

EZ No-Vent GC-MS Connector Kit

for Agilent GCs with 5971/5972, 5973, 5975, or 5977 GC-MS cat.# 21323

Kit includes:

EZ No-Vent connector; 0.4 mm ID adaptor ferrules for capillary column (2); 0.4 mm ID ferrules for transfer line (2); 100 μ m deactivated transfer line (3 ft); column plug; column nut. (cat.# 21323)

Replacement Components/Installation Tools:

Adaptor ferrules for EZ No-Vent GC Column-MS Connectors:

0.4 mm ID, 2-pk. (cat.# 21015); 0.5 mm ID, 2-pk. (cat.# 21016)

Replacement Ferrules (polyimide) for connecting transfer line to EZ No-Vent connector:

0.4 mm ID, 2-pk. (cat.# 21043)

Replacement 100 μ m Deactivated Transfer Line: 3 ft x 0.10 mm ID (cat.# 21018)

Plug: Brass, 5-pk. (cat.# 23112)

Nut: Brass, 20-pk. (cat.# 23100)

Open-end wrenches, $\frac{1}{4}$ & $\frac{5}{16}$ inch: 2-pk. (cat.# 20110)

NOTE: Ensure all GC heated zones, including the MS transfer line, have cooled prior to initial installation and subsequent analytical column changes.

Installation in Agilent 5971/5972 MS Systems

1. Prepare the instrument by performing a proper vent cycle (consult the instrument operation manual).
2. Once the instrument is cooled and vented, remove the capillary column.
3. Using a scoring wafer or similar device to make a clean, square cut, take an approximately 8 inch (20 cm) section of the 3 ft transfer line (cat.# 21018) in the EZ No-Vent kit.
4. Install the clean, square end of the 8 inch section of transfer line (cat.# 21018) into the MS (follow instrument operation manual).
5. Place a polyimide ferrule (cat.# 21043) on the end of the transfer line (cat.# 21018) that protrudes from the MS (Figure 1).
6. Using a scoring wafer or similar device, make a clean, square cut just before the ferrule, then adjust the transfer line (cat.# 21018) to extend approximately 3 mm from the tip of the ferrule (Figure 1). This ensures that the transfer line will bottom out in the EZ No-Vent connector and will eliminate dead volume in the connection.
7. Thread the EZ No-Vent connector onto the GC-MS interface. **Tighten finger tight; then tighten an additional $\frac{1}{4}$ turn** (Figure 2).
8. Place a capillary nut and ferrule (cat.# 21015 or 21016) onto the end of the capillary column (Figure 3).
9. Using a scoring wafer or similar device, make a clean, square cut at the end of the capillary tubing, then adjust the column to extend approximately 3 mm from the tip of the ferrule. This ensures that the column will bottom out in the EZ No-Vent connector, and will eliminate dead volume in the connection.
10. Thread the column nut onto the EZ No-Vent connector. **Tighten finger tight; then tighten an additional $\frac{1}{4}$ turn.** Use a wrench to hold the MS fitting in place while tightening the column nut (Figure 4).
11. Start a flow of carrier gas. Pump down MS. Use argon to check the vacuum side of the system for leaks. After the initial installation and leak check, it may be necessary to tighten the MS fitting slightly. **Tighten $\frac{1}{4}$ turn at a time—overtightening will cause leaks.**

NOTE: Polyimide ferrules shrink after thermal cycling and will need to be retightened.

Continue to the "Required Method Changes" section for further instructions prior to use. When changing columns, refer to the "Changing Columns" section for instructions.

