

MICRO-CIRRUS 3 INTERFACE



INSTALLATION INSTRUCTIONS

004-42805-00
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(Rev A)

TRADEMARKS

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ABOUT THIS MANUAL



All references to FR-series Flow Reactors in this document encompass the FR-100 and FR-200 unless otherwise noted.

Parts and accessories are located on the [Micromeritics](#) web page.

The following symbols or icons indicate safety precautions and/or supplemental information and may appear in this manual:



NOTE — Notes contain important information applicable to the topic.



CAUTION — Cautions contain information to help prevent actions that may damage the analyzer or components.



WARNING — Warnings contain information to help prevent actions that may cause personal injury.

GENERAL SAFETY



Do not modify this instrument without the authorization of Micromeritics Service Personnel.

Any piece of laboratory equipment can become dangerous to personnel when improperly operated or poorly maintained. All employees operating and maintaining Micromeritics instruments should be familiar with its operation and should be thoroughly trained and instructed on safety.

- Read the operator manual for any special operational instructions for the instrument.
- Know how the instrument functions and understand the operating processes.



- Wear the appropriate personal protective equipment when operating this instrument — such as eye protection, lab coat, protective gloves, etc.
- When lifting or relocating the instrument, use proper lifting and transporting devices for heavy instruments. Ensure that sufficient personnel are available to assist in moving the instrument.
- Always pay attention to the safety instructions provided on each label affixed to the instrument and do not alter or remove the labels. When inspecting the instrument, ensure that the safety labels have not become worn or damaged.
- Proper maintenance is critical to personnel safety and smooth instrument operation and performance. Instruments require regular maintenance to help promote safety, provide an optimum end test result, and to prevent costly down time. Failure to practice proper maintenance procedures can lead to unsafe conditions and shorten the life of the instrument.
- Improper handling, disposing of, or transporting potentially hazardous materials can cause serious bodily harm or damage to the instrument. Always refer to the MSDS when handling hazardous materials. Safe operation and handling of the instrument, supplies, and accessories is the responsibility of the operator.

INTENDED USE



The instrument is intended to be operated by trained personnel familiar with the proper operation of the equipment recommended by the manufacturer and as well as relevant hazards involved and prevention methods. Other than what is described in this manual, all use is seen as unintended use and can cause a safety hazard.



The instrument is intended to be used as per applicable local and national regulations.

TRAINING

It is the customer's responsibility to ensure that all personnel operating or maintaining the equipment participate in training and instruction sessions. All personnel operating, inspecting, servicing, or cleaning this instrument must be properly trained in operation and machine safety before operating this instrument.

SYMBOLS THAT MAY APPEAR ON YOUR INSTRUMENT

The following symbols or icons indicate safety precautions and/or supplemental information and may appear on your instrument:



Use extreme caution when working on the instrument where one of these symbols may be displayed. These symbols indicate the part may be hot and cause serious burns.



Use the cotton gloves provided in the accessory when handling heated surfaces. These cotton gloves are not intended to protect hands when heated surfaces are above 60 °C.



When working on the instrument where this symbol is displayed, refer to your Micro-meritics' instruction manual for additional information.



When this symbol is displayed, toxic or flammable gases require proper venting of exhaust.

This symbol can also indicate the instrument uses mercury which is an extremely toxic substance. Read the Material Safety Data Sheet (MSDS) and be aware of the hazards of mercury and know what to do in the event of a spill or an exposure incident

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1 INTRODUCTION

MKS CIRRUS 3



- A. Power cord connector
- B. Analog I/O 15-pin connector
- C. Ethernet port
- D. Digital I/O 25-pin connector

The *Micromeritics-Cirrus Interface Software* is used with select Micromeritics analyzers integrated with an MKS Cirrus 3 mass spectrometer. This software runs within the *MKS Process Eye Professional* application. The Micromeritics-Cirrus Interface Software will perform the following tasks:

- Automatically collect data with the Cirrus 3 mass spectrometer via trigger signal from the Micromeritics analyzer
- Customize *Peak Jump* recipes
- Access standard operations such as analog scan, barchart scan, peak jump scan, leak check, and data storage
- Calibrate detectors
- Scale the Micromeritics analyzer sample thermocouple signal

Refer to the *Micro-Cirrus 3 Interface User Guide* [part number 004-42804-00] for details on operating the interface software. If connecting the Micromeritics Breakthrough Analyzer or an FR-series to the MKS Cirrus 3, refer to the user guide that shipped with the analyzer.

