

Using Standard-Coated PicoTips® with the Thermo Finnigan Dynamic Flow Nanospray Ionization Source

New Objective has introduced the ADPT-TNS Probe Modification Kit to enable the use of industry standard 5 cm coated PicoTips® emitters with your existing Thermo Finnigan LCQ™-series nanospray ionization source. Use of both standard- and distal-coated SilicaTips™ or TaperTips™ are supported by a MicroTight® union that fits easily into the source's probe assembly. This slight modification allows emitters of various lengths to be used in the source. The MicroTight union virtually eliminates dead volume disturbances to maintain chromatographic integrity by circumventing band broadening.

Contents of ADPT-TNS

The Probe Modification Kit contains:

- MicroTight® union, fittings, and sleeves
- New Objective's diamond cleaving tool
- Fused-silica tubing (50 µm ID, 2 m long)
- Conductive elastomer tubing

Coated PicoTips® are primarily used for continuous infusion at nanospray flow rates, for nanoscale flow injection, or for connection to conventional capillary LC columns at microspray flow rates. Figure 2 details the length specifications for the two types of coatings. Emitters with a coating on the "tip end," or standard coating (-CE- in the stock number), may be subject to arcing at higher applied voltages. Arcing can be difficult to avoid, so the use of distal-coated tips (-D- in the stock number) is generally recommended. The distal coating provides a junction-style contact and is immune to arcing.

The 20 µm ID distal-coated TaperTips™ are ideal for 100–200 µm ID capillary LC columns or for continuous infusion at microspray flow rates. TaperTips feature a clog-free design for extra ruggedness and serve as the recommended starting point. The featured 10 µm ID distal-coated SilicaTips™ are ideal for connection to 75 µm nanobore LC columns or for low flow rate continuous infusion.

Table 1 provides recommended flow rates for different standard tip IDs. Note that actual performance also depends on a variety of other experimental parameters, including applied voltage, mobile phase composition, and source design. Distal-coated SilicaTips (10 µm ID) and TaperTips (20 µm ID) have been selected for inclusion in this kit.

The adapter kit includes a zero dead volume union. Making proper connections within this union is essential to maintaining the best sensitivity.

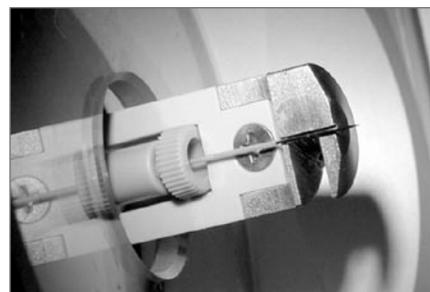


FIGURE 1 MicroTight® union holding a standard-length PicoTip® emitter

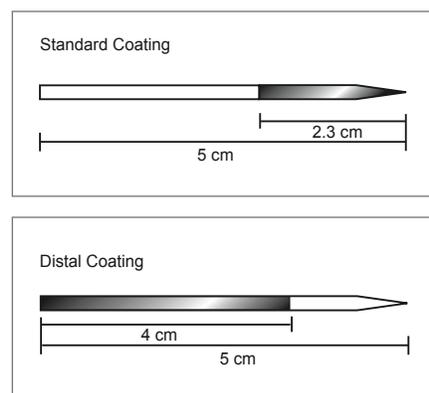


FIGURE 2 Standard PicoTip® specifications

Table 1

PicoTip® Style	Tubing Size (OD/ID)	Tip Size (µm)	Flow Rate* (nL/min)
TaperTip™	360/20	20	200–500
TaperTip™	360/75	75	300–2000
TaperTip™	360/100	100	400–3000
SilicaTip™	360/20	10	100–400
SilicaTip™	360/75	15	200–500
SilicaTip™	360/75	30	300–1000

*Typical range of ESI cone stability. Actual performance may vary.

Making a zero dead-volume connection

Remove the fittings from both ends of the MicroTight® union. Insert the white gauge plug into one side of the union and tighten until finger-tight, as shown in Figure 3A.

Thread the fused-silica transfer line tubing through a green PEEK™ MicroTight tubing sleeve.

Insert the sleeved tubing completely through one of the MicroTight fittings and carefully cleave the end. See Technical Note FS-1, available on our Web site, for instructions on cleaving fused silica.

Slide the assembled sleeved tubing and fitting into the open end of the union, as shown in Figure 3B. Press the tubing and sleeve firmly against the gauge plug to ensure they are both properly seated. Finger-tighten the fitting.

Remove the white gauge plug.

CAUTION: Coated tips should be handled with care, as mechanical abrasion can deteriorate the coatings. Wear ANSI-approved safety glasses for protection and use non-powder gloves and a pair of fine tweezers when handling the emitters and transfer lines.

Select another PEEK tubing sleeve and cut it to 15 mm. Remove a PicoTips® from its box and slide it through the cut sleeve, with the distal, non-tip end going first. Remove 15 mm from the distal end of the tip with the diamond cleaving tool (see Technical Note FS-1 for cleaving instructions) and repeat steps for connecting the emitter to the other side of the union. Figures 3C and 3D show the PicoTip before and after cleaving. Ensure that both tubing ends are firmly “butted” together within the union and that the fittings are sufficiently tight by gently pulling on the tubing. Check for leaks by running solvent through the tubing at the anticipated operating pressure. Leaks will be apparent if solvent collects at the exposed ends of the MicroTight sleeves. Figure 3E shows a fully assembled MicroTight union ready for installation.

