



ms NoVent™ II

Instruction Booklet

ms NoVent™ II

The ms NoVent™ II interface is designed to allow column changing or column maintenance to be carried out without the need to shut down the mass spectrometer. The design of the interface ensures that no air or water enters the mass spectrometer while the column is disconnected, which in turn ensures that the ion source remains contamination free. As a result a column can be changed and the instrument brought back online in minutes.

To protect the integrity of your MS.

The ms NoVent™ II tee is manufactured from stainless steel with a soft brass threaded insert for the connection to the MS interface. This will ensure that no damage can be done to the MS interface by over-tightening the tee.

Mass Spectrometer Column Change Interface

ms NoVent II Principle of Operation:

The ms NoVent™ II prevents air and water from entering the MS during column change-over. The key to the ms NoVent™ II is the unique fluidic valve and deactivated fused silica interface tube which are located at the MS interface as part of the ms-NoVent™ II Tee. The tee is shown in Figure 2. Before the column is removed from the interface, a helium purge is turned on. The fused silica restrictor interface tube limits the flow of helium into the mass spectrometer, which only marginally effects its vacuum. As shown in Figure 2, once the column has been removed from the GC, the fluidic valve (via the Flow Director Orifice) will prevent air from entering the mass spectrometer. The flow of helium through the orifice acts as a dynamic seal preventing air from being sucked back into the MS.

Normal Operation Mode

The Helium purge is turned off for normal operation. The column flow is directly through to the MS via the fused silica transfer tube. **Note: The transfer tube and tee in normal operation are under vacuum through the MS interface vacuum.**

Column Change Mode

In the column change mode a helium purge is applied to the interface tee. The column can then be disconnected without shutting down or “venting” the MS. The existing column or a new column can then be reconnected and the ms NoVent II switched back to normal mode for standard operation. **Note: There is no time limit to how long the MS system can be left in the column change mode, but please ensure that you have sufficient carrier gas supply.**

1.0 Standard ms NoVent™ II Overview

The standard ms NoVent II consists of three components:

- Control Module
- "Interface Tee" MS connection
- Fused silica restrictor



Figure 1.

1.1 Control Module

The Control Module manages the purge gas required by the ms NoVent™ II when a column is disconnected. A pressure gauge, located on the front of the module, enables monitoring of the purge pressure. Purge gas is controlled using the on-off toggle valve; forwards to turn ON ("change column") and back to turn OFF. Gas Inlet and Outlet connections are on the side of the control module.

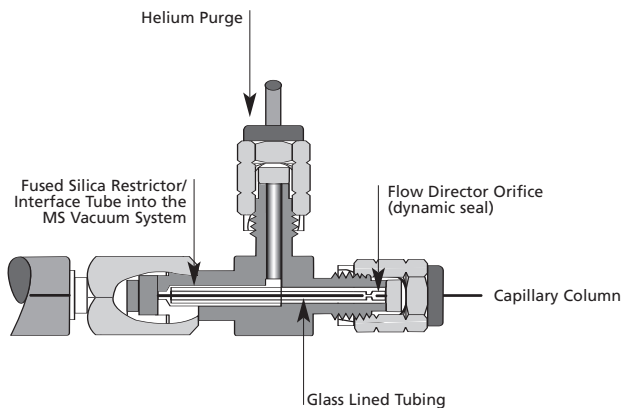


Figure 2.

1.2 "Interface Tee" MS Connection

The heart of the ms NoVent™ II is the Interface Tee installed onto the MS interface inside the GC oven.

