Agilent
Trusted Answers

Quick Reference Guide

Agilent J&W PLOT columns

Installation and Conditioning

Before proceeding, please read the following information regarding proper installation and conditioning of your Agilent J&W PLOT column. These steps are critical to proper performance and lifetime of the column.

Porous layer open tubular (PLOT) columns are highly retentive. Trace amounts of water in your carrier gas can adversely affect chromatography. Using a moisture trap on your carrier gas line is highly recommended.

1. Install the column according to the instructions enclosed in the column box.
2. After installing the column into the inlet, set the carrier gas flow rate. For PLOT columns, slowly increase the carrier gas pressure at the rate of 2 to 3 psi/min (10 to 20 kPa/min), until reaching the appropriate flow rate.

   Slow pressure ramping is not required for CP-SilicaPLOT, GS-GasPro, GS-CarbonPLOT, and PoraBOND columns. These columns can be brought to pressure rapidly due to their unique particle bonding technology.
3. Let the carrier gas purge for three to five minutes before connecting the column to the detector.
4. Condition the columns per the guidelines in Table 1.

Note: *Do not exceed the maximum operating temperature of the column when setting inlet and detector temperatures.*

Table 1. Agilent J&W PLOT column conditioning guidelines.

Phase Type	Column	Conditioning Temperature	Conditioning Time
Aluminum Oxide	CP-Al_2O_3 CP-Al_2O_3 PT GS-Alumina GS-Alumina PT HP-PLOT Alumina HP-PLOT Alumina PT	200 °C	8 hours
Molecular Sieve	CP-Molsieve 5Å	350 °C	3 to 8 hours
	CP-Molsieve 5Å PT	300 °C	3 to 8 hours
	HP-PLOT Molesieve	300 to 350 °C	3 to 6 hours
Porous Polymers	GS-Q GS-Q PT	250 °C	8 to 10 hours
	PoraBOND Q PoraBOND Q PT HP-PLOT Q HP-PLOT Q PT	270 °C	3 to 6 hours
	PoraPLOT Q PoraPLOT Q PT PoraPLOT Q-HT PoraPLOT Q-HT PT PoraPLOT S	250 °C	3 to 6 hours
	PoraPLOT U PoraPLOT U PT PoraBOND U HP-PLOT U HP-PLOT U PT	190 °C	3 to 6 hours
Carbon	CP-CarboPLOT P7	115 °C	3 to 6 hours
	CP-CarboBOND	300 °C	3 to 6 hours
	GS-CarbonPLOT	300 to 350 °C	3 to 6 hours
Silica	CP-SilicaPLOT	225	3 to 6 hours
	GS-GasPro	260 °C	3 to 6 hours

Particle traps

In a typical PLOT column, more than 1011 particles are present. Though highly stabilized, it is impossible to guarantee that no particles will dislodge from the column wall. Upon sudden pressure shocks, for example in valve-switching applications, some particles will leave the column. To prevent these particles from disturbing your detector signal or damaging your valve, use a particle trap.

Agilent offers PLOT columns with built-in dual-sided particle traps. Through our innovative coating technology, PLOT PT columns have a coating of stationary phase between particle traps on the front and the end of a single length of capillary column. With the inclusion of these built-in particle traps, under normal use, you can confidentially connect these PLOT columns to backflush valves, heart-cut valves, capillary flow technology (CFT) devices, and any of your GC detectors without concern for stationary phase particles causing valve failures or chromatographic anomalies that you can experience with a standard PLOT column. PLOT PT columns are suitable for use in GC/MS applications and, because they are one continuous length of capillary tubing, and do not have unions attaching the particle traps, they are leak-free. The direction of carrier gas flow through the column is unrestricted, so feel free to connect your column backwards, and do not worry about reverse gas flow applications causing problems with particle spiking or valve damage.

Note: Under extreme conditions of excessive carrier gas pressure, damage to the stationary phase can occur. Under such conditions, it is possible that stationary phase particles may break through the particle traps. Table 2 provides guidelines for the upper maximum flow based on inside diameter.

Table 1. Agilent J&W PLOT column conditioning guidelines.

Id	Upper Maximum Flow
0.25 mm	3 mL/min
0.32 mm	5 mL/min
0.53 mm	10 mL/min

There are other functional differences that you need to be aware of as you get ready to install your PLOT PT column and set up your GC system. There are sections on the bottom and the top of the column that have a different appearance (Figure 1). These are the particle trap sections of your PLOT PT column.

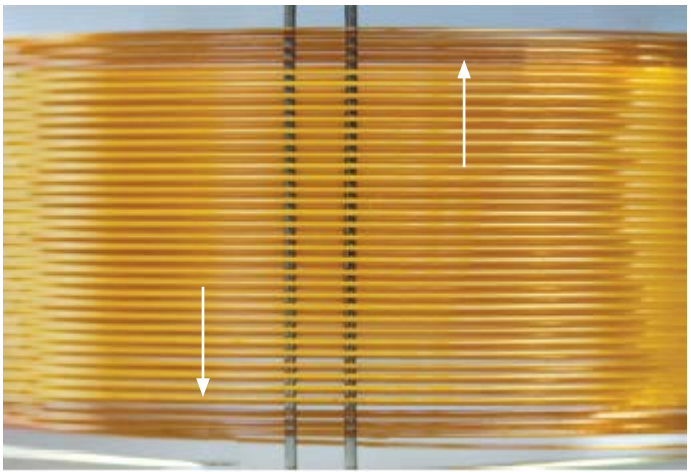

Figure 1. The 2.5 m particle trapping portions of an Agilent PLOT PT column, identified by different colored tubing.