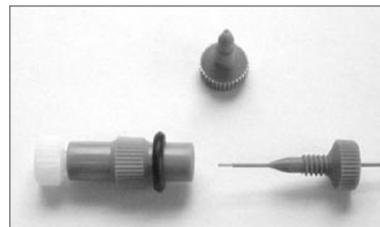


FIGURE 3A MicroTight® union with gauge plug in left side and assembled sleeved tubing with fitting on right

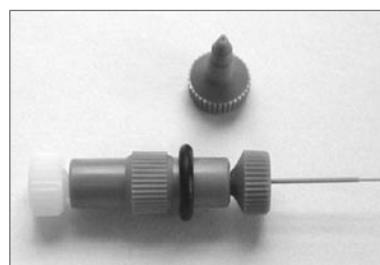


FIGURE 3B Union with assembled sleeve, tubing, and fitting

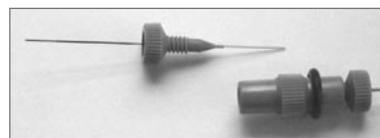


FIGURE 3C PicoTip® assembled with sleeve and fitting before cleaving...

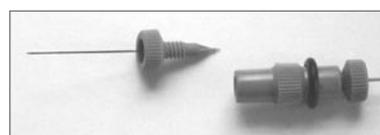


FIGURE 3D ...and after cleaving the distal end of the emitter

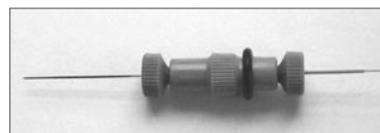


FIGURE 3E Fully assembled MicroTight® union, shown with the PicoTip® on the left

Installing the assembled union

To avoid electrical shock, put the LCQ™ in Standby mode in the Tune Plus window and remove the high-voltage leads from the nanospray (NSI) source. Loosen the two retaining knobs on the spray shield and pull the NSI source slide adapter back along the rails. Remove any existing emitter from the NSI probe assembly.

Use a 5/64 Allen key to loosen the 2-56 socket screw holding the emitter clip in place. Remove the emitter clip (see Figure 4A) and gently slide a piece of the conductive elastomer tubing 3–4 mm over the end of the clip where the screw hole is located (sliding the tubing over the bent end is more difficult and is not recommended). Trim the excess tubing at the end of the clip and slide the tubing over the clip until it covers the clip bend, as shown in Figure 4B.

Being sure not to touch the tip to any surface, carefully grasp the assembled union with one hand, and with the other feed the transfer line through the opening in the API spray shield, from the instrument side, out through the notch on the left side of the probe cover (or over the top of the probe cover). When the bulk of the transfer line is through the spray shield, position the union in the large groove in the NSI body assembly (as shown in Figure 5A), angling the tip end up slightly. Slide the union toward the instrument until it is pressed against the forward edge of the groove; then, gently align the PicoTips® in the tip groove, as shown in Figure 5B. If it is necessary to adjust the position of the PicoTip, use fine forceps so as not to scratch the coating. The PicoTip should extend approximately 5 mm beyond the end of the probe assembly when properly positioned.

Install the emitter clip with the elastomer tubing, as shown in Figure 6, and tighten the screw holding the clip in place. Secure the union in place with a small piece of tape.

Attach the free end of the transfer line to the ZDV ground union and subsequently to your pumping element, as described in the Thermo Finnigan manual.

Inspect the end of the probe to make certain that the MicroTight® sleeve is not preventing electrical contact between the conductive coating and probe. Reattach the high-voltage leads.

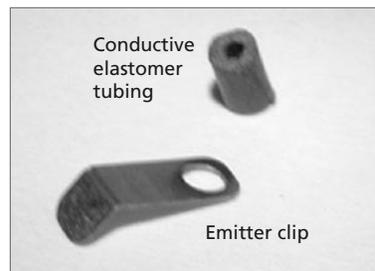


FIGURE 4A Conductive elastomer tubing and emitter clip

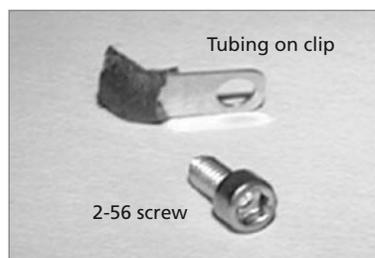


FIGURE 4B Conductive elastomer tubing on the emitter clip and the socket screw

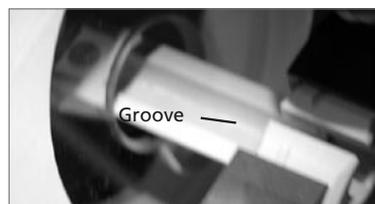


FIGURE 5A Front view of probe assembly groove

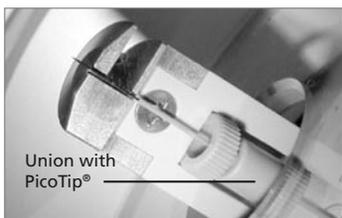


FIGURE 5B Top view of assembled union in position

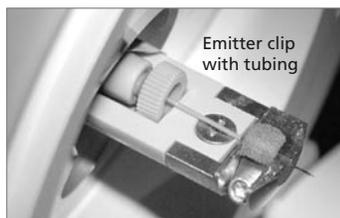


FIGURE 6 Emitter clip and tubing shown with assembled union

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