1.3 Fused silica restrictor

This connects the tee, to the source in the MS, and restricts the flow of gas into the MS. Each GC-MS model requires a restrictor with a specific length and inside diameter.

ms NoVent II Ordering Information

Control Unit	Part No.	
GC - MS	113440	
	Fused Silica Restrictor (Pkt 2)	ms NoVent II Tee
Agilent/HP5970	113451	113490
Agilent 5971/HP5972	113452	113490
Agilent/HP5973	113453	113490
Agilent/HP5989	113454	113490
HP-GCD	113455	113490
HP5988-A	113456	113490
PerkinElmer Turbomass/Gold	113460	113492
Shimadzu MS 5000/5050	113465	113491
Shimadzu MS 5000/5050 with Wide Bore Interface	113466	113490
Shimadzu 2010	113455	113490
Thermo Finnigan GCQ	113470	113490
Thermo Finnigan SSQ7000	113471	113490
Thermo Finnigan Voyager	113472	113490
Thermo Polaris Q	113475	113490
Thermo Trace DSQ	113475	113490
Thermo Focus DSQ	113475	113490
Varian Saturn 2000, 2100, 2200	113480*	113490
Varian Saturn 1,2,3 and 4	113481*	113490

* includes adaptor. Replacement Restrictor only may be ordered as follows:

GC - MS	Replacement Restrictor only
Varian Saturn 2000, 2100, 2200	113482
Varian Saturn 1,2,3 and 4	113483

2.0 Installation of the Interface

2.1 Check the average carrier gas velocity using an unretained solute. Record this value for reference later.

2.2 Cool all the heated zones of the GC-MS and follow the specific venting procedure for your MS.

2.3 Turn off the carrier gas source supply.

2.4 Turn off the GC and unplug the power cord.

2.5 Place the ms NoVent II control module in a convenient position on top of, or beside the GC.

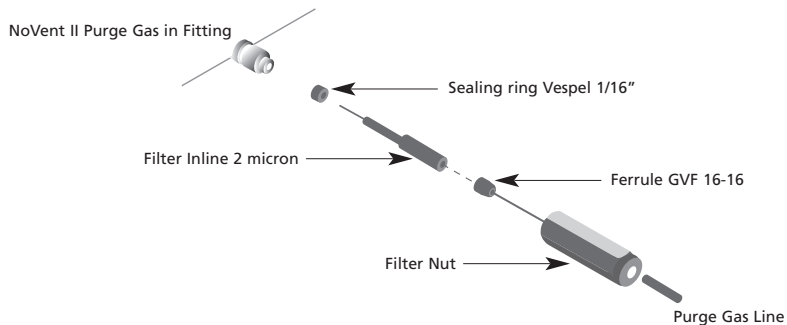


Figure 3.

2.6 Cut the carrier gas source inlet line behind the GC. Install the Parker® tee using the nuts and ferrules provided. Insert and fix the 1/8" bushed end of the supplied 1/16" stainless steel tubing to the side arm of the Parker® tee using the nuts and ferrules provided.

Connect the other end of the 1/16" tubing to the ms NoVent™ II control module "purge gas in", via the inlet filter, as shown in Figure 3. Please ensure that the tapered end of the GVF 16-16 ferrule points into the filter nut. Tightening the filter nut secures both the ferrule and the sealing ring.

2.7 Take the second piece of coiled 1/16" stainless steel (NOT having the 1/8" bushing) and identify the marked end. The marked end of the tubing has a restriction that MUST be connected to the ms NoVent II tee.

2.8 Connect the NON-MARKED end of the 1/16" tubing to the "NoVent Tee" outlet of the ms NoVent control module using the 10-32 nut and Graphitized Vespel® ferrule provided (the 10-32 nut is located in the same bag as the inlet filter). Thread the tubing into the GC oven so that its outlet is located near the ms NoVent™ II tee.

Note: The tubing can be introduced into the oven by one of the holes in the roof of the GC. Be careful not to get insulation into the tubing when passing it through the oven roof. Another option would be to have the tubing enter via the same hole as the transfer line i.e. oven wall.