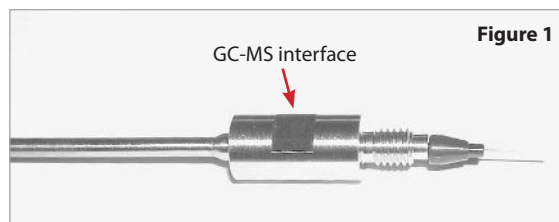


Figure 1

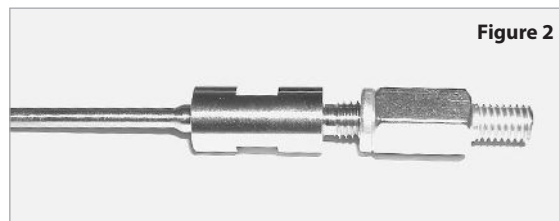


Figure 2

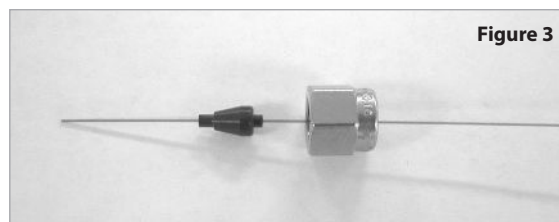


Figure 3

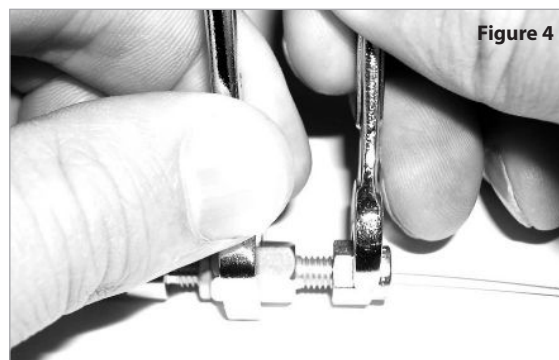


Figure 4

Installation in Agilent 5973 MS Systems

1. Prepare the instrument by performing a proper vent cycle (consult the instrument operation manual).
2. Once the instrument is cooled and vented, remove the capillary column.
3. Using a scoring wafer or similar device to make a clean, square cut, take an approximately 8 inch (20 cm) section of the 3 ft transfer line (cat.# 21018) in the EZ No-Vent kit.
4. Trim the transfer line to the correct final length.
 - a. Using the MS installation gauge (cat.# 21894), install a nut and ferrule (cat.# 21043) onto the 8 inch section of transfer line (cat.# 21018) (Figure 5).
 - b. Make a clean, square cut on the tubing end protruding from the ferrule. Leave approximately 5 mm of tubing protruding from the tip of the ferrule.
 - c. Insert the uncut end of the transfer line (cat.# 21018) through the installation gauge (Figure 6).
 - d. Tighten the connector onto the installation gauge until the transfer line (cat.# 21018) can no longer be moved.
 - e. Make a clean, square cut in the tubing at the end of the installation gauge (Figure 7).
 - f. Loosen the installation gauge and remove the transfer line (cat.# 21018).
5. Carefully install the transfer line into the MS source.
6. Thread the EZ No-Vent connector onto the GC-MS interface (Figure 8). **Tighten finger tight; then tighten an additional 1/4 turn.**
7. Place a capillary nut and ferrule onto the capillary column.
8. Make a clean, square cut at the end of the capillary tubing; then adjust the column to extend approximately 3 mm from the tip of the ferrule. This ensures that the column will bottom out in the EZ No-Vent connector and will eliminate dead volume in the connection.
9. Thread the column nut onto the EZ No-Vent connector (Figure 9). **Tighten finger tight; then tighten an additional 1/4 turn.** Use a wrench to hold the MS fitting in place while tightening the column nut (Figure 10).
10. Start a flow of carrier gas. Pump down MS. Use argon to check the vacuum side of the system for leaks. After the initial installation and leak check, it may be necessary to tighten the MS fitting slightly. **Tighten 1/4 turn at a time—overtightening will cause leaks.**

NOTE: Polyimide ferrules shrink after thermal cycling and will need to be retightened.

Continue to the "Required Method Changes" section for further instructions prior to use. When changing columns, refer to the "Changing Columns" section for instructions.

