

AirSharp™

Installation Instructions

1.0 Introduction to the AirSharp™ cold trap system

The AirSharp™ is a cold trap that is used to sharpen up peaks in a chromatogram. Cold traps increase the signal to noise ratio and improve the detection limit of an analysis. Unlike other cold trap systems, the AirSharp™ doesn't use high-pressure liquids like Carbon Dioxide or Nitrogen as the coolant. It uses air at ambient temperature. This means that the AirSharp™ can run indefinitely off an air compressor, eliminating the need to changeover gas bottles.

1.1 Principle of Operation

The AirSharp™ works by cooling a very small area of the capillary column. Cooling causes the sample to spend more time in the stationary phase, which slows it down. As a sample peak approaches the cold trap, the leading edge of the sample band will travel slower, and eventually the trailing edge will catch it. See figure 1.

This process causes the sample band to become very narrow. When the cooling is turned off, the narrowed sample peak is released and travels through the column as normal. The result is a very sharp peak with a high signal to noise ratio.

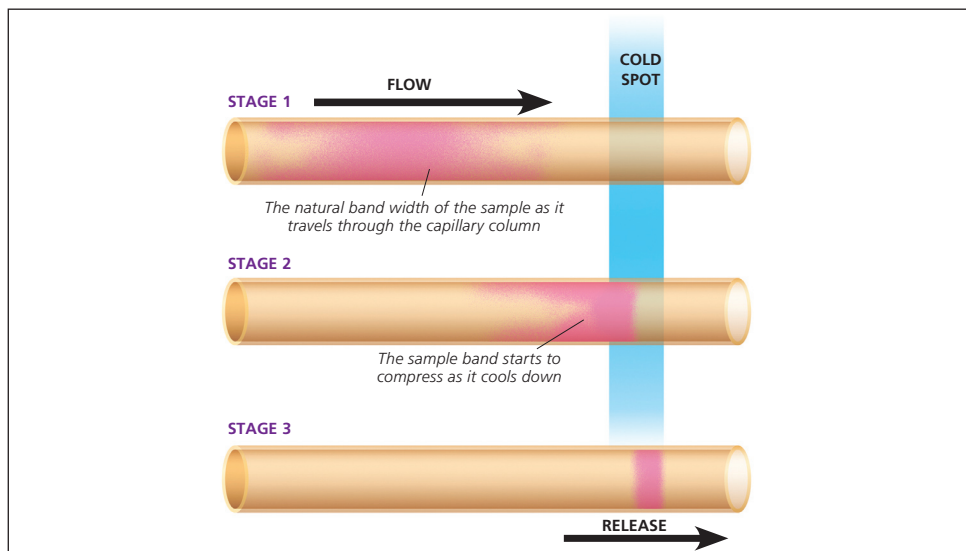


Figure 1. Sample band narrowing as it approaches the cold spot.

1.2 AirSharp™ Overview

The AirSharp™ consists of two major components:

- A control module
- An insulated stainless steel cold trap

The Control Module

The AirSharp™ control module is the interface between the gas chromatograph and the cold trap. It receives instructions from the instrument and distributes compressed air to the cold trap accordingly. The control module must be connected to the gas chromatograph's 24V-valve output and controlled via instrument's timed events table or associated software.

The Cold Trap

The AirSharp™ cold trap receives compressed air from the control module and applies it to the outer surface of the capillary column. The cold trap is air insulated and designed to heat up and cool down quickly.

2.0 Installation hints and guidelines

The AirSharp™ cold trap system can not trap volatile compounds; it is not a cryogenic cold trap. The AirSharp™ is designed to cool a section of the column, to ambient temperature when the oven is hot. This design makes the system very effective at trapping semi-volatile and non-volatile compounds (dioxins for example).

The AirSharp™ can be used in 3 ways:

- At the beginning of the column to compress the initial sample band.
- At the beginning of the 2nd column in multidimensional system to simulate an injection.
- At the end of a capillary column to sharpen up individual peaks before they hit the detector.

