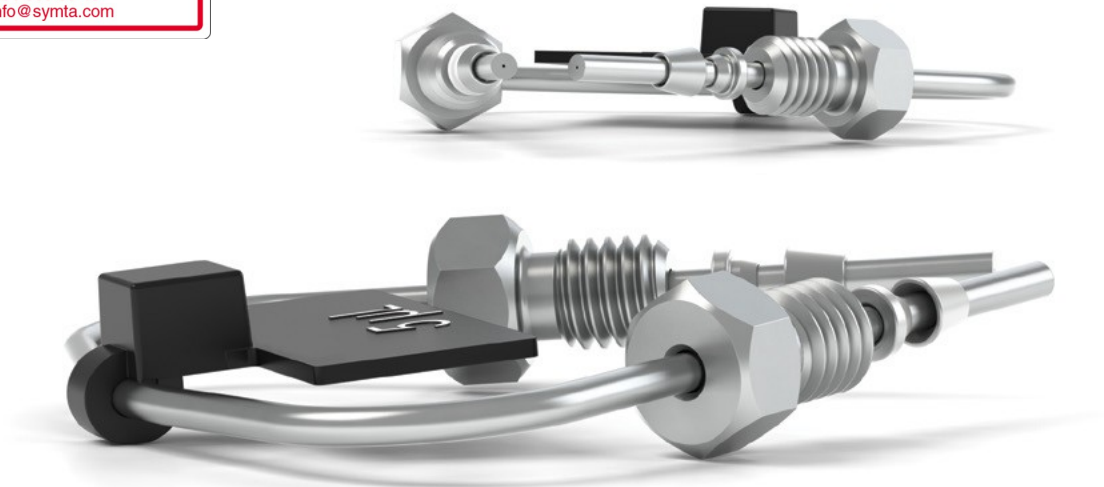


Previously known as UPCHURCH



## VALVE ACCESSORIES

Our valve accessories include a variety of products that work with and are specific to our valve mechanics. From Sample Loops, driver boards, or mounting brackets we offer a wide array of accessories to meet your system requirements. We also include tools that work specifically with our valves and valve components.

- 127** STAINLESS STEEL SAMPLE LOOPS
- 128** PEEK SAMPLE LOOPS
- 131** SUCTION NEEDLE ADAPTER
- 132** INJECTION PORT ADAPTERS
- 133** WRENCHES, BRACKETS, & REPLACEMENT FITTINGS



# Stainless Steel Sample Loops



## APPLICATION NOTE

### How to Properly Install Sample Loops: Stainless Steel

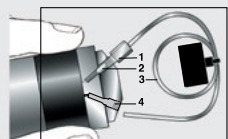
Stainless steel sample loops are supplied with fittings that are not swaged onto the tube. It is important that the loop be completely bottomed in the injector port before the ferrule is swaged onto the tube. The depth of the tubing holes may vary slightly from port to port and from valve to valve. A fitting made up in one port may leave a small cavity in another port. The cavity causes high dispersion and peak distortion such as fronting, tailing, or broadening. It is good practice to label loop ends so they will be replaced in the same, respective ports that were used in swaging the ferrules. Hint: swaging ferrules separately on each side, into each respective valve port makes loop installation easier.

These high quality stainless steel sample loops have burr-free, square-cut ends to ensure a flush connection to valve ports. The size designations of loops are nominal. The actual volumes can differ from the theoretical designations because the ID tolerance varies depending on the tubing tolerance of the metal tubing bore. Accuracy of large metal loops (1.0 mm, 0.040" bore) is about  $\pm 5\%$ , intermediate loops (0.5 mm, 0.020" bore)  $\pm 10\%$ , and small loops (0.2 mm, 0.007" bore)  $\pm 30\%$ .

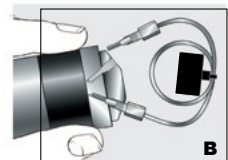
Since both standards and unknowns are usually analyzed using the same sample loop, knowledge of the actual, accurate volume is rarely needed. If the sample loop volume must be known, it is best to calibrate the loop in place on the valve so the flow passages in the valve are also taken into account. An alternative to calibration is to use a dual mode injector and partial-filling method of loading. See the "Sample Loop Loading" Application Note on page 131.