HARDWARE

The mass spectrometer requires periodic maintenance. Allow adequate space for accessing connections and cables, as well as for ventilation. Refer to the *MKS-Cirrus* hardware manual for information pertinent to the mass spectrometer.

NETWORK CONNECTION

Micromeritics analyzers and MKS Cirrus 3 require separate Ethernet connections to a computer. An Ethernet switch can be used to connect both instruments to one Ethernet port on the computer, however, they must both be on the same subnet.



Initially, the BTA and FR-series analyzers are configured to use an address that begins with *168.12* and the Cirrus 3 is set to automatically configure the computer's IP address. Once a connection to the Cirrus 3 is established, it can be configured to use a static IP address that begins with *168.12*. Refer to the MKS Cirrus 3 instruction manual.

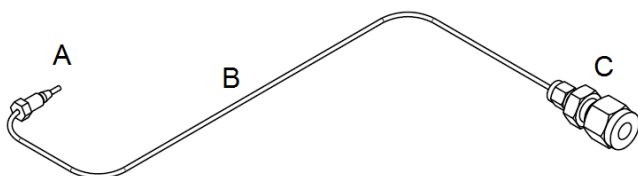
2 ASAP 2020 CHEMISORPTION

Software Installation and Operation Preparation on page 6 - 1



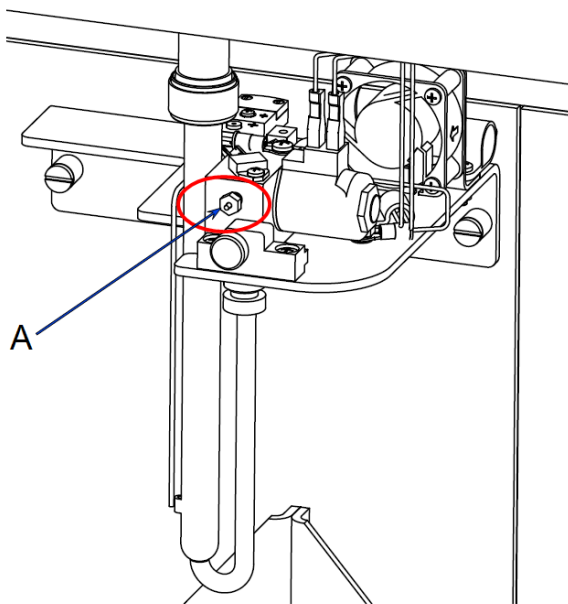
Accessories kit [part number 202-33040-00] is required to complete this installation.

1. Assemble the 316 stainless steel tubing with the reducing union on one end and the swaging nut and ferrule on the other.



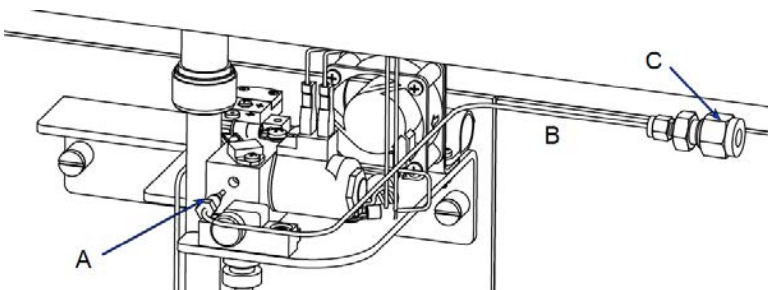
- A. Nut [part number 004-25541-00]
Ferrule [part number 004-25541-01]
- B. Stainless steel tubing
- C. Reducing union
[part number 004-25316-02]

2. Remove the 1/16 in. plug from the analyzer.



- A. 1/16 in. plug

3. Insert the ferrule into the opening where the 1/16 in. plug was removed.



- A. Nut [part number 004-25541-00]
Ferrule [part number 004-25541-01]
- B. Stainless steel tubing
- C. Reducing union [part number 004-25316-02]. Attach mass spectrometer capillary tube.

