sample going into the restrictor line just before the valve switches. For a description of each function and parameter, see "Timing Parameters" in the *Operator's Manual* or the application guide.
- 4 The loop evacuation delay, probe rinse, rinse station refill parameters, and equalization delay can all be set to 1.0 initially.
- 5 In the ICP software, turn any rinse parameters off and adjust the "effective read delay" or "uptake time." OEM software platforms call these parameters by different names.
- 6 In the ICP software, turn off any fast flush parameters or plasma stabilization times so that only one pump speed and one read delay are to be dealt with, at least at first. On rare occasions, a fast flush option may be used.
- 7 In the ICP software, incrementally adjust the read delay. Usually, a significant amount of time can be cut from this parameter, perhaps a quarter at first. After this, make fine adjustments to delay timing and or pump speed, making sure to have the spray chamber wet with sample on the front side of integration for about 5-9 seconds.
- 8 On the back side of the analysis, make sure that the loop has not been depleted of sample before the integration is complete. It is important to use the worst case sample for this purpose. Some OEM software platforms perform preshots and then adjust integration times depending upon the information that is obtained during this process.

For some OEM instruments, the lowest concentrated samples take the most time, but for others, the most highly concentrated ones, and some use user-specified integration times no matter what the concentration.

- 9 After the instrumentation is set up as described, look to the RSD's to make fine adjustments. One second of read delay or a very slight change in pump speed can yield major differences in precision.
- 10 Finally, adjust the configuration parameters of probe rinse and refill. Make sure that the overall ASXPRESS PLUS macro time is less than the instrument's analysis time. If this condition is not met, samples will be skipped and the system will appear to not function correctly.

How to Install Nuts and Ferrules

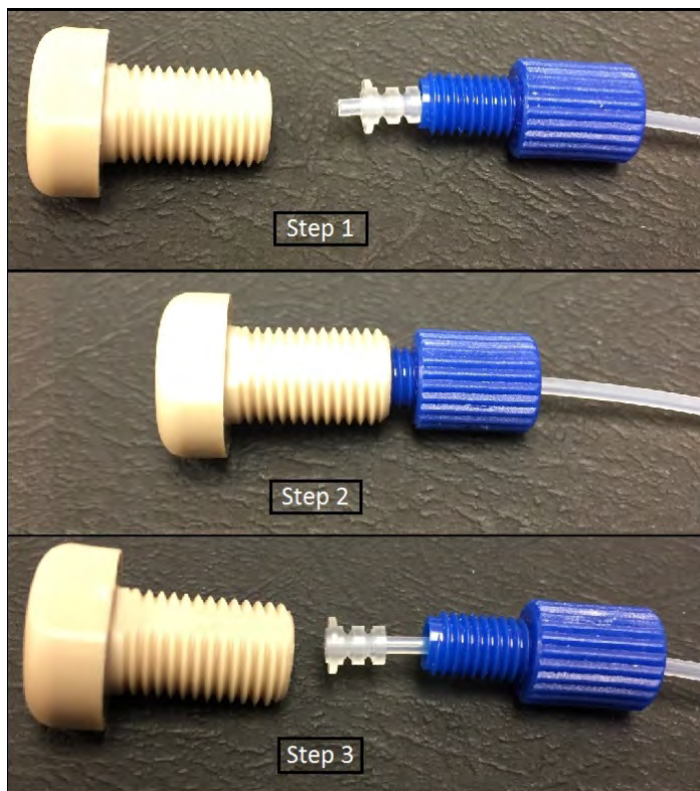
The ASXpress Plus 6-port valve accepts ¼-28 flangeless fitting nuts with a collapsible ferrule.

To install a nut and ferrule combination, ensure that the connecting 1/16 inch OD tubing is cut with a flat end.

- 1 Thread the 1/16" OD tubing through the nut first and then the ferrule. Set the ferrule so that the tubing sticks out ¼ to ½ an inch.
- 2 Insert the combination nut/ferrule into the nut and ferrule position placement fitting. Maintain slight pressure on the tubing as you tighten down the nut.
- 3 Give the tubing a slight tug to ensure that it is snugly connected. Remove from the placement fitting and verify that the tubing is flush with the end of the ferrule.

Note the positioning of the ferrule and the length of extra tubing. The end of the tubing should be flush with the end of the ferrule.