Model 7725 Injector loops are not interchangeable with loops for the model 7125. The port angle for the 7725 is 30° whereas the port angle for the 7125 is 20° requiring the loops to have a different shape. Model 8125 Micro-Scale Sample Injector requires special loops in the 5.0  $\mu\text{L}$  to 50  $\mu\text{L}$  range. The 8125 sample loops are made with 0.5 mm (0.020") OD tubing.

### To install the sample loop:



- Take one end of the loop and place the nut (1) and ferrule (2) onto the tubing (3) with the threaded portion of the nut and tapered portion of the ferrule toward the end. See Figure A.



- Insert the tubing into port (4). Confirm that the tubing is bottomed in the valve port as shown in Figure A.
- While firmly pressing down on the tubing, hand-tighten the nut as tight as possible.



- With the IDEX Wrench (page 51), designed especially for fittings, tighten one quarter turn past finger tight. Remove the loop to confirm the ferrule is swaged onto the tube.
- Repeat steps a-d with the other end of the loop while the swaged end remains outside the valve port. See Figure B.
- Reinstall each end of the loop to their respective ports. See Figure C.

Part No.	Volume	Tubing	Qty.
<b>STAINLESS STEEL LOOPS FOR 7125, 7010 INJECTION VALVES (DO NOT USE FOR 7725)</b>			
7020	5 $\mu\text{L}$ Sample Loop	0.18 mm (0.007") ID x 1/16" OD	ea.
7021	10 $\mu\text{L}$ Sample Loop	0.30 mm (0.012") ID x 1/16" OD	ea.
7022	20 $\mu\text{L}$ Sample Loop	0.51 mm (0.020") ID x 1/16" OD	ea.
7023	50 $\mu\text{L}$ Sample Loop	0.51 mm (0.020") ID x 1/16" OD	ea.
7024	100 $\mu\text{L}$ Sample Loop	0.51 mm (0.020") ID x 1/16" OD	ea.
7025	200 $\mu\text{L}$ Sample Loop	0.76 mm (0.030") ID x 1/16" OD	ea.
7026	500 $\mu\text{L}$ Sample Loop	0.76 mm (0.030") ID x 1/16" OD	ea.
7027	1.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	ea.
7028	2.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD	ea.
7029	5.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD	ea.
1876	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	ea.
<b>STAINLESS STEEL LOOPS FOR 3725-038, 3725I-038 INJECTION VALVES</b>			
3065-018	2.0 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	ea.
3065-019	5.0 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	ea.
3065-023	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	ea.
3065-025	20 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	ea.
<b>STAINLESS STEEL LOOPS FOR 7725, 7725I, PR/EV700-100, PR/EV703-100, MX MODUL INJECTION VALVES (DO NOT USE FOR 7125)</b>			
7755-020	5 $\mu\text{L}$ Sample Loop	0.18 mm (0.007") ID x 1/16" OD	ea.
7755-021	10 $\mu\text{L}$ Sample Loop	0.30 mm (0.012") ID x 1/16" OD	ea.
7755-022	20 $\mu\text{L}$ Sample Loop	0.30 mm (0.012") ID x 1/16" OD	ea.
7755-023	50 $\mu\text{L}$ Sample Loop	0.51 mm (0.020") ID x 1/16" OD	ea.
7755-024	100 $\mu\text{L}$ Sample Loop	0.51 mm (0.020") ID x 1/16" OD	ea.
7755-025	200 $\mu\text{L}$ Sample Loop	0.76 mm (0.030") ID x 1/16" OD	ea.
7755-026	500 $\mu\text{L}$ Sample Loop	0.76 mm (0.030") ID x 1/16" OD	ea.
7755-027	1.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	ea.
7755-028	2.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD	ea.
7755-029	5.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD	ea.
1876	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	ea.
<b>STAINLESS STEEL LOOPS FOR 8125 INJECTOR (USE 7755-024 TO 7755-029 FOR VOL)</b>			
8020	5 $\mu\text{L}$ Sample Loop	0.20 mm (0.008") ID x 0.020" OD	ea.
8021	10 $\mu\text{L}$ Sample Loop	0.20 mm (0.008") ID x 0.020" OD	ea.
8022	20 $\mu\text{L}$ Sample Loop	0.25 mm (0.010") ID x 0.020" OD	ea.
8023	50 $\mu\text{L}$ Sample Loop	0.30 mm (0.012") ID x 0.020" OD	ea.

