

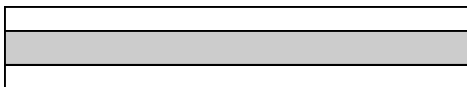
NPD-DELCD combination detector operation

The NPD or combination NPD/DELCD detector is mounted on the right side of the SRI 8610C or 310 GC's column oven

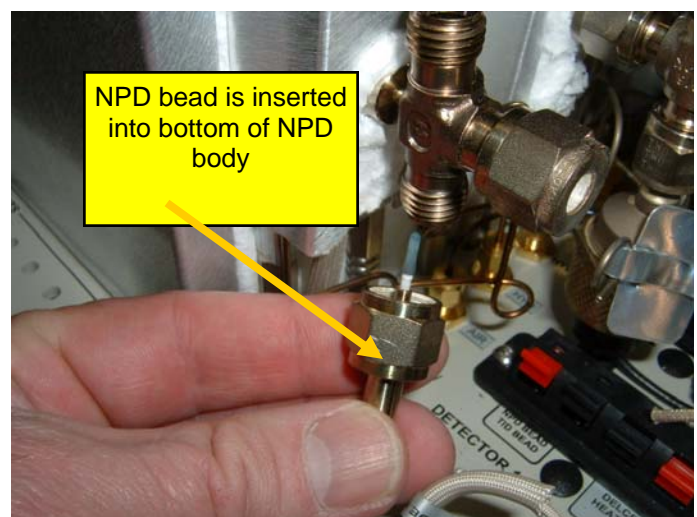
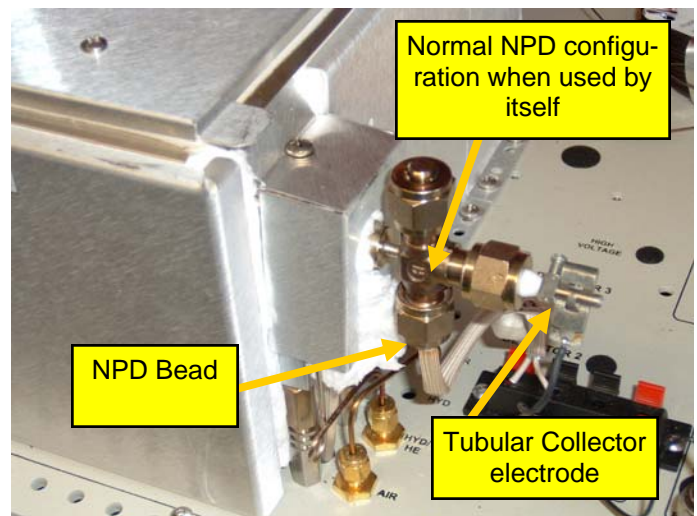
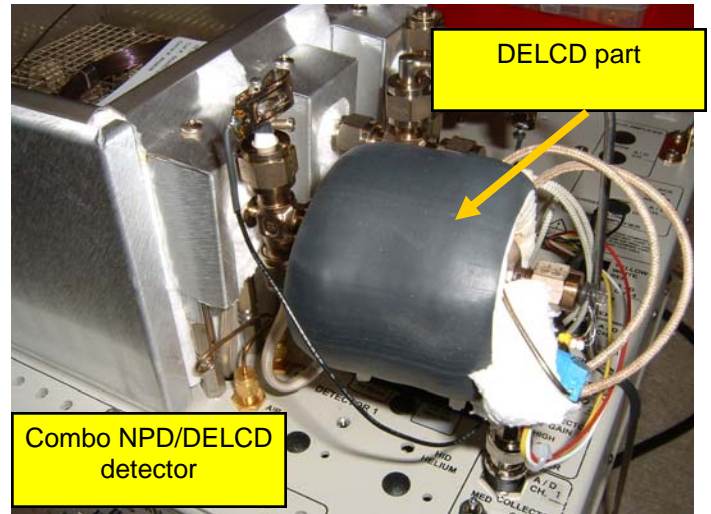
The NPD (Nitrogen-Phosphorus Detector) is shown here by itself for clarity. In this photo the collector electrode is located at the right side instead of the top. Either top or right side position may be used for the NPD collector. When the DELCD is connected for use as a simultaneous NPD/DELCD, the collector electrode must be mounted in the top position. Also the collector electrode must be a solid rod instead of a tube to direct ALL the gas flow into the DELCD after it has passed over the NPD bead.



