

Agilent G3510A/G3511A Multimode Inlet

IC 沪制01150234号

For the Agilent 7890A Gas Chromatograph

Installation Instructions

Parts Supplied

Table 1	Liquid Carbon	Dioxide	(CO_{2})	Kit G3510A
			\ <u></u>	

Description	Quantity
Liquid CO2 MMI inlet assembly (MMI Inlet weldment assembly, EPC module, Thermocouple board, TC board cable, split vent filter and valve)	1
MMI Inlet Chassis	1
CO ₂ Cryo bracket and CO ₂ valve	1
Captive screw, M4 x 14 mm long (for CO ₂ cryo bracket)	2
Split vent filter retaining bracket	1
Machine screw, M4 x 12 mm long (for Thermocouple board and split vent filter retaining bracket)	3
Column Nut Cup	1
Capillary Cup Insulation	1
Screw M4 x 12 mm long (for column nut cup)	2
MMI ship kit	
Column hanger	1
Liner, MS Certified, splitless, single taper, deactivated, glass wool	1
11 mm low bleed septa (5 pk)	1
O-Ring, 2-010, Fluoroelastomer (5 pk)	1
Ferrule, Graphite, 0.5 mm id for 320um columns (10 pk)	1
Agilent 3500A/G3510A Multimode Inlet Large Volume InjectionTutorial	1
Wrist strap, disposable 4-LG 1-W	1



Description	Quantity	
Liquid N2 MMI inlet assembly (MMI Inlet weldment assembly, EPC module, Thermocouple board, TC board cable, split vent filter and valve)	1	
MMI Inlet Chassis	1	
CO ₂ Cryo bracket	1	
Captive screw, M4 x 14 mm long (for CO ₂ cryo bracket)	2	
Split vent filter retaining bracket	1	
Machine screw, M4 x 12 mm long (for Thermocouple board and split vent filter retaining bracket)	3	
Column Nut Cup	1	
Capillary Cup Insulation	1	
Screw M4 x 12 mm long (for column nut cup)	2	
Liquid N ₂ cryo valve assembly	1	
Liquid N ₂ insulation cover	1	
MMI Liquid N ₂ nut plate	1	
Screw M4 x 0.7 12mm (for N2 insulation cover, N2 hut plate, N2 cryo assy)		
MMI ship kit		
Column form hanger		
Liner, MS Certified, splitless, single tpr, D, GW		
11 mm low bleed septa (5 pk)		
O-Ring, 2-010, Fluoroelastomer (5 pk)		
Ferrule Graphite 320um 0.5mm id (10 pk)		
Agilent 3500A/G3510A Multimode Inlet Large Volume InjectionTutorial	1	
Wrist strap, disposable 4-LG 1-W	1	

Table 2 Liquid Nitrogen (N2) Kit G3511A

Parts Identification



Figure 1 MMI CO₂ parts







 $\label{eq:Figure 3} \quad \text{CO}_2 \text{ cryo assembly with board bracket}$



Figure 4 N₂ cryo assembly

Tools Required

- T-10 and T-20 Torx drivers
- Open-end wrench
- Diagonal sheet metal cutter

Installation Procedure

This procedure explains how to install the Multimode (MMI) inlet accessory on the Agilent 7890A Gas Chromatograph (GC). This document covers the following Multimode inlet accessories:

Table 3

Kit Number	Coolant
G3510-64000	Liquid carbon dioxide (CO ₂)
G3511-64000	Liquid nitrogen (N ₂)

Before beginning the installation, read the 7890A Safety Manual found on the Agilent Instrument Utility software DVD.

Check the GC firmware revision

- 1 Make sure the instrument/component is turned on and not in use. Make sure any sampler or other device is also connected and turned on.
- 2 Press [Status][Clear] to view the GC firmware version.
- 3 The MMI requires 7890A GC firmware A.01.10 or higher.
 - If the firmware needs to be updated, use Agilent Instrument Utility B.01.0x or Agilent Lab Advisor B.01.0x or greater to update the firmware.
 - To get the latest firmware, see the Agilent web site.
 - For help in performing the update, see the Instrument Utility or Lab Advisor help.

Prepare the GC

- 1 Turn off the GC and unplug the power cord.
- 2 Allow time for the oven and heated zones to cool.
- **3** Turn off all gas supplies.