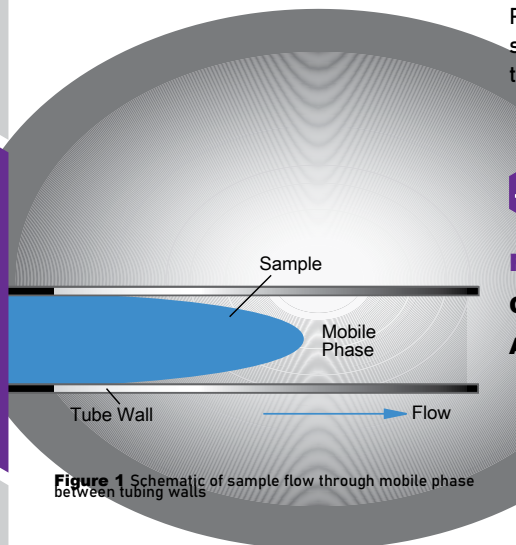


# PEEK Sample Loops

Flexible PEEK sample loops are alternatives to stainless steel loops. PEEK loop ends are provided with clean, straight cuts for easy valve installation.

PEEK polymer is inert to almost all organic solvents and is biocompatible, giving PEEK loops added versatility. Natural PEEK is used for these sample loops. Like metal loops, the size designations of PEEK loops are nominal. The actual volumes can differ from the theoretical designations because of the tolerance of the tubing bore. Accuracy of large PEEK loops (0.8 mm, 0.030" bore) is about  $\pm 14\%$ , intermediate loops (0.5 mm, 0.020")  $\pm 21\%$ , and small loops (0.2 mm, 0.007")  $\pm 65\%$ .

PEEK loops are also supplied with unwaged RheFlo fittings but do not require the same swaging precaution. The fittings can reposition along the loop tubing when the fitting is reinserted in the ports for correct loop installation.



**Figure 1** Schematic of sample flow through mobile phase between tubing walls



## APPLICATION NOTE

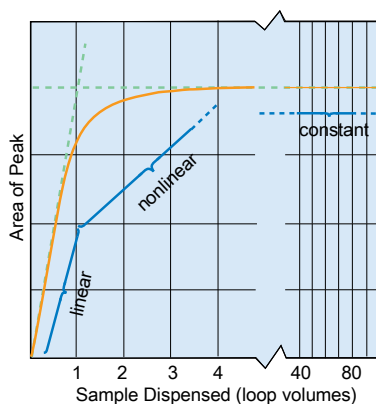
### Fluidic Movement in Tubes

**Q:** "Why can I load only up to half of the volume of the loop in partial-filling method?"

**A:** Sample occupies 2  $\mu\text{L}$  of loop for every 1  $\mu\text{L}$  loaded from the syringe. For example, 10  $\mu\text{L}$  of sample spreads out over the entire length of a 20  $\mu\text{L}$  loop. Any additional sample loaded will overflow the end of the loop and exit out to waste. Reproducibility is poor because the volume of sample in the loop is different from the known volume originally loaded by your syringe.

Fluid spreads in a parabolic shape through a tube instead of moving in one plug because the velocity is different at the center of the tube than at the walls. The velocity at the center of the tube is twice the average velocity, and near the wall the velocity is almost zero, creating a parabolic shape. This fluidic movement is called laminar flow. See Figure 1.

In dual mode injection valves (see "Sample Loop Loading" Application Note on page 131) the sample from the syringe needle loads directly into the sample loop. The sample volume is known since there is no sample waste. The laminar flow phenomenon accounts for the shape of the plot as shown in Figure 2. Note that the plot has three regions:



**Figure 2** Sample mass (observed peak area) vs. volume of sample dispensed from the syringe, in units of loop volumes, injected onto the column from our dual mode injector such as model 7725

- 1 Partial-Filling Region.** When the volume dispensed is less than half the loop volume, the curve is linear. Sample has not reached the end of the loop. Within this region, performance depends on the syringe and operator.
- 2 Nonlinear Region.** When the volume dispensed is between half the loop volume and about two loop volumes, the curve is nonlinear. Sample is lost from the loop, so reproducibility is poor. If you dispense a volume equal to the loop size, you are in this region of poor performance.
- 3 Complete-Filling Region.** When the volume of sample dispensed is several loop volumes, the loop contains only pure sample, undiluted by residual mobile phase. Within this region, reproducibility is highest.