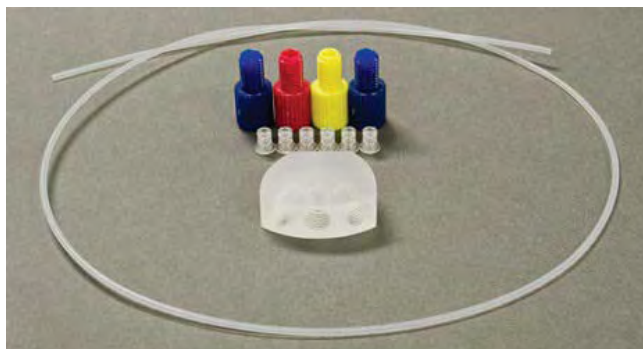
These fittings should only be finger tight—do not use tools as overtightening can damage the fittings and the valve.



Installing the Optional Internal Standard Addition Mixing Tee

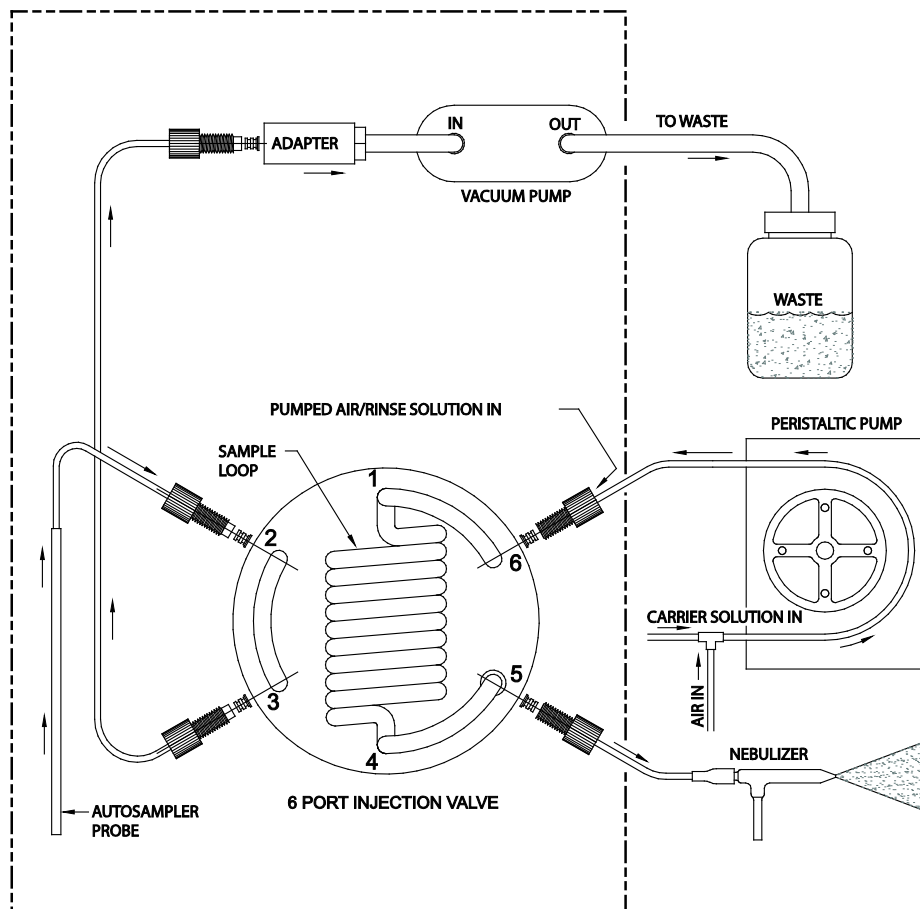
The optional internal standard addition tee provides a practical and consistent way to mix each sample with an internal standard. This technique is commonly used to correct for a variable matrix or plasma related effects.

The installation kit comes with additional tubing of three different inside diameters. It is recommended to use the same size for the internal standard line and the line connecting to the valve and to use the next larger size for the connection to the nebulizer.



