

# LabSmith Application Note

## How to Make Leak-Free, Zero Dead-Volume Microfluidic Connections

This application note describes how to make reliable, tight connections using LabSmith's CapTite™ microfluidic connectors.

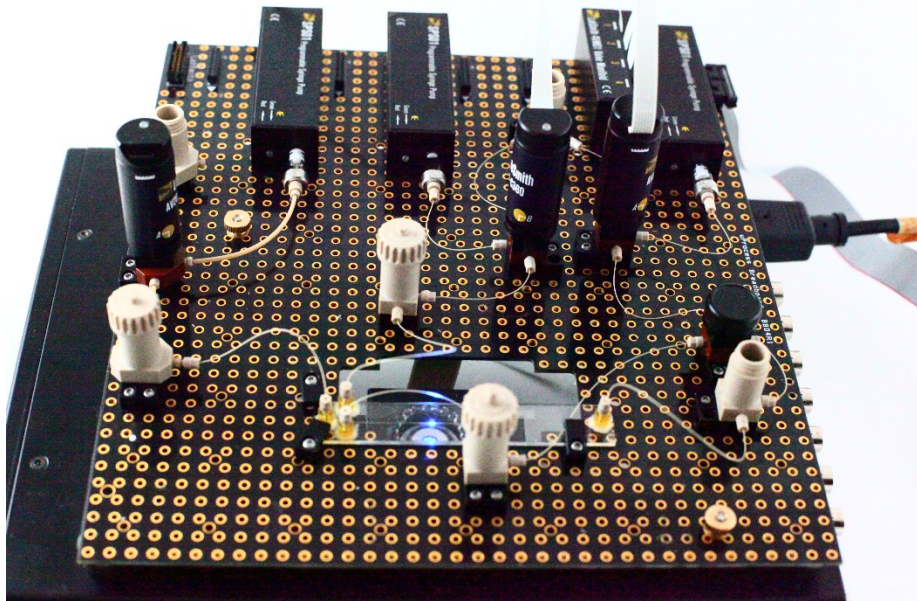
### INTRODUCTION

CapTite™ fluid routing components provide leak-free connectivity, even at high pressures, for fluid circuits with 360µm capillary, 1/32" and 1/16" tubing. CapTite components are designed for low dead volumes and easy cleaning, enabling long life over multiple runs. With one-piece CapTite fittings, combined with CapTite interconnects and uProcess™ automated valves, pumps and sensors, you can quickly build, and rebuild, both simple and complex microfluidics circuits.

Follow the guidelines and procedures below to ensure leak-free connections, so you can focus on your research.

### FOCUS ON LAYOUT

A good microfluidic circuit layout minimizes the volume of fluid in the circuit and places minimal stress on the tubing and connections. We recommend that you first lay out the components without fastening them down or making any fluid connections. Where possible, plan to use jogs or bends in the tubing between breadboard-mounted components so that tubing lengths do not need to be as precise. Use spacers with the interconnects to help keep the tubing level throughout circuit.



Once you have determined a good layout, use the T7 Torx driver and the screws included with your components to mount the components to the breadboard. Using the correct screws will minimize the chance of stripping the breadboard mounting holes. Avoid over-tightening the screws which can crack the components.

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### CUT CLEANLY

Now that the components are in place you can measure and cut all tubing to the correct lengths. Make all cuts as short as possible to avoid wasting fluids, but not so short as to place stress on the connections.