In the single mode injection valves the sample must pass through a connecting passage before it reaches the sample loop. Since some of the sample dispensed from the syringe remains in the connecting passageway, an unknown amount enters the sample loop. Therefore, single mode injection valves achieve high reproducibility only by using the complete-filling method.



## APPLICATION NOTE

### PEEK Physical Strength Characteristics

Although PEEK material is compatible with virtually all solvents, there are many factors that affect burst pressure of PEEK tubing. Factors such as increases in inner diameter, temperature, exposure time, and concentration of organic solvents affect the degradation of PEEK. Other solvents such as THF, methylene chloride and DMSO cause PEEK tubing to swell while concentrated nitric acid and sulfuric acid weaken the tubing.



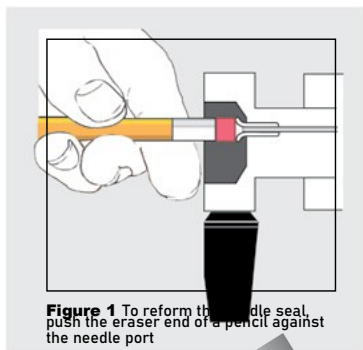
## APPLICATION NOTE

### How to Find and Fix Common Sample Injector Leaks

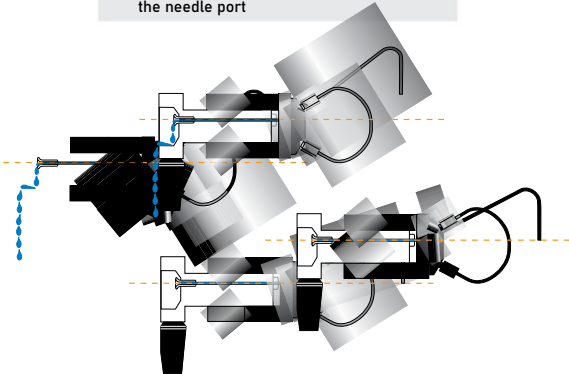
Leaks cause valuable sample loss. Nobody wants that. The key to the valve holding pressure is the integrity of the sealing surfaces. If there is a scratch on the sealing surface, or the needle seal in the rotor seal is damaged, a leak may appear. It is also important to realize what appears to be a leak can instead be a result of siphoning. The following are the three most common situations in which fluid leaks occur.

- 1 If fluid leaks out of the needle port only while loading the loop (i.e., while pushing down the plunger of the syringe), the problem is most likely that the needle seal or the needle port fitting in the loop filler port is not gripping the syringe needle tightly enough. Tighten the needle seal grip by pushing with the eraser end of a pencil on the needle port (See Figure 1). The tightening reduces the hole diameter of the needle seal and port fitting.
- 2 If fluid leaks continuously from the needle port or vent lines and/or from the stator-to-stator ring interface, replace the rotor seal and/or stator face assembly. Scratches on the rotor seal or cracks in the stator face assembly allow mobile phase to escape and cause cross port leakage. Genuine IDEX Health & Science RheoPumps are listed on page 124.
- 3 If fluid leaks from the needle port and/or vent lines but eventually stops, the cause is most likely siphoning and not a leak. Siphoning occurs if the vent lines are lower or higher than the needle port. Adjust the vent line(s) so that the outlet is at the same horizontal level as the needle port to prevent siphoning. (See Figure 2).

For other leakage or injection troubleshooting, refer to our Troubleshooting Guide for HPLC Injection Problems. You may download the Guide from our web site: [www.idex-hs.com](http://www.idex-hs.com) under Education & Tools.



**Figure 1** To reform the needle seal, push the eraser end of a pencil against the needle port

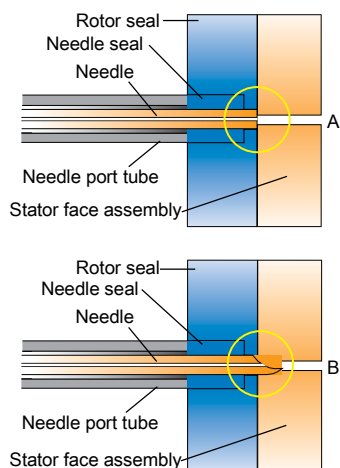


**Figure 2** Needle port level compared to the level of vent line outlet:

- (A) siphoning occurs when the vent line outlet is above the needle port level  
 (B) siphoning does not occur if the vent line outlet is the same horizontal level as the needle port