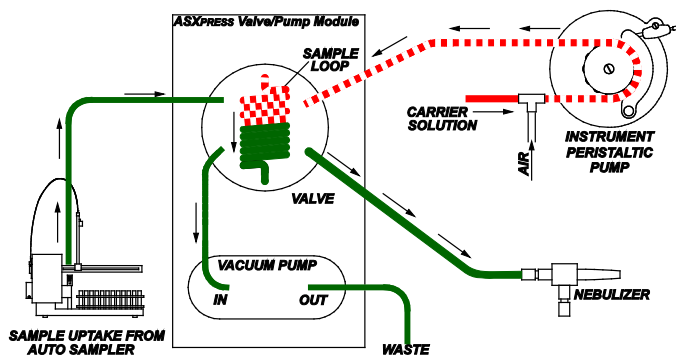
- 1** Position the tee between the nebulizer and the valve so as to provide the shortest path length without causing kinks or strain in the tubing. The tee can hang freely on the tubing; it does not need to be mounted. Once positioned, cut the tubing down as much as possible.
- 2** Attach the yellow fitting to the PFA tubing and then connect it to one of the outside ports of the internal standard mixing tee. Insert the other end of the tubing to a peri-pump tubing output on the instrument's peristaltic pump. It may help to cut this end at an angle. Insert another length of PFA tubing in to the input side of the peristaltic pump tubing and place the other end in the internal standard solution reservoir.
- 3** Attach a blue fitting to the same ID PFA tubing as used for the IS line. Connect this fitting to the other outside port of the internal standard mixing tee and connect the other end of the tubing to port #5 of the valve via another blue fitting.
- 4** Attach the red fitting to a larger ID PFA tubing and connect to the center port of the internal standard mixing tee. Connect the other end to the ICP nebulizer.

Valve/Pump Module Liquid Flow Connections

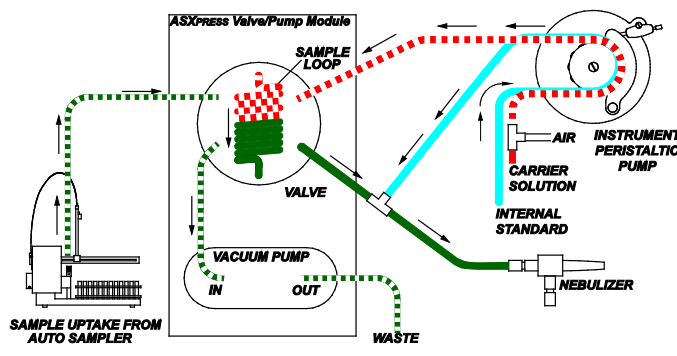


ASXPRESS PLUS 6-Port Valve Liquid Flow Connections

(6-port valve shown in the inject position)