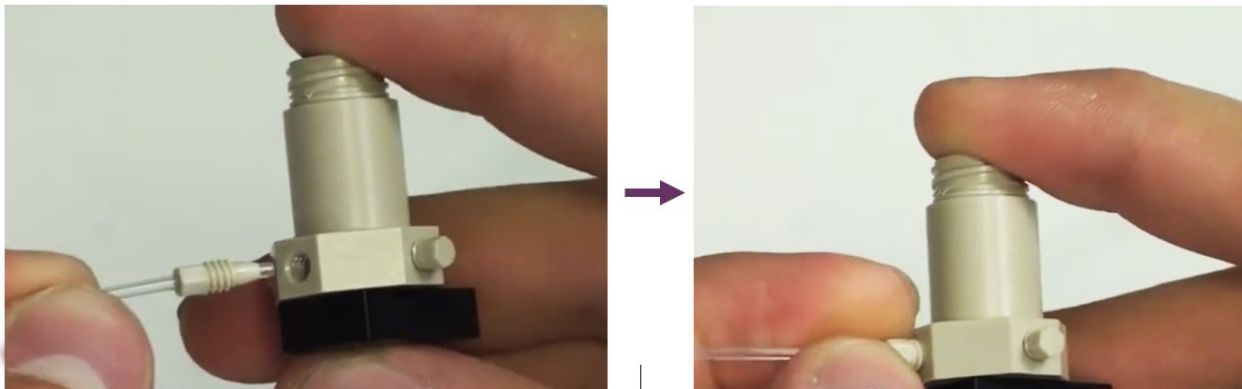
Clean cuts matter: for PEEK tubing use a blade or knife to make straight, right-angle cuts across the tubing. For fused-silica, use a cutting stone to score the tubing, then snap to break the tubing cleanly.

### MAKE THE CONNECTIONS

1. Insert the tubing into the CapTite one-piece fitting. The tubing should protrude through the end of the fitting as shown below.



2. Screw the fitting and tubing into the port in the component. This step is best done by pushing the tubing into the port with one hand and twisting the connector in with the other, finger-tight.



3. Typically, a finger-tight connection is sufficient. In some higher pressure circuits it may be necessary to tighten the fitting an additional 1/4 turn with the included hex wrench. You can also use the hex wrench to tighten connections in tight spaces between components.

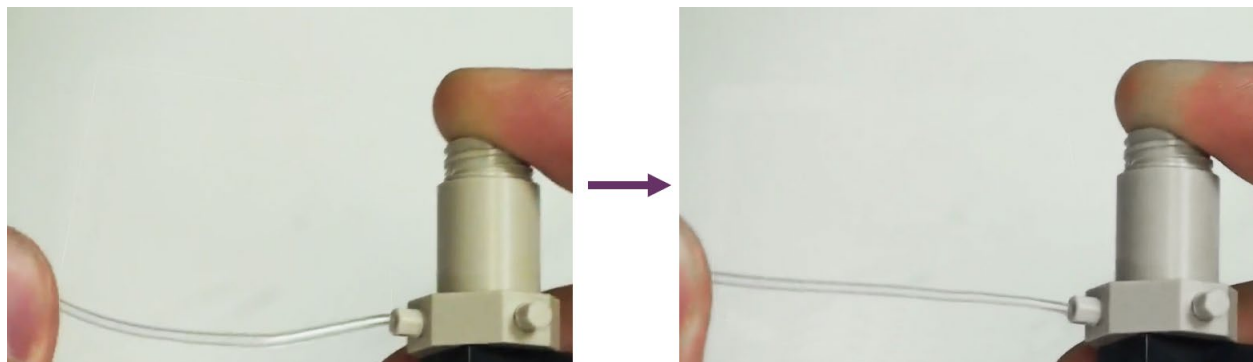
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**CAUTION:** Do not over-tighten the fitting, which will break the CapTite.

4. Gently tug on the tubing to verify that it is secure. If the tubing comes out of the CapTite, remove and repeat the steps above, making sure that the tubing extends past the end of the one-piece fitting as shown above.



5. You can test each connection by inserting a CapTite one-piece plug into the system outlet and pressurizing the circuit with a manual syringe. Use only air to pressurize, to avoid contaminating the circuit.

