

# Standard Pumps Selecting Syringes

## Syringe Types

### Diluent Syringe (For use with pumps with valves - BPV & APV models)

Designed for use with the TriContinent valve, the polycarbonate valve has luer fittings, one male and one female. One fitting is positioned upward and is typically used for liquid output for ease of priming.

### Dual Port Syringe (For use with pumps without valves - BP & AP models)

Designed for use as the sampling syringe on a dual-syringe diluter set-up. The adapter is a “T” with the output positioned upward, for priming consideration. This syringe utilizes male luer fittings.

### Single Port Syringe (For use with pumps without valves - BP & AP models)

This syringe has a single 1/4-28 female port positioned at the top of the adapter. It is ideal for use with external, customer provided valves. It is also ideal for air displacement applications.

## How to Select the Correct Syringe Size

Syringe size is necessarily a compromise between being small enough to provide high accuracy and large enough to deliver the fluid at a suitable rate. Choosing a large syringe to deliver very small volumes is not recommended if accuracy and precision are important to the application. However, smaller syringes do not provide the throughput or liquid dynamics of a larger syringe.

Selecting the correct syringe for any particular application is largely a matter of experimentation, however, there is one rule of thumb that should never be ignored. ***Use the largest syringe capable of giving acceptable results with your smallest desired volume.*** Use the chart on [page 2](#) to select a syringe as a starting point for testing.

All too often, instrument developers assume that a smaller syringe will always provide better performance due to improved resolution. This completely ignores the real world of liquid-handling. Adequate priming, speed and liquid shear are just as important as syringe resolution, if not more so.

Please remember also, the results you achieve are products of the entire liquid-handling system, not just the pump/syringe combination. Probe design and pump movement protocol play as significant a role in overall system performance as a syringe size. Improperly designed tubing paths or connectors are common causes of system failure.

If the rest of your system is designed properly, syringe selection is a simple matter of sample size vs. throughput/flowrate.

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## Syringe Selection Chart

Syringe Size					Available Syringe Type		Recommendations	
	Stroke	Resolution 1 step =	Length	Diluent	Single Port Sample	Dual Port Sample	Minimum Sample*	Maximum Flowrate*
50µL	Short	.05µL	.656 (16.7mm)	No	NO	YES	1µL	35µL/second
250µL	Short	.25µL	.656 (16.7mm)	No	YES	YES	5µL	175µL/second
500µL	Short	.50µL	.656 (16.7mm)	YES	YES	NO	10µL	350µL/second
2mL	Long	1.0µL	1.312 (33.3mm)	YES	YES	NO	20µL	600µL/second
5mL	Long	2.5µL	1.312 (33.3mm)	YES	YES	NO	35µL	1mL/second
10mL	Long	5.0µL	1.312 (33.3mm)	YES	YES	NO	50µL	1.5mL/second

\*Accuracy and precision will depend on system configuration and integrity.

\*\*Tubing size and probe diameter can substantially reduce these flowrates, if restricted.