ASXPRESS PLUS Flow Diagram with Passive Bubbling Tee

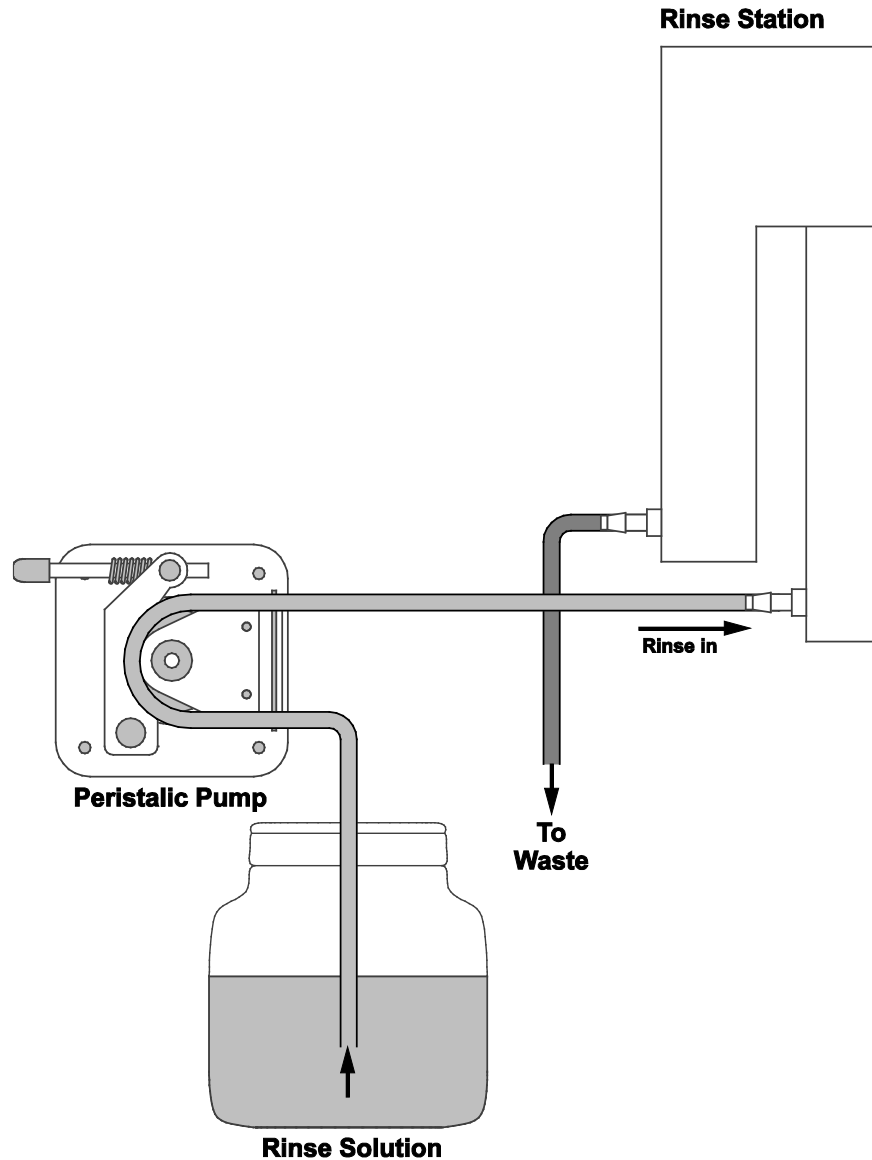


ASXPRESS PLUS Flow Diagram with Internal Standard and Passive Bubbling Tee

It is also possible to actively add bubbles to the carrier solution by using an additional channel of the instrument peristaltic pump. To do this, insert a tee in the carrier solution tubing after the pump.

Autosampler Rinse Station Liquid Flow Connections

Commonly used, general connections are shown. Refer to the ASXPRESS PLUS Operator's Manual or contact Teledyne CETAC for configurations for other autosamplers or for specific applications.



Typical rinse connections for an ASX-280/ASX-560/Oils 7400/Oils 7600 autosampler with gravity drain.

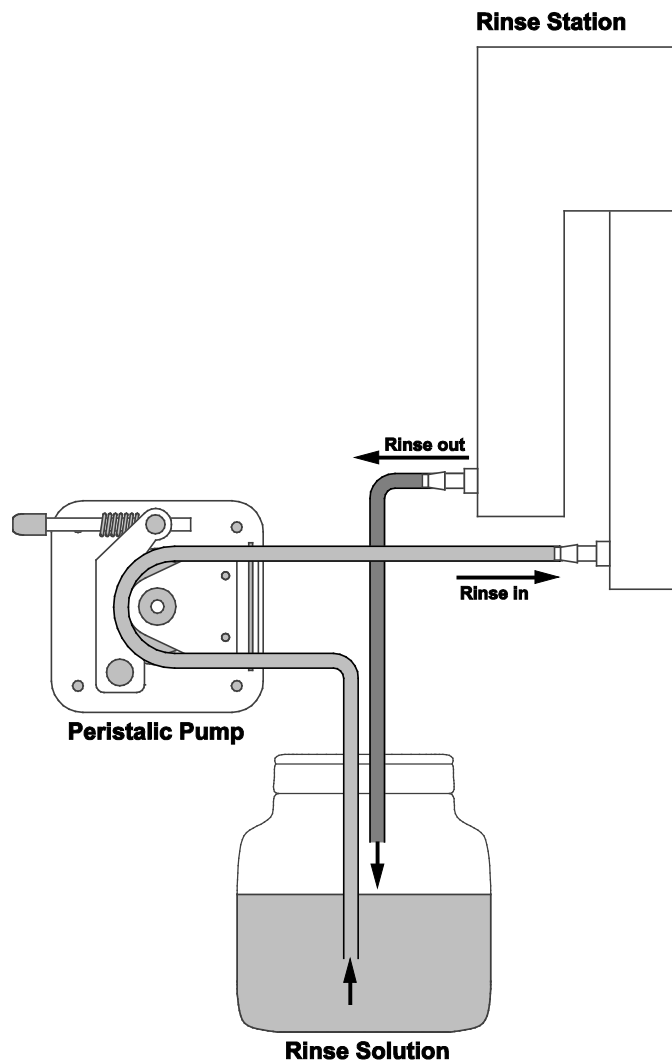
For applications which require that the rinse solution be completely uncontaminated, use separate containers for the clean and waste rinse solution. This configuration uses a gravity drain for the rinse station.

The XLR-8₆₀ requires a pumped drain as described in the XLR-8₆₀ Operator's Manual.