Some hints when installing the airsharp:

- Turn on the compressed air and slowly re-pressurize the line to 60 psi (range 40 to 100 psi) after having installed the AirSharp
- Check for leaks around the tee piece and connections to the control module.

3.0 Installation of the AirSharp™ cold trap system

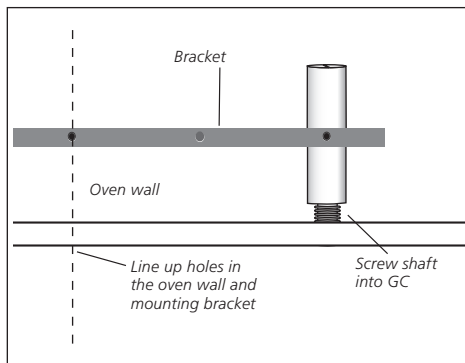


Figure 2.

Find a suitable place on top of the GC to install the cold trap mounting bracket. Ensure a hole can be made through the top of the GC that is in line with one of the two large holes in the bracket.

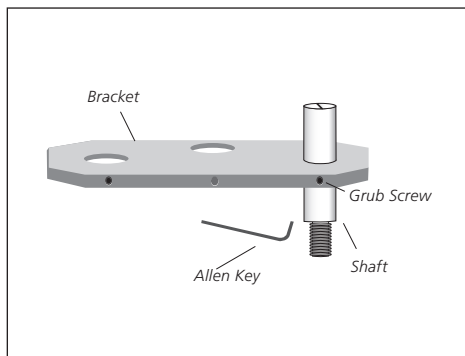


Figure 3.

Securely fix the mounting bracket to the GC by screwing the shaft into a screw shaft on the GC. Make sure one of the large holes in the bracket lines up with the hole in the top of the GC. Tighten the grub screw until the bracket does not move. Use the Allen key provided.

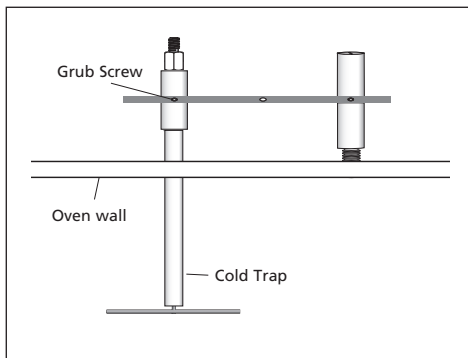


Figure 4.

Thread the top of the cold trap through the hole in the oven ceiling until it reaches the mounting bracket and fix the cold trap to the bracket with the grub screw and Allen key (figure 4).

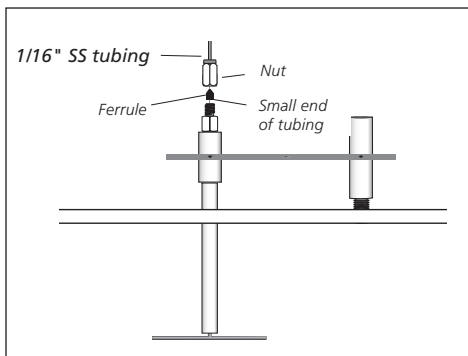


Figure 5

In the kit there is a piece of stainless steel tubing labelled "Cold trap connection tube". It is a 1/16" OD tube that has a smaller piece of tubing soldered to one end. Connect the small end of the tubing to the cold trap with the 0.8 mm ID graphite ferrule and nut, as shown in figure 5.

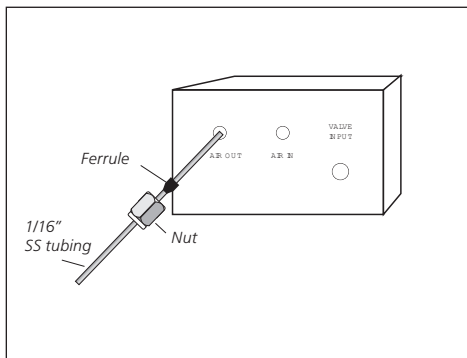


Figure 6.