- **4** If there is an Automatic Liquid Sampler (ALS) tray installed on the GC, remove it. See the ALS user documentation for instructions.
- **5** Remove the detector cover by raising the cover vertically and then firmly lifting up on the right side of the cover to free the lid from the hinge pin. Slide the pin out of the hole on the left side hinge and put the cover aside.
- 6 Clean out the oven, removing all columns and hardware associated with both inlets.
- 7 Remove the gray plastic inlet cover by loosening the screws.
- 8 Remove the left side cover by loosening the top screw, sliding the panel towards the rear, and lifting the cover off.
- **9** Unsnap the pneumatics cover by pressing the black clips on the sides of the cover. Lift the cover up and off.
- **10** Remove the EPC module bracket adjacent to the inlet EPC module area by removing the screw and lifting the bracket off.



Figure 5 Locating the EPC module brackets

11 Put on the ESD wrist strap and attach the ground to the GC sheet metal frame for electrostatic protection.

Prepare the inlet mounting position

Choose the position to install your MMI inlet. The MMI inlet can be installed in the front or back inlet position. If an inlet is already installed in your chosen position, remove the inlet, pneumatics module, and all associated tubing and wiring. If your chosen inlet position is not used:

- 1 Remove the round metal cutout at this location using diagonal cutters. Make the cuts so that the metal nubs remain attached to the discarded metal circle.
- 2 Remove and discard the circular insulation plug.

Replace the inlet chassis

- 1 If the chassis contains an inlet that you are keeping in addition to the MMI inlet, remove this inlet and temporarily set it beside the chassis.
- **2** Record how the wiring of the fan is routed but do not unplug the connections. This fan will be installed in the new chassis.
- **3** Remove the fan from the old inlet chassis by pressing on the clips and lifting the fan out.



Figure 6 Inlets and fan removed

- **4** Remove the GC electrical connectors from the inlet chassis by pressing the clips on the connectors and pushing them down, freeing them from the chassis. Record the position and order of the connectors on the chassis.
- **5** Remove the old inlet chassis by removing the screws in each corner and lifting the chassis off. This chassis will not be used, but the four removed screws with be used to secure the new chassis.
- **6** Install the new MMI inlet chassis, positioning it similarly to the old chassis alignment with the fan slot to the rear of the GC. Do not screw the chassis down at this time.

- 7 Align the fan with the sloping rear face of the chassis so that the direction of the air flow matches the direction of the arrow on the fan body.
- 8 Route the wiring as recorded in step 1.
- **9** Press the fan into the chassis until the clips engage.
- 10 If removed, install the inlet you are keeping.
- **11** Route the GC electrical connector ends from bottom to top and fit into the slots on the new inlet chassis in the same configuration as before. You may need to lift up the inlet chassis to fit these wires under the GC frame.



Figure 7 GC connectors routed properly into inlet chassis frame

Install the liquid CO₂ MMI inlet module

If you are installing the liquid N_2 MMI inlet module, skip to "Install the liquid N_2 MMI inlet module" on page 15.

Prepare the cryo assembly (liquid CO₂ MMI only)

The solenoid valve assembly should be installed onto the cryo bracket as shown in Figure 9. If not, assemble as follows:



Figure 8 Installing the cryo valve assembly onto the new bracket

- 1 Install the solenoid valve on the new bracket using two screws as shown in Figure 8.
- **2** If necessary, disconnect all electrical connections on the thermocouple board.
- **3** Mount the thermocouple board onto the new cryo assembly bracket using two screws. Plug the solenoid valve control wire into the connector on the thermocouple board. Route the coolant tube around the back of the thermocouple board bracket to avoid an electrical short.



Figure 9 CO₂ cryo and board assembly ready for installation

Position the inlet

- **1** Rest the EPC module in the pneumatics area. Do not install the EPC module at this time. It will be installed at the end of the procedure.
- 2 Insert the MMI inlet body into the desired inlet position in the chassis so that the tubing and wiring are running to the left side of the chassis. See Figure 13 and Figure 15 for proper routing.

Install the split vent valve and filter assemblies

1 Install the split vent filter into the housing, making sure that the flat sides on the split vent filter are vertical. The split vent filter will lock into place when properly installed. See Figure 10.



Figure 10 Installing the split vent filter assembly

- 2 Align the split vent valve assembly over the two screw holes and secure using two captive screws.
- **3** Install the split vent filter retaining bracket with one screw to secure the split vent filter.
- **4** Position the tubing from the split vent assembly to the inlet so that it will not be pinched by the left side cover.