Installation in Agilent 5975/5977 MS Systems

1. Prepare the instrument by performing a proper vent cycle (consult the instrument operation manual).
2. Once the instrument is cooled and vented, remove the capillary column.
3. Using a scoring wafer or similar device to make a clean, square cut, take an approximately 8 inch (20 cm) section of the 3 ft transfer line (cat. # 21018) in the EZ No-Vent kit. This will be a longer section than is required and will be trimmed to its final length later in the process.
4. Carefully install the transfer line into the MS source.
5. Thread the EZ No-Vent connector onto the GC-MS interface (Figure 8). **Tighten finger tight; then tighten an additional 1/4 turn.**
6. Trim the excess length of tubing that sticks out of the transfer line in the MSD with a ceramic wafer.
7. Place a capillary nut and ferrule onto the capillary column.
8. Make a clean, square cut at the end of the capillary tubing; then adjust the column to extend approximately 3 mm from the tip of the ferrule. This ensures that the column will bottom out in the EZ No-Vent connector and will eliminate dead volume in the connection.
9. Thread the column nut onto the EZ No-Vent connector (Figure 9). **Tighten finger tight; then tighten an additional 1/4 turn.** Use a wrench to hold the MS fitting in place while tightening the column nut (Figure 10).
10. Start a flow of carrier gas. Pump down MS. Use argon to check the vacuum side of the system for leaks. After the initial installation and leak check, it may be necessary to tighten the MS fitting slightly. **Tighten 1/4 turn at a time—overtightening will cause leaks.**

NOTE: Polyimide ferrules shrink after thermal cycling and will need to be retightened.

Continue to the "Required Method Changes" section for further instructions prior to use. When changing columns, refer to the "Changing Columns" section for instructions.



Figure 5

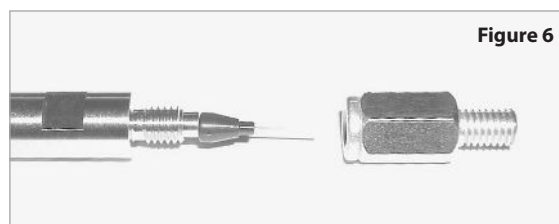


Figure 6



Figure 7

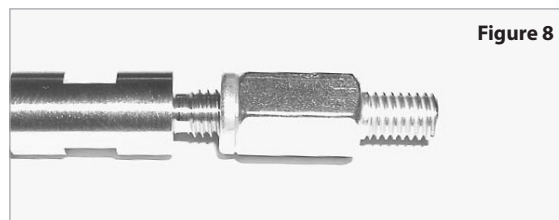


Figure 8

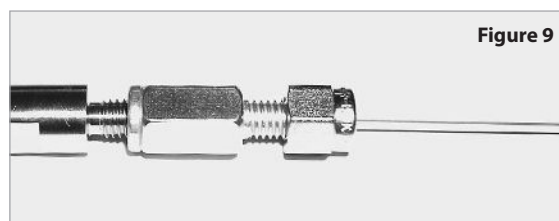


Figure 9

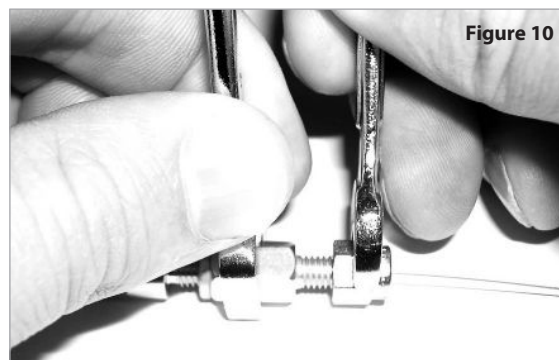


Figure 10

Required Method Changes

The EZ No-Vent connector operates by creating a restriction to flow in the MS transfer line. The insertion of a short, narrow-bore length of deactivated fused silica tubing in the MS transfer line is the source of the restriction. To account for that restriction, existing method conditions need to be updated to maintain similar chromatographic performance as observed without the EZ No-Vent connector installed.

Hardware or software upgrades normally are not needed to obtain excellent results with the EZ No-Vent connector.

If your analytical column is already 0.1 mm ID, simply extend the length of the column by the length of the transfer line tubing.

If your analytical column is a different ID, the two different IDs will have to be accounted for in your method.

If your software permits the configuration of a composite column (i.e., define separate column segments with different dimensions), be certain to update your method to account for the addition of the 0.1 mm ID tubing in the transfer line.

If your software only permits one set of column dimensions, you will have to change one of two parameters, determined by your gas management mode – constant flow or constant pressure.

When using constant flow mode, the column length value will need to be adjusted to a length much longer than the actual length to account for the restriction.

When using constant pressure mode, the head pressure will need to be increased.

See Table I for examples of how to set the new column length based on your actual column length for constant flow mode or how to adjust your head pressure if operating in constant pressure mode.