The other end of this tube must be connected to the "AIR OUT" port of the control module (figure 6). Use the 1/16" nut and 1/16" graphite Vespel® ferrule provided.

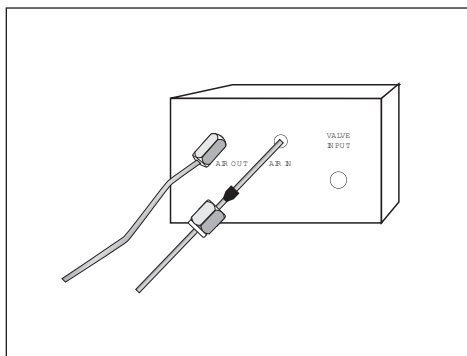


Figure 7.

In the kit there is a piece of 1/16" stainless steel tube labelled "Air supply tube", one end of this tube has a larger diameter of 1/8" which will be used later. Connect the smaller 1/16" tubing end to the "AIR IN" port of the AirSharp™ control module with the same type of 1/16" graphite Vespel® ferrule and 1/16" nut that was used on the "AIR OUT" connection (figure 7).

3.1 Connecting the compressed air gas line to the AirSharp™ control box

- Ensure the compressed air cylinder or air compressor is turned off.
- De-pressurize the line until the pressure gauge reads zero.
- Locate the 1/8" line that supplies the compressed air and cut it with an appropriate tube cutter. Be sure to cut the line within reach of the AirSharp™ control box.

- Connect the 1/8" Parker™ tee to the air line and connect the 1/8" sleeved end of the 1/16" stainless steel tube to the sidearm of the tee, as shown in Figure 8.

If the GC does not require compressed or bottled air (non FID/PID GCs), one side of the tee will not be connected to the GC as shown in Figure 8. If this is the case, use the 1/8" ferrule with no hole to block the vacant side of the tee. As shown in Figure 9.

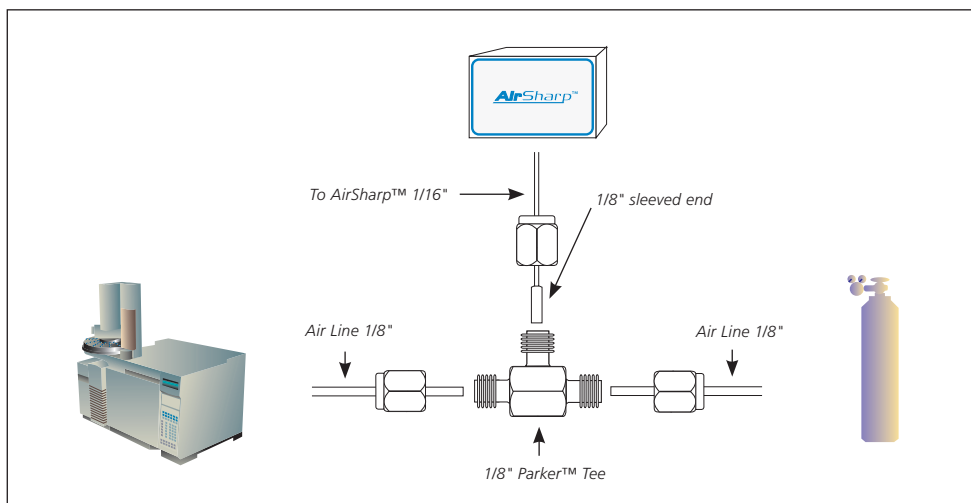


Figure 8.