For better performance, you may need to increase the rinse solution flow rate using one of these methods:

- Use an external pump (Teledyne CETAC part SP6605)
- Increase the pump speed
- Use both pump channels (by placing a tee before and after the pump)

Autosampler Rinse Station Liquid Flow Connections (continued)



Typical rinse connections for an ASX-280/ASX-560/Oils 7400/Oils 7600 autosampler with gravity drain (recycled rinse solution).

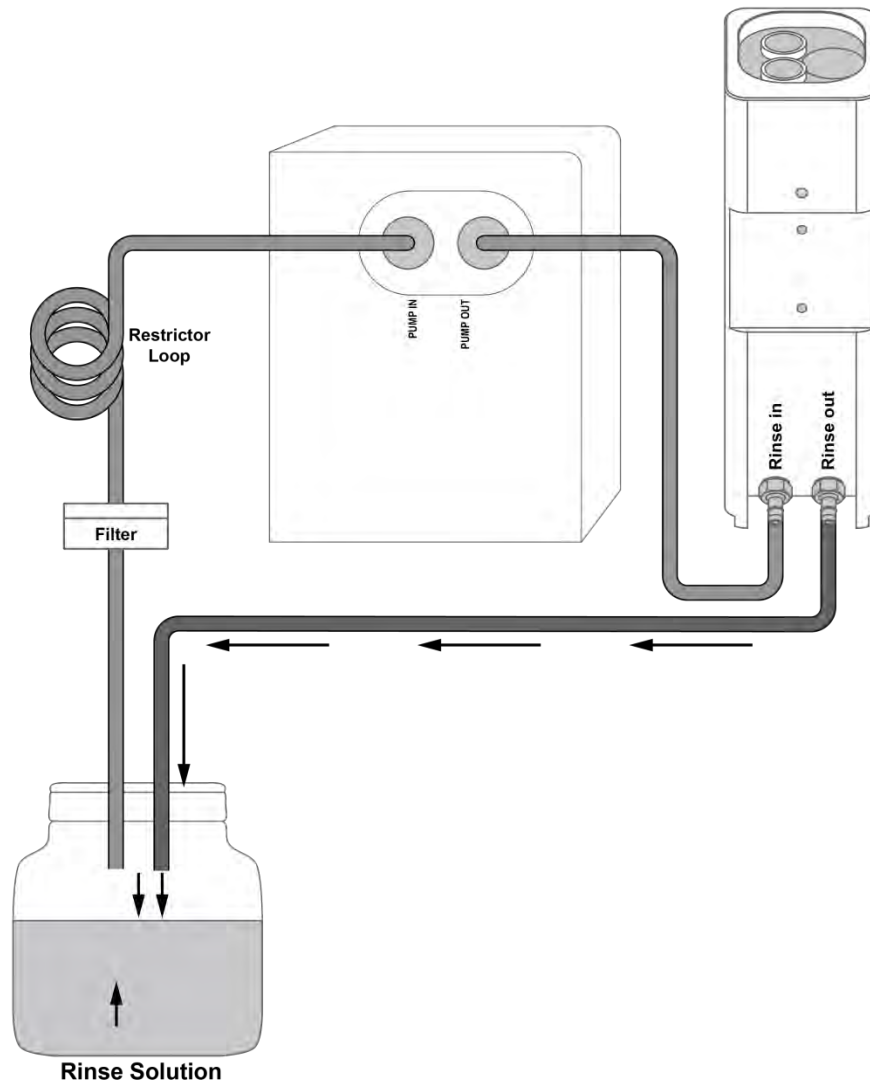
For many applications, the rinse solution may be recycled as shown here; replace the rinse solution on a schedule appropriate for the application. This configuration uses a gravity drain for the rinse station.

The XLR-8₆₀ requires a pumped drain as described in the *XLR-8₆₀ Operator's Manual*.

For better performance, you may need to increase the rinse solution flow rate using one of these methods:

- Use an external pump (Teledyne CETAC part SP6605)
- Increase the pump speed
- Use both pump channels (by placing a tee before and after the pump)

Autosampler Rinse Station Liquid Flow Connections (continued)



Typical rinse connections for an ASX-1400/1600 autosampler with diaphragm pump and gravity drain.

This is the recommended configuration for ASX-1400/1600 autosamplers. This configuration recycles the rinse solution, and uses a gravity drain for the rinse station. The diaphragm pump is powered by the ASXPRESS PLUS electronics module. A loop in the rinse uptake tubing serves as a flow restrictor to ensure that the rinse station does not overflow.

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