Additionally, manual adjustments can be made by empirically measuring the dead time before EZ No-Vent connector installation and then adjusting the appropriate input (column length or head pressure) until you obtain the same dead time, and therefore the same linear velocity, as the original setup.

Linear Velocity

NOTE: In the case where the EZ No-Vent connector has been installed but the same volumetric column flow rate is maintained in the method, the result will be a decrease in linear velocity. This may result in undesirable chromatographic performance. If this is observed, adjust flow rate until the original linear velocity is achieved.

Table I: Changes to Conditions Required When Using the EZ No-Vent Connector

Actual Column Length (m)	To Maintain Constant Flow: Software Programmed Column Length (m)		Software Programmed Column ID (µm)	To Maintain Constant Pressure: Column Head Pressure (psi)		Software Programmed Flow (mL/min)	Software-Calculated Linear Velocity (cm/sec)*		Dead Time @ 40 °C (min)
	w/o	w/EZ No-Vent		w/o	w/EZ No-Vent		w/o	w/EZ No-Vent	
30	30	112	250	4.8	22.9	0.8	32	17	1.66
30	30	115	280	0.9	15.8	0.8	32	17	1.75
30	30	200	320	0.44	24.5	1.3	41	16	1.49
60	60	145	250	16.1	33.1	1.0	26	17	3.75
60	60	200	320	6.77	29.0	1.3	29	16	3.19

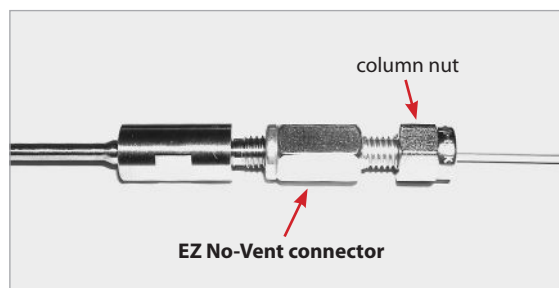
*Values determined with helium carrier gas and an oven temperature of 40 °C. Column outlet pressure set for vacuum.

Changing Columns

The EZ No-Vent connector is designed to allow column changes without the need to cool or “pump down” the MS system. To change columns:

1. Remove the column nut and ferrule from the EZ No-Vent connector. **Note:** Be sure to use a second wrench to hold the MS fitting in place when changing out the column after the initial installation. This is necessary to prevent loosening the fitting between the EZ No-Vent connector and the MS transfer line.
2. Install the plug (supplied) onto the column end of the EZ No-Vent connector and finger tighten.
3. Install the nut and ferrule onto the new column, following the procedure described in the instructions.
4. Remove the plug from the EZ No-Vent connector and install the column. **Tighten 1/4 turn past finger tight; overtightening will cause leaks.** After installing the new column, purge the MS for 30 minutes.

Note: Polyimide ferrules can shrink after one or two thermal cycles. Retighten the fitting and column connection to ensure a leak-free seal. **Tighten only 1/4 turn at a time; overtightening will cause leaks.**



Troubleshooting

Problem	Possible Cause	Suggested Solution
MS will not pump down	Leak in the system	Check EZ No-Vent fitting—retighten; check column connection—retighten.
Extended retention times	Compensation for the EZ No-Vent connector not being accounted for.	Follow the procedure in the “Required Method Changes” section.
Poor peak shapes	Column/transfer line not properly installed Linear velocity after installation doesn't match initial value.	Reinstall column or reconnect EZ No-Vent fitting to MS transfer line. Ensure the final linear velocity matches the initial value. This can be done using software capable of programming the EZ No-Vent restriction correctly or empirically by measuring dead times after installation and making the necessary adjustments to match the pre-installation linear velocity.
High background	Leak in the system	Check EZ No-Vent fitting—retighten; check column connection—retighten.
Ferrules stick in EZ No-Vent fitting	Ferrules overtightened	Tighten only 1/4 turn at a time to obtain a leak-tight seal.
Ferrules do not seal/require excessive torque	Incorrect ferrule ID for tubing OD	Use correct ferrule.
	Incorrect ferrule alignment/placement	See Instructions for correct ferrule placement.
	Incorrect nut used for ferrule	Nut must have correct inner chamfer for ferrule, do not use nuts other than those provided with EZ No-Vent kit.

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