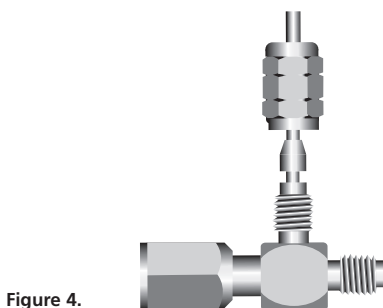


Figure 4.

2.9 Ensure that the pressure regulator control knob on the top of the ms NoVent™ II control unit is turned fully counterclockwise and that the ms NoVent™ II on/off toggle valve is set to "change column". Turn on carrier gas supply.

2.10 Adjust the pressure regulator control knob on the top of the ms NoVent™ II control unit

to a pressure of 5-8 PSI. Helium is now purging through the control box and purge line. After 5 minutes set the ms NoVent™ II toggle valve to off (back position).

Note: For high sensitivity applications, allow the lines to purge for 2-4 hours to expel all ambient air and water trapped in the control module and purge gas lines.

2.11 Disconnect the column from the mass spectrometer, following the normal instrument procedure.

Caution: MS interface may be HOT. Care should be taken when dealing with HOT surfaces.

ms NoVent Restrictors

An instrument specific restrictor must be installed into the MS interface for correct operation of the ms NoVent™ II. Please ensure the restrictor matches your MS.

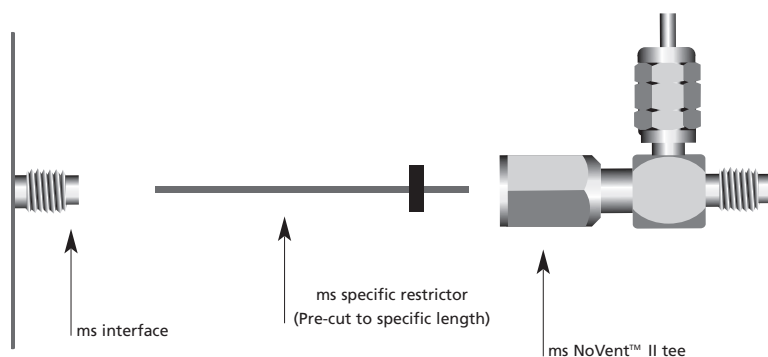


Figure 5.

2.12 Restrictors supplied with an adaptor. (If restrictor is not supplied with adaptor go to 2.13).

For some instruments an adaptor is required to allow the NoVent™ II tee to be connected to the MS interface. Please follow the instructions provided with the adaptor.

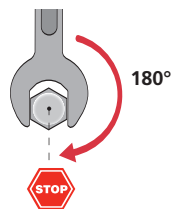
2.13 Remove the MS specific restrictor from its protective packaging. Insert the short end of the restrictor into the ms NoVent™ II tee ensuring that the fused silica tubing passes into the GLT™ orifice at the center of the tee approximately 20mm.

Note: Replace restrictors after the seal between the MS and ms NoVent™II tee interface is broken.i.e. for source cleaning.

Slide the long end of the restrictor through the interface and into the mass spectrometer's source. Tighten the tee using the following procedure:

- Use fingers (rather than a wrench) to hold the tee and tighten the nut onto the interface (or adaptor) until it stops.
- Use a wrench to tighten to a further 30°. A reliable seal will be achieved. Do not tighten further as the interface may be damaged and the fused silica restrictor will be broken after approximately 180° of further turning.

2.14 Connect the marked end of the 1/16" tube to the sidearm of the ms NoVent™ II union tee inside the oven, using a 1/16" SilTite nut & ferrule. It is important that the tubing is inserted all the way into the tee sidearm to avoid leakage. Initially finger tighten while maintaining pressure on the tubing which is located in the sidearm. Then, using a wrench, gradually tighten the SilTite nut until the ferrule just begins to hold the tubing. Then tighten a further 180°.