Install the cryo assembly

1 Place the cryo assembly into the position next to the split vent assembly.



Figure 11 Cryo assembly installed

- 2 Secure the bracket using two screws.
- **3** Route the cryo tubing across the left side of the GC. Do not connect the tubing to the inlet until the electrical wires are routed, as described in the following steps.

Route the MMI electrical wiring

- 1 Disconnect the wiring harness from the inlet heater cable.
- 2 Route the white connector ends (FI and FV) of the wiring harness up through channels on the GC (Figure 12), plugging them into the appropriate connectors (FI and FV or BI and BV) on the inlet chassis. It may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots.) shows the routing for a front inlet position.



Figure 12 Routing wiring harness through chassis



 $\label{eq:Figure 13} \quad \text{CO}_2 \text{ electrical wire routing (front inlet installed)}$

- **3** Route the thermocouple and heater wires from the inlet down through the GC frame. Again, it may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots.
- **4** Route the thermocouple wire across the left side of the GC and up under the split vent line.
- 5 Plug the thermocouple wire into the thermocouple connector on the Thermocouple board, matching positive and negative connectors. See Figure 14.



Figure 14 CO₂ assembly board connections

- 6 Plug the heater wire connector into the heater connector labeled HTR on the wiring harness.
- 7 Route the wiring harness plug labeled PCB across the left side of the GC and up through the channel in the cryo assembly area.
- 8 Slide the grommet on the left side of the GC out of the sheet metal slot and include all the wires and cables in the grommet. Position the grommet back in the slot.
- **9** Connect the tubing from the cryo assembly to the open CO_2 tube on the inlet.



Figure 15 Connecting the cryo assembly tubing to the inlet

10 Plug the PCB connector into the front connector on the MMI board. See Figure 14.

Complete the installation

- 1 Secure the MMI inlet into place by tightening the three screws.
- **2** Secure the inlet chassis onto the GC by tightening the four screws on the inlet chassis.
- **3** To complete the installation of the liquid CO_2 MMI inlet, skip to "Install the EPC module" on page 18.

Install the liquid N₂ MMI inlet module

If you are installing the liquid CO_2 MMI inlet module, skip to "Install the EPC module" on page 18.

Prepare the Thermocouple board (liquid N₂ only)

- **1** If necessary, disconnect all electrical connections on the Thermocouple board.
- **2** Install the Thermocouple board onto the new board bracket using two screws, as shown below.



Figure 16 Thermocouple board assembly ready for installation

Position the inlet

- **1** Rest the EPC module in the pneumatics area. Do not install the EPC module at this time. It will be installed at the end of the procedure.
- 2 Insert the MMI inlet body into the desired inlet position in the chassis so that the tubing and wiring are running to the left side of the chassis. See Figure 13 and Figure 15 for proper routing.

Install the split vent valve and filter assemblies

- 1 Install the split vent filter into the housing, making sure that the flat sides on the split vent filter are vertical. The split vent filter will lock into place when properly installed. See Figure 10.
- **2** Align the split vent valve assembly over the two screw holes and secure using two captive screws.
- **3** Install the split vent filter retaining bracket with one screw to secure the split vent filter.
- **4** Position the tubing from the split vent assembly to the inlet so that it will not be pinched by the left side cover.

Install the Thermocouple board

Install the Thermocouple board in the position next to the split vent assembly and secure using two screws. See Figure 17 for correct bracket and board orientation.



Figure 17 N₂ assembly board connections

Install the cryo assembly and route the MMI electrical wiring

- 1 Unplug the wiring harness from the inlet heater cable.
- **2** Route the white connector ends (FI and FV) of the wiring harness up through channels on the GC, plugging them into the appropriate connectors (FI and FV or BI and BV) on the inlet chassis. It may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots. See Figure 13.
- **3** Route the cryo line, thermocouple wire, and heater wires from the inlet down through the GC frame. Again, it may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots.
- **4** Remove the top round metal cutout on the lower rear cover using the diagonal cutters. Make the cuts so that the metal nubs remain attached to the discarded metal circle.
- **5** Position the nut plate inside the damper assembly in the rear of the GC. Align nut plate with the screw holes in the left side of the GC and secure with a screw.