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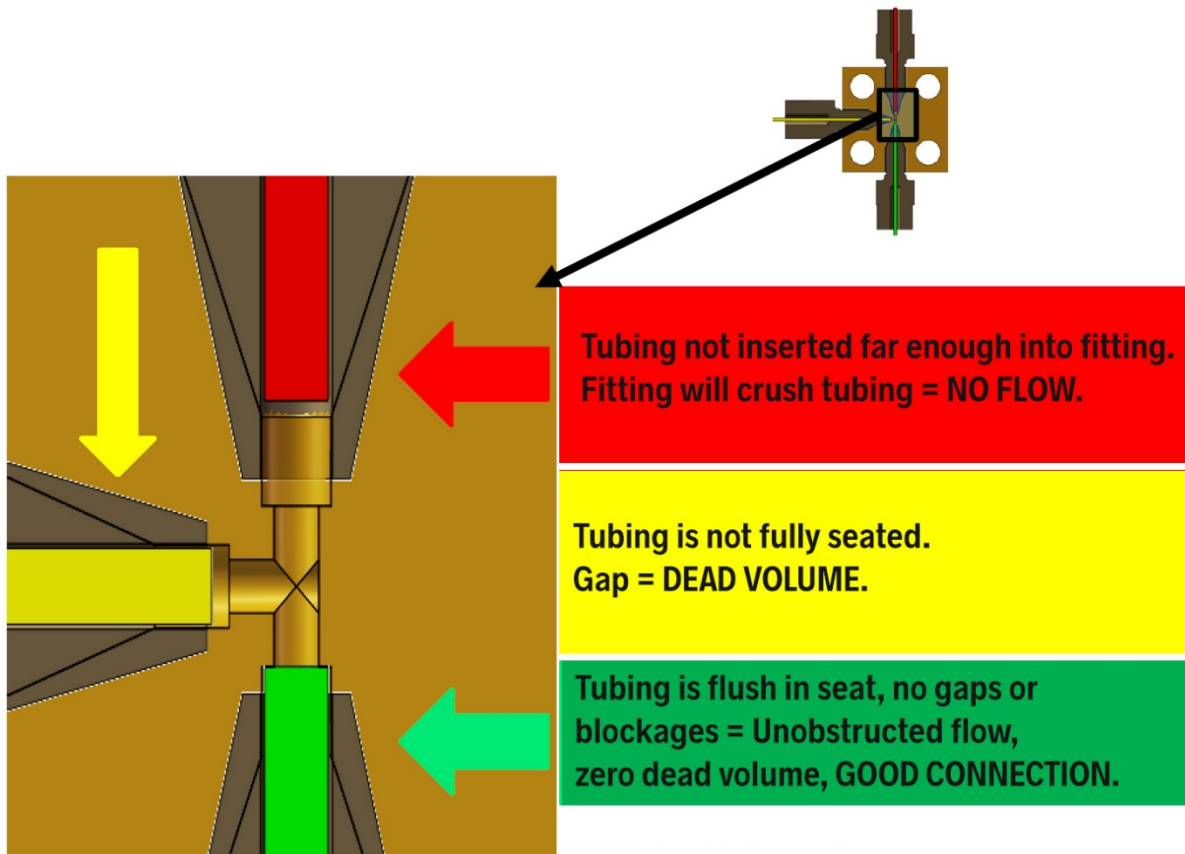
### TROUBLESHOOTING CONNECTIONS

The following diagram shows three potential conditions for a new connection.

In the upper connection, shown in red, the tubing has not been inserted far enough into the one-piece fitting. When you tighten the fitting, it will crush the end of the tubing and will block the flow.

In the yellow connection, the tubing has been inserted far enough to avoid crushing but not far enough to seat properly in the connector. Fluid will flow correctly, but the space left between the tubing and the seat will constitute dead volume and will waste fluid. If the space is significantly large this connection may also leak.

In the lower, green connection, the tubing is fully seated, resulting in an unobstructed, leak-free connection with zero dead volume.



For more information on making good fluid connections view our video: [LabSmith One-Piece Fitting Installation.](#)