2.15 If it was removed, re-connect the column to the injector. Then turn the column head pressure back on. Place the other end of the column in some organic solvent and check for bubbles exiting the end of the column. Do not connect the column to the ms NoVent™ II interface tee until all the air has been purged out of it. This will take 5 to 10 minutes. You may also wish to condition or "Bake Out" the column at this point to avoid contamination of the MS.

2.16 Column Connection to the ms NoVent NoVent™ II

Note: It is important that care is taken to correctly install the column to avoid possible leakage. Use the following procedure to install the column:

- Insert the capillary column into the SilTite™ nut.
- Insert the capillary column into the appropriate SilTite™ ferrule; ensure the direction of

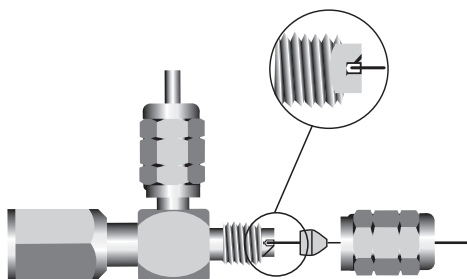
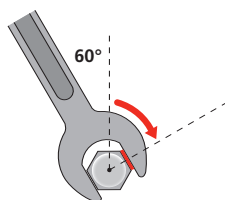


Figure 6.

ferrule is as shown in Figure 6. Use a 0.4mm hole ferrule for 0.25mm ID columns, or a 0.5mm hole ferrule for 0.32mm ID columns.

- Slide the ferrule loosely into the SilTite™ nut.
- With one hand holding the SilTite™ nut, and the other hand holding the capillary column; place the end of the capillary column into the recess of the tee as shown in Figure 6.

Note: Do not force the column into the tee.



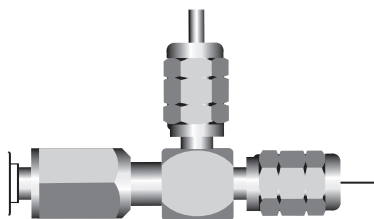


Figure 7.

Note: SilTite ferrules and nuts are to be used on all connections to the ms NoVent™ II tee.

- e) Slide the SilTite™ nut onto the tee and finger tighten while maintaining a minimum amount of pressure on the column which is up against the tee hole.
- f) Using a wrench, gradually tighten the SilTite nut until the ferrule begins to hold the fused silica. Then tighten a further 60°.

2.17 Pump down the mass spectrometer as per the manufacturer's instructions, and allow the system to equilibrate (on the initial installation of the ms NoVent NoVent™ II, MS equilibration may take 5-10 hours). Ensure that ms NoVent NoVent™ II change column toggle valve is in the off position.

Note: Placing the ms NoVent™ II in line will decrease column flow due to its restriction. To compensate for this column length, or head pressure, or flow will need to be adjusted on the GC. On GC-MS systems that have the feature, changing the detector pressure setting from "vacuum" to "atmospheric pressure" may provide sufficient compensation. However due to variations in individual vacuum pumping systems, this may not always be the case.

Table 2 at the rear of these instructions lists the "old" programmed parameters (before the ms NoVent II is installed) and "new" programmed parameters (after the ms NoVent™ II is installed), which can also be used as a guide to maintaining the same flow through the column. If you have only manual pressure control, then change the column head pressure from the "old" pressure value to the "new" value. If you have Electronic Pressure Control, then change the column length setting from the "old" column length to the "new" column length. The Electronic Pressure Control system will then calculate the new column head pressure.

These figures are a guide only. Always double-check the average flow velocity after the ms NoVent™ II is installed, using an unretained solute, and ensure that it is the same as the initial value recorded prior to installation of the ms NoVent™ II.

2.18 The system is now ready for use (Refer to Figure 7).

2.19 Double check the average column flow velocity using an unretained solute.

3.0 Procedure for changing a column

3.1 Cool the oven and injection port to ambient temperature, set the toggle valve to "Change Column" and turn the column head pressure off.