Figure 18 Nut plate installed

- 6 Slide the nut end of the insulated tubing of the N_2 cryo assembly through the top round cutout on the lower rear cover of the GC.
- 7 Align the sheet metal plate through holes in the N_2 cryo assembly over the attachment holes in the left side of the GC and secure with three screws. Refer to Figure 18 for the locations of the screw holes.
- 8 Route the solenoid valve cable from the cryo assembly and the thermocouple wire from the inlet to the MMI board. See Figure 17.
- **9** Plug the solenoid valve cable into the valve connector on the MMI board. Plug the thermocouple wire into the correct +/- connection on the MMI board. See Figure 17.
- **10** Route the PCB cable from the wiring harness to the MMI board and plug it into the PCB connector on the board. See Figure 17.
- **11** Slide the grommet on the left side of the GC out of the sheet metal slot and include the thermocouple wire, solenoid valve cable, and PCB cable in the grommet. Position the grommet back in the slot. See Figure 13.
- 12 Route the cryo tubing from the inlet through the chassis slot to the cryo valve assembly fitting so that the tubing lies flat against the left side of the GC. See Figure 19.
- 13 Attach the cryo tubing to the N2 cryo valve.



Cryo tubing routed through slot

Figure 19 Connecting the cryo assembly to the inlet

14 Position the sheet metal insulation cover over the insulated tubing of the cryo assembly and secure the cover with two screws.



Figure 20 Insulation cover installed

Complete the installation

- 1 Secure the MMI inlet into place by tightening the three screws.
- **2** Secure the inlet chassis onto the GC by tightening the four screws on the inlet chassis.

Install the EPC module

- **1** Position the EPC module over the selected inlet slot in the pneumatics area. The rear inlet slot is for a rear inlet and the front inlet slot is for a front inlet.
- **2** Connect the communication cable from the GC to the communication connector on the EPC module, and connect the split vent valve wire from the split vent assembly to the split vent valve connector on the EPC module.



Figure 21 Split vent valve and communication cable connections on EPC module

- **3** Slide the EPC module into the slot, being careful not to pinch the wires.
- 4 Attach the EPC module bracket and secure with a screw.
- 5 Route the carrier gas tubing from the inlet to the EPC module to the MMI inlet alongside the Inlet chassis.

Install the Insulation Cup

1 Place the insulation in the column nut cup.



Figure 22 Placing the insulation in the column nut cup

2 From inside the oven, install the two heat-resistant screws in the cutouts adjacent to the inlet opening. Do not tighten the screws. Place the column nut cup slots into the screws and tighten the two screws to complete installation.

Restore the GC to operating condition

- **1** Replace all instrument covers in the reverse order that they were removed.
- 2 Plug in the GC and turn on the power.
- **3** To unlock the configuration, press **[Options]**, select **Keyboard & Display**, and press **[Enter]**. Scroll to **Hard Configuration Lock** and press **[Off/No]**.
- 4 On the GC keypad, press [Configure] then [Front Inlet] or [Back Inlet].
- 5 On the unconfigured parameter, press [Mode/Type].
- 6 For N_2 or CO_2 Cryo scroll to Install Frnt Inlet (FVCRYO) or Install Back Inlet (BVCRYO). Press [Enter]. A caution message will appear instructing you to reboot.
- 7 Reboot the GC.
 - a Press [Options].
 - **b** Scroll to **Communications** and press [Enter].
 - c Scroll to **Reboot the GC?** and press **[On/Yes]** twice to reboot the GC and have the changes take effect.
- 8 Zero the pressure sensors.
 - a On the GC keypad, press [Options].
 - **b** Scroll to **Calibration** and press [Enter].
 - c Scroll to select the front or back inlet and press [Enter]. Scroll to [Pressure Zero] and press [On/Yes].

- **9** Connect the source gas lines to the EPC module using the provided 1/8-inch nuts and ferrules.
- 10 Turn on gas pressure and leak-check all fittings
- 11 Zero the specific flow sensor.
 - a Press [Options], scroll to Calibration, and press [Enter].
 - **b** Scroll to the new MMI module to be zeroed and press [Enter].
 - **c** Scroll to a zero line and press **[Info]**. The GC will remind you of the conditions necessary for zeroing that specific sensor.
 - d Press [On/Yes] to zero or [Clear] to cancel.

© Agilent Technologies, Inc. 2009

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

First Edition, May 2009

This information is subject to change without notice.

Printed in USA and China

Agilent Technologies, Inc. 2850 Centerville Road, Wilmington, DE 19808-1610 USA

安捷伦科技 (上海)有限公司 上海市浦东新区外高桥保税区 英伦路 412 号 联系电话: (800) 820 32

Manual Part Number

G3510-90010

Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