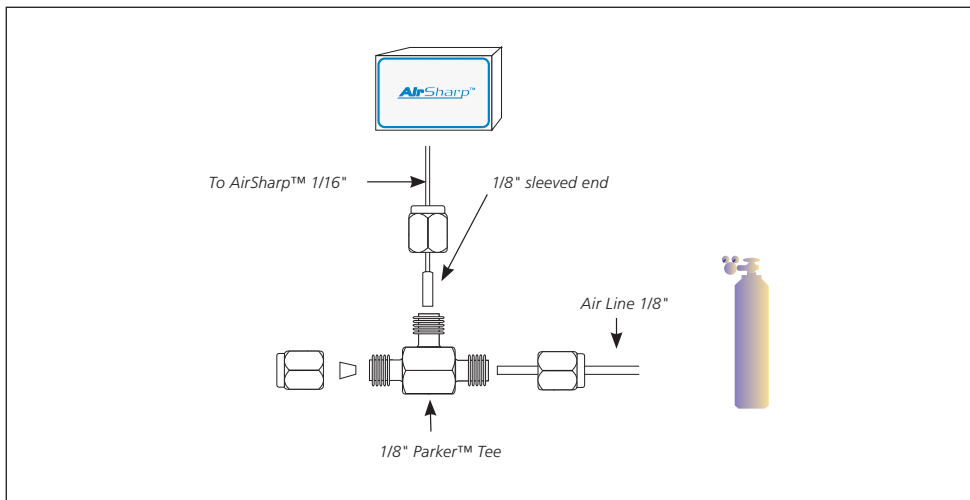


Figure 9.

3.2 Connecting the AirSharp™ Control box to the GC instrument

- In the AirSharp™ kit there are two white valve input cables that can connect the control module to the GC. For the Agilent 6890, the cable with the 8 pin DIN plug is used, on all other instruments the cable without the DIN plug is used. Take the appropriate cable for your instrument and plug it into the “Valve Input” connection on the AirSharp™ control module.
- Plug the other end of the cable into the external events output of the GC.
- On the Agilent 6890, the DIN plug connects to the “EXT EVNT” port on the back panel of the instrument.
- For the Varian 3800, the two wires at the end of the cable connect to the external events screw terminal block, labelled “E.E.”. The screw terminal block is located under the left-hand top panel and is usually orange. Connect the wires from the valve input cable into a pair of connectors, eg. Valve 4.

4.0 Installing the Capillary Column

Before installing the capillary column into the GC, thread one end of the column through the cold trap as shown in Figure 10.

The end of the column that is threaded through the trap will be determined by the intended application of the system, see section 2.0.

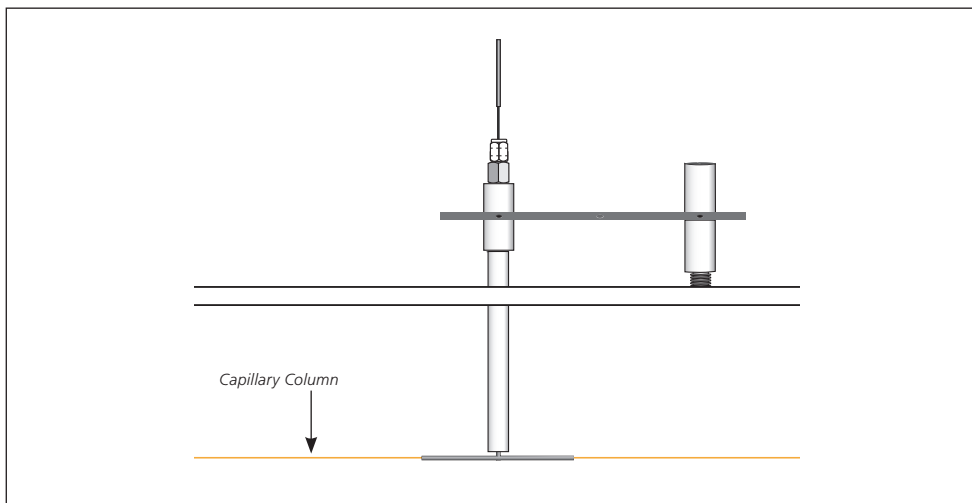


Figure 10. Complete installation

The AirSharp™ is now ready for use.

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