3.2 Turn the ms NoVent™ II purge gas on (set the toggle valve to the “Change Column” position. Helium is now purging through the control box and into the tee.

3.3 Disconnect the column from the ms NoVent™ II interface tee and the injector.

Caution: The interface tee may be very hot. Heat insulating oven mitts/gloves should be used when handling hot surfaces.

3.4 Now follow instructions 2.15 and 2.16

3.5 Switch on the oven, injection port heater and column head pressure.

3.6 Turn the ms NoVent™ II purge gas off.

3.7 The system is now ready for use. (Refer to Figure 7). If a column with different length or ID has been installed, it may be necessary to refer to Table 2, and adjust either the column head pressure, or length, as described in the note in section 2.17.

3.8 Double check the column flow velocity using an unretained solute.

Table 2

5973 MS		(Old Pressure, New Pressure, New Length)		
Column Length	0.1	Internal Diameter		
		0.22	0.25	0.32
10	(30.3, 32.95, 11.21)			
12		(-3.5, 3.03, 30.08)		(-9.4, 3.24, 137.48)
15			(-3.9, 4.24, 46.15)	(-8.1, 4.56, 127.70)
25		(8.6, 15.27, 41.35)		(-3.7, 9.17, 117.69)
30			(6.9, 15.26, 57.7)	(-1.5, 11.46, 117.81)
50		(31.8, 38.61, 65.73)		(7.3, 20.55, 128.39)
60			(28.5, 37.10, 86.28)	(11.7, 25.07, 136.15)
5972/1 MS (approx equal to Varian Saturn 123)		(Old Pressure, New Pressure, New Length)		
Column Length	0.1	Internal Diameter		
		0.22	0.25	0.32
10	(30.3, 34.07, 11.75)			
12		(-3.5, 5.12, 37.56)		(-9.4, 7.28, 206.29)
15			(-3.9, 6.81, 59.48)	(-8.1, 8.57, 186.44)
25		(8.6, 17.36, 47.32)		(-3.7, 13.186, 160.67)
30			(6.9, 17.85, 68.14)	(-1.5, 15.49, 156.93)
50		(31.8, 40.74, 71.08)		(7.3, 24.64, 159.88)
60			(28.5, 39.77, 95.39)	(11.7, 29.18, 165.78)
5970 MS/Varian Saturn 2000		(Old Pressure, New Pressure, New Length)		
Column Length	0.1	Internal Diameter		
		0.22	0.25	0.32
10	(30.3, 36.47, 12.93)			
12		(-3.5, 9.17, 54.52)		(-9.4, 15.12, 379.92)
15			(-3.9, 11.77, 90.11)	(-8.1, 16.35, 331.88)
25		(8.6, 21.37, 59.91)		(-3.7, 20.93, 262.23)
30			(6.9, 22.82, 90.52)	(-1.5, 23.23, 247.77)
50		(31.8, 44.81, 81.89)		(7.3, 32.45, 229.65)
60			(28.5, 44.84, 113.98)	(11.7, 37.03, 230.37)
Shimadzu QCP5000/5050 All types / Finnigan GCQ		(Old Pressure, New Pressure, New Length)		
Column Length	0.1	Internal Diameter		
		0.22	0.25	0.32
10	(30.3, 35.95, 12.67)			
12		(-3.5, 8.34, 50.77)		(-9.4, 13.51, 339.95)
15			(-3.9, 10.75, 83.31)	(-8.1, 14.75, 298.64)
25		(8.6, 20.55, 57.22)		(-3.7, 19.34, 239.44)
30			(6.9, 21.81, 85.70)	(-1.5, 21.65, 227.53)
50		(31.8, 43.98, 79.63)		(7.3, 30.86, 214.41)
60			(28.5, 43.81, 110.06)	(11.7, 35.43, 216.36)

All calculations made assuming: He carrier, 50°C oven temp and 35cm/sec average linear velocity.