# PEEK Sample Loops (Cont.)

## APPLICATION NOTE



**Figure 1** A square cut needle: (A) stops against the stator face assembly; The tip of a pointed needle (B) slips into the stator face and the tip breaks off as the valve rotates

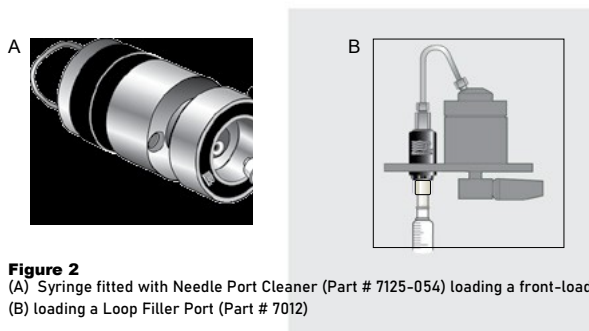
### Using Proper Syringe Needles

With front-loading injection valves it is important to use the correct needle when loading the sample loop. An incorrect needle will damage the valve and can cause poor reproducibility. When the needle is too short the tip will not reach the needle seal. When the needle is too small in diameter the seal will not grip tightly enough. Needles with a beveled tip can damage the rotor seal and stator face assembly (see Figure 1). The needle should be #22 gauge (0.028"–0.0285"/ 0.72 mm), and 90° point style (square cut end). Model 3725i requires a #16 gauge (0.0645"–0.0655"/ 1.65 mm) needle. Never use a beveled, pointed, or tapered needle.

Needle specifications are not critical when using a Loop Filler Port to load the sample loop. However, it is important to tighten the needle port fitting around the needle if using a syringe needle with a slightly smaller diameter than 0.7 mm (0.028").

If the loading method used is complete-filling, a syringe without a needle can be used. A syringe fitted with a Needle Port Cleaner can be used with a front-loading valve (Figure 2A) or with a Loop Filler Port (Figure 2B).

Needle port accessories are listed on page 132.



**Figure 2** (A) Syringe fitted with Needle Port Cleaner (Part # 7125-054) loading a front-loading valve (model 7725); (B) loading a Loop Filler Port (Part # 7012)

## PEEK Sample Loops

Part No.	Volume	Tubing	Valco No.	Qty.
<b>PEEK LOOPS FOR 3725, 3725I INJECTION VALVES</b>				
3055-018	2.0 mL Sample Loop	1.6 mm (0.062") ID x 1/8" OD	N/A	ea.
3055-019	5.0 mL Sample Loop	1.6 mm (0.062") ID x 1/8" OD	N/A	ea.
3055-023	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	N/A	ea.
3055-025	20 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	N/A	ea.
<b>PEEK LOOPS FOR 9725, 9010, PR/EV750-100, PR/EV753-100 INJECTION VALVES</b>				
Part No.	Volume	Bore / Tubing	Valco No.	
9055-020	5.0 µL Sample Loop	0.18 mm (0.007") ID x 1/16" OD	SL5CWPK	ea.
9055-021	10 µL Sample Loop	0.25 mm (0.010") ID x 1/16" OD	SL10WPK	ea.
9055-022	20 µL Sample Loop	0.25 mm (0.010") ID x 1/16" OD	SL20WPK	ea.
9055-023	50 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	SL50WPK	ea.
9055-024	100 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	SL100WPK	ea.
9055-025	200 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	N/A	ea.
9055-026	500 µL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL500WPK	ea.
9055-027	1.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL1KCWPK	ea.
9055-028	2.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL2KCWPK	ea.
9055-029	5.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	N/A	ea.
9055-033	10 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	N/A	ea.
<b>PEEK LOOPS FOR 7725, 7725I, PR/EV700-100</b>				
7123-227	1 µL Sample Loop (models PR/EV700-100 and EV750-100 only)	Internal groove	N/A	ea.
7755-015	2 µL Sample Loop (models 7725, 7725i, and 9725(i) only)	Internal groove	N/A	ea.
<b>REPLACEMENT RHEFLX FITTINGS FOR PEEK LOOPS</b>				
6000-078	Nut/Ferrule Set, Natural PEEK, 5/16-24, for 1/8" OD loops			ea.
6000-079	Ferrules, Natural PEEK, for 1/8" OD loops			5-pk
6000-251	Ferrules, Natural PEEK, for 1/16" OD loops			10-pk
6000-254	Nut/Ferrule Sets, Natural PEEK, 10-32, for 1/16" OD loops			10-pk



# Suction Needle Adapter

Our adaptable Loop Filler Ports (Part #7012 and 9012) are used to load sample from syringe needles or luer tips. The Needle Port (Part #9013) conserves sample by minimizing the volume between the needle and the valve.

