

# EZ No-Vent™ GC/MS Connector for Agilent 5971/5972 and 5973 Mass Spectrometers

(cat.# 21323)

**EZ No-Vent™ GC/MS Connector for Agilent GCs Includes:** EZ No-Vent™ connector,  $\frac{1}{16}$ " stainless steel nut, 0.4mm ID polyimide ferrules for connecting a capillary column, 0.4mm ID polyimide ferrules for connecting a transfer line, 3 feet x 0.10mm ID deactivated transfer line, EZ No-Vent™ plug.

## Replacement Components/Tools

### EZ No-Vent™ ferrules:

- for connecting capillary column: 0.4mm ID (2-pk.) cat.# 21015; 0.5mm ID (2-pk.) cat.# 21016
- for connecting transfer line: 0.4mm ID (2-pk.) cat.# 21043

**EZ No-Vent™ deactivated transfer line:** 3 feet x 0.10mm ID, cat.# 21018

**EZ No-Vent™ plug:** (2-pk.) cat.# 21915

**Column nut:** (ea.) cat.# 21900

**Open-end wrench,  $\frac{1}{4}$ - x  $\frac{5}{16}$ -inch:** (ea.) cat.# 20110

## Installation in Agilent 5971/5972 MS System

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 approximate 8 inch (20cm) section of the 3 foot transfer line in the EZ No-Vent™ kit.
4. Install the clean, square end of the 8-inch section of transfer line into the MS (follow instrument operation manual).
5. Place a polyimide ferrule (cat.# 21043) on the end of the transfer line 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 to extend approximately 3mm 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 transfer line, then tighten the connector onto the MS source. First tighten only 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 3mm 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.

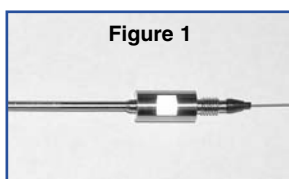


Figure 1

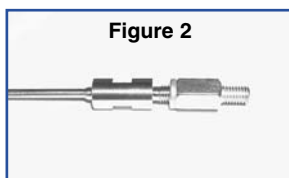


Figure 2

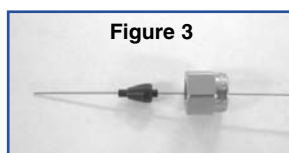


Figure 3

10. Thread the column nut onto the EZ No-Vent™ connector, then tighten. First tighten only 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. 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.

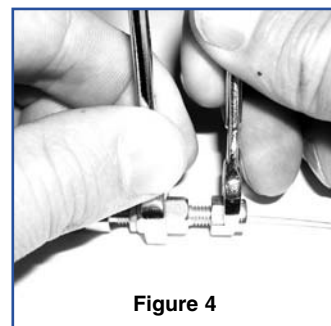


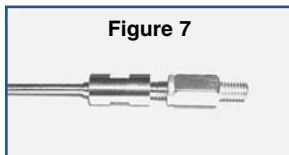
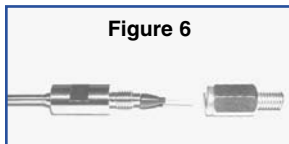
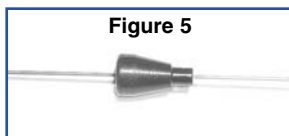
Figure 4

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

## Installation in Agilent 5973 MS System

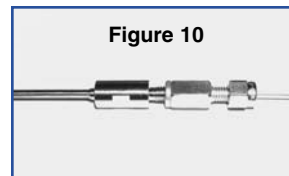
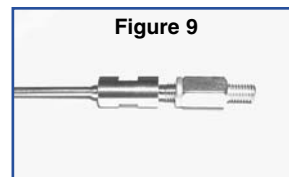
1. Prepare the instrument by performing a proper vent cycle (consult the instrument operation manual).
2. Once the instrument is cooled and vented, remove the capillary column.
3. Using a scoring wafer or similar device to make a clean, square cut, take an approximate 8 inch (20cm) section of the 3 foot transfer line in the EZ No-Vent™ kit.
4. a) Using the MS Installation Gauge (cat.# 21894), install a nut and ferrule (cat.# 21043) onto the 8-inch section of transfer line (Figure 5).  
b) Make a clean, square cut on the tubing end protruding from the ferrule. Leave approximately 5mm of tubing protruding from the tip of the ferrule.  
c) Insert the uncut end of the transfer line through the installation gauge (Figure 6).  
d) Tighten the connector onto the installation gauge until the transfer line can no longer be moved (Figure 7).  
e) Make a clean, square cut in the tubing at the end of the installation gauge (Figure 8).  
f) Loosen the installation gauge and remove the transfer line.