ms NoVent™ II Packing List

	Quantity	Reorder
Installation and Instruction Manual	1	MN-0476-A
Control Unit NoVent™ II	1	113440
Connection Tube Restricted Flow SS 1/16" DIA.	1	113417
Connection Tube SS 1/16" DIA. Sleeved 1/8" DIA.	1	113421
Accessories in Box		
Wrenches 1/4" AF 5/16" AF 2 18500001	2	N/A
In Line Filter With Seal Ring and Nut	1	113499 (PKT 2)
Ferrules – SilTite 0.25mm ID Column	5	073220 (PKT 10)
Ferrules – SilTite 0.32mm ID Column	5	073221 (PKT 10)
Ferrules – SilTite 1/16" ID	5	073223 (PKT 10)
Ferrules – Graphite Vespel 1/16" ID	5	072657 (PKT 10)
Tee Piece 1/8"	1	N/A
Nut – For 1/16" Tube (for use on Control Module outlet)	1	103408 (PKT 5)
Accessories with Tee		
Nuts – SilTite 10/32" 0.8MM ID hole (for column connection)	2	073224 (PKT 5)
Nuts – SilTite 10/32" 1/16" ID hole (for connection of Restricted Flow SS tubing)	1	073225 (PKT 5)

For replacement tees and restrictors see items table "MS NoVent™ II Ordering Information"

Trouble Shooting Guide

Symptom	Possible Cause	Remedy
System Leakage		
MS will not pump down	Gross leak in one of the ms NoVent II tee connections	<ol style="list-style-type: none"> 1) Check column connection - retighten 2) Check helium purge side arm connection - retighten 3) Check tee-interface connection – retighten
High background of 18, 28 and 32 ion.	Air Leakage	<ol style="list-style-type: none"> 1) Check column connection - retighten 2) Check helium purge side arm connection - retighten 3) Check tee-interface connection – retighten
Purge Gas Control/Column Flow		
Poor MS vacuum without the presence of 28 or 32 ions	Helium ms NoVent II purge not turned off	<ol style="list-style-type: none"> 1) Check helium purge valve is turned off 2) Check that valve is operating correctly
No signal from MS	<ol style="list-style-type: none"> 1) Helium ms-NoVent II purge not turned off 2) Column blocked 3) ms NoVent II tee or restrictor blocked 	<ol style="list-style-type: none"> 1) Ensure helium purge gas is off 2) Check column flow with column disconnected 3) Check tee and/or restrictor for blockage
Long retention times	Helium ms NoVent II purge not turned off	<ol style="list-style-type: none"> 1) Check helium purge valve is turned off 2) Check that valve is operating correctly
Chromatography Parameters		
Chromatographic retention is different from when the ms NoVent II was not connected	Pressure/flow/column length compensation has not been programmed	<ol style="list-style-type: none"> 1) Following the procedure outlined on effecting compensation in Section 2.17 - 2.19 2) Check flow velocity with unretained solvent peak
System Activity	<ol style="list-style-type: none"> 1) MS restrictor active 2) Wrong restrictor selected 	Replace MS restrictor
Poor peak shape	<ol style="list-style-type: none"> 1) Column Connection 2) Broken MS restrictor 	<ol style="list-style-type: none"> 1) Reconnect the column 2) Check restrictor and replace if broken
Large tailing solvent peak in splitless injection	Micropurge (50µL/min) from control box is blocked	<ol style="list-style-type: none"> 1) Check micropurge flow from helium purge line 2) Unblock by ultrasonication/gas pressure if possible 3) Replace helium purge line
<p><i>Argon is a very good way to check for the source of MS system leakage. By moving the Argon around system connections and looking at a total ion MS trace, the presence of Argon in the MS flow stream can be identified by the 40amu – Argon ion. Also note: 18amu=Water; 28amu = Nitrogen; and 32amu = Oxygen</i></p>		

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