9125-076



7012

9013

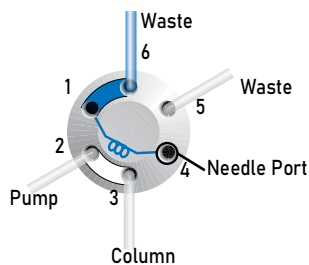
9012

7125-054

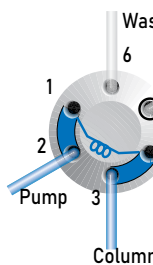


## APPLICATION NOTE

### Flow path for the typical dual mode injector **Dual Mode Sample Loop Loading: Partial-Filling vs. Complete-Filling**



**LOAD**



**INJECT**

#### Partial-Filling

Use the partial-filling method if you need to conserve sample, or if you want to vary sample volume frequently.

In partial-filling, the syringe sets the volume injected onto the column. There is no sample waste, and the volume injected onto the column is equal to that dispensed from the syringe. Reproducibility is 1.0% relative standard deviation (RSD). The volume of the sample loaded is limited to half the sample loop volume. For example, the most you can load into a 200  $\mu\text{L}$  sample loop is 100  $\mu\text{L}$ .

#### Complete-Filling

Use the complete-filling method if you have plenty of sample, if you do not vary sample volume, or if you need high reproducibility.

In complete-filling, the loop sets the volume loaded onto the column. Use excess sample (two to five loop volumes) to replace all the mobile phase in the loop. See Figure 2. Change the loop to vary the sample volume. Reproducibility is typically 0.1% RSD for loop sizes  $\geq 5 \mu\text{L}$ . Accuracy is limited as loop volumes are nominal.

**Q:** "Which method should I use and which IDEX Health & Science sample injection valves use this method?"

**A:** There are two types of injection valves available: dual mode and single mode. Dual mode injection valves allow both partial- and complete-filling whereas single mode injection valves allow only complete-filling. See manual injection valves, page 123.

If you are collecting experimental data, sample is scarce, and/or you want to use different sample volumes, a dual mode injector with a large volume sample loop is appropriate. Only dual mode injection valves allow the partial-filling method for easily varying your volumes (up to half your sample loop volume) by setting the syringe volume. Once you begin routine analysis, and/or you have an abundance of sample, either a dual mode or single mode injector is appropriate. Both types of injection valves allow the complete-filling method in which you overfill the sample loop. Complete-filling maximizes the reproducibility of your results.

Part No.	Description	Qty.
<b>SUCTION NEEDLE ADAPTER &amp; ACCESSORIES</b>		
7012	Stainless Steel Loop Filler Port	ea.
7125-054	Needle Port Cleaner	ea.
9012	PEEK Loop Filler Port	ea.
9013	PEEK Needle Port	ea.
9125-076	Suction Needle Adapter (for Models 7725 and 9725)	ea.



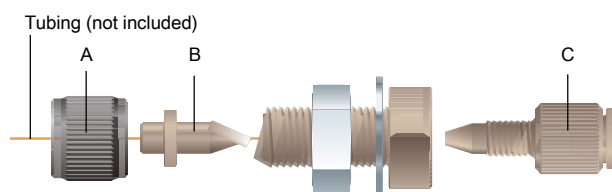
V-447

# Injection Port Adapters

- › For 360  $\mu$ m OD tubing
- › Mount on bracket or bulkhead

To introduce sample, connect 360  $\mu$ m OD capillary tubing to an Injection Port Adapter Assembly. This adapter accepts standard 22 gauge Hamilton-style injection syringe needles. No additional swept volume is added to the fluid pathway by this adapter, as the needle butts directly against the connecting tubing during injections. The adapter can be bulkhead mounted or mounted with the V-447 Kits.

To introduce a sample directly into a 10-32 port, purchase a M-432-03 separately.