Collector electrode is solid for use with DELCD



Collector electrode is tube for use with NPD alone

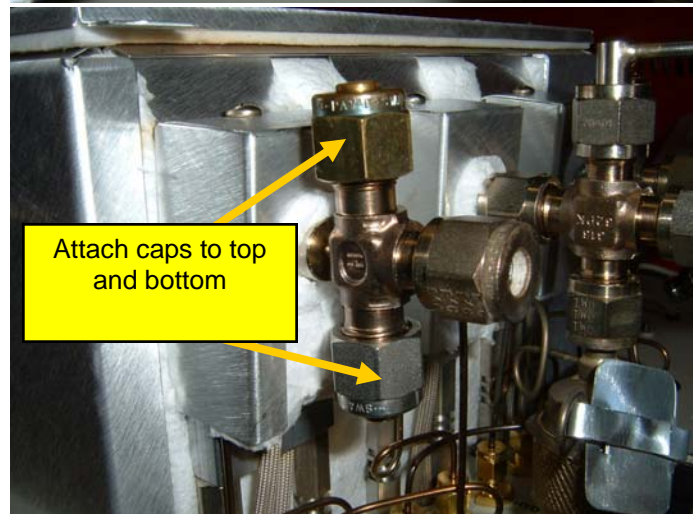
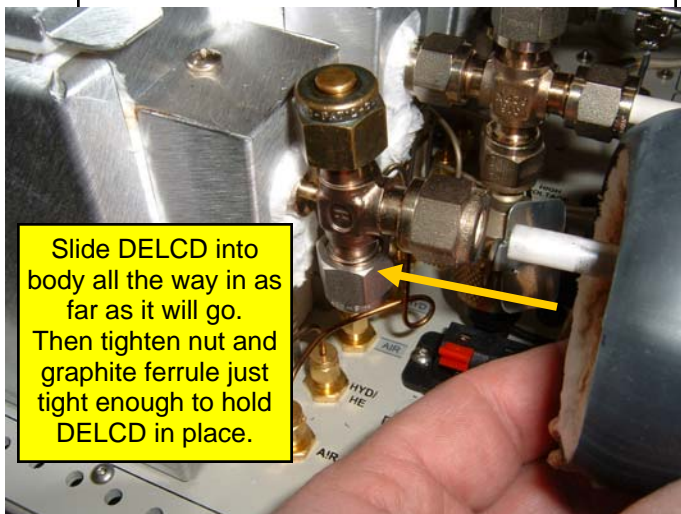
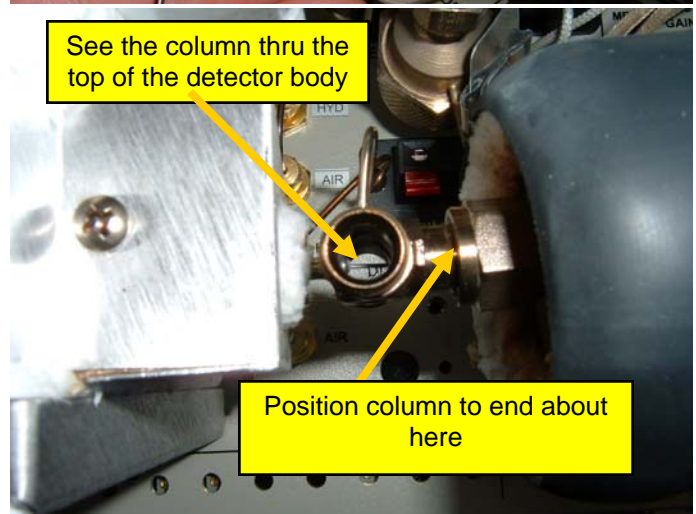


NPD-DELCD combination detector operation

To operate the detector as a DELCD only, remove the collector electrode and the NPD bead from the detector body.

Push the column further into the detector so it ends just inside of the alumina (white ceramic) tube part of the DELCD. This is to keep the dead volume to a minimum and preserve the best peak shape.

Attach cap fittings to both the top and bottom and then slide the DELCD into the body from the right.



NPD-DELCD combination detector operation

When operated as a simultaneous NPD/DELCD detector the behavior of the combination can be seen from the three chromatograms. 1ul of 10ppm Chlorpyrifos was injected each time. Chlorpyrifos is a pesticide which contains both chlorine and phosphorus atoms, so the NPD and DELCD both respond to the same molecule of chlorpyrifos. Each chromatogram is shown as a set of two with the NPD in the upper window and DELCD signal in the lower.

In the top chromatogram the Hydrogen (for the NPD) is set to 10psi (about 3ml/min). Air for the NPD and DELCD was left constant at 5psi (about 150ml/min).

The middle chromatogram shows the same sample with the Hydrogen set to 8psi (about 2ml/min)

The bottom chromatogram shows 6psi Hydrogen.

The trend shows that as the hydrogen is reduced, the NPD signal gets smaller while the DELCD signal grows a little



NPD-DELCD combination detector operation

When the Hydrogen is reduced to 0.00 (no hydrogen at all), the NPD response drops to zero while the DELCD signal becomes much larger.

This is because any hydrogen (even in the form of water H₂O) quenches the DELCD response. When operating the DELCD for maximum sensitivity it is important to use very dry air (not from the built-in air compressor if there is one) for the DELCD reaction gas.

The middle chromatogram shows the same chromatogram as the top but the attenuation has been increased by a factor of 16 to keep the DELCD signal visible on scale. Based on the signal to noise, it is estimated that the DELCD's detection limit when optimized with 0.00 Hydrogen and dry Air is about 100ppb.

The bottom chromatogram shows the much lower detection limits of the NPD. The chromatogram shows 50ppb of another pesticide (Simazine) plus the 10ppm of Chlorpyrifos. Based on the signal to noise, it is estimated that the NPD detection limit is about 10ppb.