There are approximately five coils (approximately 2.5 meters) for each of the particle traps. You may notice that there appear to be voids or particles inside the column at the interface where the particle trap and the stationary phase coating meet—this is normal for this type of column. The column you received has been individually inspected to a visual cosmetic standard, and has been tested to verify the highest chromatographic performance available in any PLOT column. PLOT PT columns are coated to have the same phase ratio (β), that is, the same stationary phase film thickness through the coated section of the column, as their standard PLOT column counterpart. This means that your PLOT PT column has the same chromatographic characteristics as the standard column of that nominal coated length.

Attention: The maximum allowable temperature for CP-Molsieve 5Å PT columns is 300 °C. Due to bleeding of the particle traps, the maximum temperature is lowered compared to non-PT Molsieve columns. Please use 300 °C as the maximum temperature when conditioning the column.

Agilent offers separate particle traps that can be connected to your standard PLOT column using a glass press fit connector. Connect the trap to the end of the column if the column is used in normal mode, and to the beginning of the column when used in backflush mode.

Table 3. Agilent particle traps.

Description	Part Number
2.5 m × 0.25 mm Particle trap	CP4019
2.5 m × 0.32 mm Particle trap	CP4016
2.5 m × 0.53 mm Particle trap	CP4017
2.5 m × 0.53 mm Particle trap for UltiMetal deactivated stainless steel columns	CP4018
Particle trap connector (0.25/0.32 mm) (10/pk)	CP4788
Particle trap connector (0.53 mm) (10/pk)	CP4789

Column maintenance

PLOT columns can become contaminated by water, polar compounds, or hydrocarbons in a sample of carrier gas streams. When contamination is suspected, bake out the column at its conditioning temperature for several hours, or until the baseline is stable.

Contaminant compounds vary depending on retention and selectivity of the PLOT stationary phase. Consult Table 4 for typical contaminants by PLOT phase type.

Table 4. Typical contaminants by PLOT phase type

Phase Type	Typical Contaminants
Aluminum Oxide	Water; carbon dioxide; large hydrocarbons and substituted aromatics; oxygen-containing compounds such as alcohols, ethers, and ketones; sulfur-containing compounds
Molecular Sieve	Water; carbon dioxide; hydrocarbons larger than C3
Porous Polymers	Larger hydrocarbons and substituted aromatics
Carbon	Larger hydrocarbons and substituted aromatics
Silica	Larger hydrocarbons and substituted aromatics

To maintain the installed column between uses, hold the oven temperature at 100 to 150 °C with continuous carrier gas flow. This helps avoid problems associated with accumulation of water, CO_2, or other carrier gas impurities.

Column storage

Seal the column ends with GC septa, and return the column to the original box. Upon reinstallation, cut the column ends to ensure that no pieces of septum have been left in the column.

Gas Clean filters

The Agilent Gas Clean filter system delivers clean gasses, reducing the risk of column damage, sensitivity loss, and instrument downtime. Inserting a Gas Clean filter system into the gas line immediately before the instrument inlet greatly reduces the level of impurities, and improves trace analysis. The sensitive indicators within the filter change color, alerting you that the filter needs to be replaced. Replacing the filters when they have reached absorption capacity ensures maximum protection of your GC columns and analytical hardware.

Figure 2. Agilent Gas Clean filters.

For more information, visit: agilent.com/chem/gasclean

Maintain column performance with high-quality GC supplies

Certified supplies

Ultra Inert inlet liners

Agilent Ultra Inert GC Liners prevent surface adsorption, providing robust, reproducible and reliable trace-level analysis of active compounds. The non-stick liner O-rings are certified pre-cleaned, conditioned to eliminate out-gassing of contaminants critical for trace analysis.

UltiMetal Plus Flexible Metal ferrules

The novel, flexible design allows each ferrule to gently compress around the column, preventing column breakage or leakage. Stainless steel construction holds its shape during temperature cycling to maintain a leak-free connection without re-tightening while chemical deactivation provides an inert surface critical for analysis of active analytes at trace levels.

Certified gold seals

A unique, proprietary process gives the most consistent, smooth, and inert surface to seal the inlet and prevent leaks or sample degradation; critical when working with active compounds or high-sensitivity analyses.

Agilent Self Tightening column nut

This unique stainless steel GC column nut delivers a leak-free connection without adaptors, or special tools.

Column installation

Pre-swaging and measurement tools

Ensure GC reproducibility by verifying proper length of column into the fittings, time after time.

Discover all the Agilent supplies that help ensure leak-free connections at: **agilent.com/chem/bettergcconnections**

Gas management

Agilent gas clean purification system

Filters carrier gas impurities reducing risk of column damage, sensitivity loss and improving trace analysis. For more information, please visit: **agilent.com/chem/gasclean**

ADM Flow Meter

An incorrect mix of gases can cause peak tailing, ghost peaks, retention time shifts, loss of resolution and baseline noise. ADM Flow Meters are ideal for measuring gas streams with composite gas composition.

CrossLab CS Electronic Leak Detector

Gas leaks can cause detector noise and baseline instability, shorten column life, and waste expensive carrier gas. Agilent's Leak Detector is an easy way to quickly identify leaks in your system.

Learn more: **agilent.com/chem/gas-management**

Helpful GC resources

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