**M-432**  
Micro Injection Port Adapter Assembly

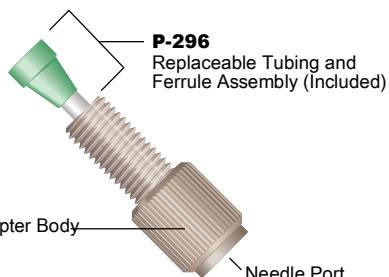


## RELATED PRODUCTS

	A	B	C
<b>FOR 360 <math>\mu</math>m OD TUBING</b>			
M-432 and V-447	P-416BLK	F-152	M-432-03

- › For use with Injection Valves on page 123.

This simple, biocompatible adapter is designed specifically for the Injection Valves on page 123 and can also convert any 1/4-28 flat-bottom port into a port that can accept a standard 22 gauge HPLC injection needle. This injection port adapter is adjustable, so you can create a snug fit around the needle to prevent any leaking of the analyte. In addition, this product features an internal stop that prevents you from inserting the needle too far, eliminating the possibility of damaging the valve with the needle tip.



**P-295**  
1/4-28 Flat-Bottom  
Injection Port Adapter

Adapter Body

Needle Port

**P-296**  
Replaceable Tubing and  
Ferrule Assembly (Included)

Part No.	Description	Qty.
<b>MICRO INJECTION PORT ADAPTER</b>		
<b>FOR 360 <math>\mu</math>m OD TUBING</b>		
F-152	Replacement MicroFerrule for M-432, Natural PEEK	ea.
M-432	Micro Injection Port Adapter Assembly	ea.
M-432-03	Replacement Tubing/Fitting Assembly for M-432 & M-433	ea.
P-416BLK	Replacement Female Nut for M-432, Black PEEK	ea.
V-447	Micro Injection Port Adapter Assembly Actuator Mounting Kit Includes (1) M-432 with mini-actuator bracket and (2) mounting screws	ea.
<b>1/4-28 FLAT-BOTTOM INJECTION PORT ADAPTER</b>		
P-295	Adjustable Injection Port Adapter	ea.
P-296	Replacement Tubing/Ferrule Assembly	ea.

# Wrenches, Brackets & Replacement Fittings



6810

## Valve Wrenches

- › For convenient wrench-tightening of fittings on high pressure rotary shear valves
- › For removal of knobs on Manual Valves

The smartly designed IDEX Wrench is a double-ended slotted socket wrench that fits over 1/16" and 1/8" OD tubing. It easily loosens and tightens 1/4" and 5/16" hex head stainless steel or PEEK fittings. The "Z" shape of the IDEX Wrench provides ideal leverage for changing sample loops and fittings, and keeps one end from restricting the use of the other.

The V-103 is an Allen (hex-key) wrench designed to remove the knob from our V-101 valves (page 123). The V-104 is an Allen wrench that can be used to remove the knob from our Medium Pressure Selection and Injection Valves (also found on page 123).



7160-010

7160

7160-029



## Mounting Brackets

Our mounting brackets and panels of different shapes and sizes organize and provide a sturdy support for IDEX Health & Science valves. The Ring Stand Mounting Bracket now allows the valves to mount onto common laboratory equipment.

## MXX Replacement Fittings

Use these replacement Ferrules and O-rings for 1/8" and 1/16" tubing with the MXX Series II valves shown on page 119. Please see the part number chart below for a list of individual part numbers.

Part No.	Description	Qty.
<b>VALVE WRENCHES</b>		
6810	IDEX Wrench	ea.
<b>MOUNTING BRACKET ACCESSORIES</b>		
7160	Mounting Panel	ea.
7160-010	Valve Angle Bracket	ea.
7160-029	Ring Stand Mounting Bracket	ea.
<b>VALVE BRACKET</b>		
M-615-1	Mounting Bracket for IDEX Health & Science Switching Valves	ea.
M-615-2	Mounting Bracket for IDEX Health & Science Injection and Selection Valves	ea.
<b>REPLACEMENT FITTINGS</b>		
7770-039	Ferrules for 1/8" OD Tubing	25-pk
7770-040	Ferrules for 1/8" Tubing	50-pk
7770-041	Ferrules for 1/8" Tubing	100-pk
7770-044	Ferrules for 1/16" OD Tubing	25-pk
7770-046	Ferrules for 1/16" Tubing	100-pk
7770-124	O-rings for 1/16" OD Tubing	25-pk