5. Carefully install the transfer line into the MS source.
6. Thread the EZ No-Vent™ connector onto the transfer line, then tighten the connector onto the MS source (Figure 9). First tighten only 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 3mm 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, then tighten (Figure 10). First tighten only 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 9).



10. Start a flow of carrier gas. 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.**

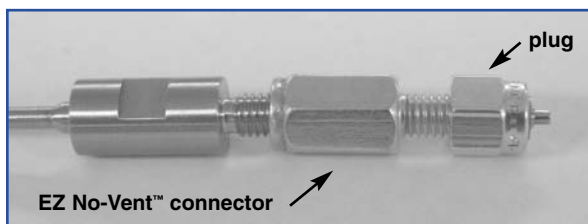


## Changing Columns

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: Take care not to loosen 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™ connector - retighten. Check column connection - retighten.
Prolonged retention times.	Compensation for EZ No-Vent™ connector not being programmed.	Check linear velocity with unretained peak and follow new operating parameters chart (Table 1).
Poor peak shapes.	Column/transfer line not properly installed.	Reinstall column or reconnect EZ No-Vent™ connector to MS transfer line.
High background.	Air leak.	Check EZ No-Vent™ connector and column connection; retighten.
Ferrules stick in EZ No-Vent™ connector.	Ferrules overtightened.	Tighten only 1/4 turn at a time to obtain a leak-free seal.
Ferrules do not seal/require excessive torque.	Wrong Ferrule ID for tubing OD. Wrong ferrule alignment/placement. Wrong nut used.	Use correct ferrule. See Instructions for correct ferrule placement. Nut must have correct inner chamfer for ferrule. Do not use nuts other than those included with the EZ No-Vent™ connector.

## Retention Time (Dead Volume) for Methane

$$\text{Average linear velocity (cm/sec.)} = \frac{\text{column length (cm)}}{\text{dead volume time (sec.)}}$$

### Retention Time in Min.

Column Length	10m	15m	20m	30m	45m	60m	75m	105m
Hydrogen @ 40cm/sec.	0.42	0.63	0.83	1.25	1.88	2.50	3.13	4.38
Helium @ 20cm/sec.	0.83	1.25	1.67	2.50	3.75	5.00	6.25	8.75

## Changes Required When Using the EZ No-Vent™ Connector

Changes are required to the manual pneumatics or electronic pressure control (EPC) because the small bore restrictor (0.10mm) inserted into the MS source creates flow characteristics for which the software was not designed to compensate. The higher head pressures used with the EZ No-Vent™ connector can change the injection port characteristics. In some cases, higher split vent flows or shorter splitless hold times may be required.

Hardware or software upgrades normally are not needed to obtain excellent results with the EZ No-Vent™ connector. If you have questions, please call our technical service team (800-356-1688 or 814-353-1300, ext. 4).

## Using Table 1

### Operation in Constant Head Pressure Mode

With the EZ No-Vent™ connector installed, the pressure drop across the 0.10µm transfer line makes it necessary to increase the head pressure to obtain retention times equal to those you obtained without the connector. For example, if you were using a 30m x 250µm ID column at 4.8psi before installing the EZ No-Vent™ connector, increase the head pressure to 22.9psi to obtain similar retention times.

Similarly, software-calculated column flow rates and split ratios will be incorrect. Set the split ratio by measuring or programming the split vent flow.

### Operation in Constant Flow Mode

With the EZ No-Vent™ connector installed, the pressure drop across the 0.10µm transfer line makes it necessary to program the system for a longer than actual column length to obtain retention times equal to those obtained without the connector. For example, if you were using a 30m x 250µm ID column at 0.8mL/min. before installing the EZ No-Vent™ connector, program for a column length of 112 meters to obtain similar retention times.

Software-calculated linear velocity will be incorrect. If necessary, determine the linear velocity by using the dead time method.



**Table 1. Changes to Conditions Required When Using the EZ No-Vent™ Connector**

Actual Column Length (m)	Software Programmed Column Length (m)		Software Programmed Column ID (µm)	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.

**Call Technical Service at 800-356-1688 or 814-353-1300, ext. 4 (or your local Restek representative) if you have any questions about this product or any other Restek product.**



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