4. Bend the stainless steel tubing so that it does not interfere with the operation of the analyzer.
5. Insert the mass spectrometer capillary hose fitting into the reducing union on the stainless steel tube.



Slide reducing union onto the tip of the capillary tube

6. Use a 9/16 in. wrench to tighten the nut on the reducing union.

PIN-OUTS ASAP 2020 CHEMISORPTION CABLE

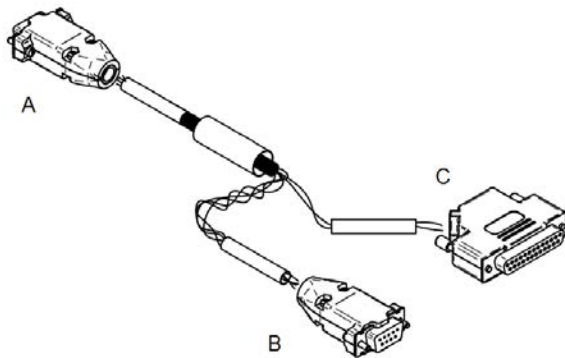
The cable from the chemisorption port has a 25-pin D connector with female contacts. It is designed to allow a 25-pin D cable with male connector pins on both ends to directly connect to a MKS Cirrus mass spectrometer.

Pin 6. Normally open contact.

Pin 10. The common pole.

Other pins are not used.

CONNECT ASAP 2020 CHEMISORPTION CABLE TO THE MASS SPECTROMETER



Mass Spectrometer Interface Cable [part number 202-60815-00]

- A. 25-pin female adapter. Connect to straight-thru cable (*part number 003-20656-03*).
- B. Connect to Valve/Fan port on analyzer front.
- C. 9-pin female adapter. Connect to chemisorption assembly.

1. Disconnect the 9-pin connector from the *Valve/Fan* port on the front of the analyzer.
2. Connect and tighten the 9-pin female connector on the interface cable to the 9-pin male connector disconnected in the previous step.



Attach mass spectrometer capillary interface cable to the chemisorption assembly adapter

3. Connect and tighten the 9-pin male connector to the *Valve/Fan* port on the analyzer front.
4. Connect and tighten the extension cable [part number 003-20656-03] to the 25-pin connector on the interface cable [part number 202-60815-00].
5. On the rear panel of the mass spectrometer, attach the 25-pin male connector of the straight-thru cable. Tighten the retaining screws.
6. Plug one end of the power cord into the connector on the rear panel of the mass spectrometer and the other end into an appropriate power source. See the MKS Cirrus hardware manual for electrical specifications.

3 AUTOCHEM

[AutoChem 2920 \(Serial Numbers 700 and Below\) below](#)
[AutoChem 2920 \(Serial Numbers 701 and Above\) on page 3 - 9](#)

[AutoChem HP 2950 on page 3 - 14](#)

[AutoChem III on page 3 - 22](#)

[Pin-outs for AutoChem 2920 and 2950 Mass Spectrometer Connectors on page 3 - 18](#)

[Software Installation and Operation Preparation on page 6 - 1](#)

AUTOCHEM 2920 (SERIAL NUMBERS 700 AND BELOW)

[Connect AutoChem 2920 and 2950 Cables to the Mass Spectrometer on page 3 - 21](#)

[Pin-outs for AutoChem 2920 and 2950 Mass Spectrometer Connectors on page 3 - 18](#)

[Software Installation and Operation Preparation on page 6 - 1](#)



Accessories kit [part number 292-33040-00] is required to complete this installation.

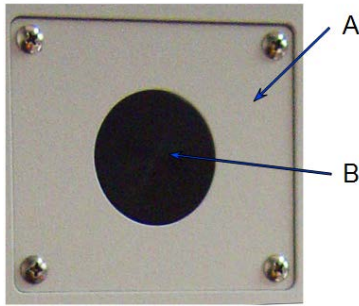


The equipment images in this topic may differ slightly from your equipment; however, the instructions are the same unless otherwise noted.

REQUIRED TOOLS

- Phillips head screwdriver
- 1/4 in. open-end wrench
- 3/8 in. open-end wrench
- 5/16 in. open-end wrench
- 7/16 in. open-end wrench
- 9/16 in. open-end wrench

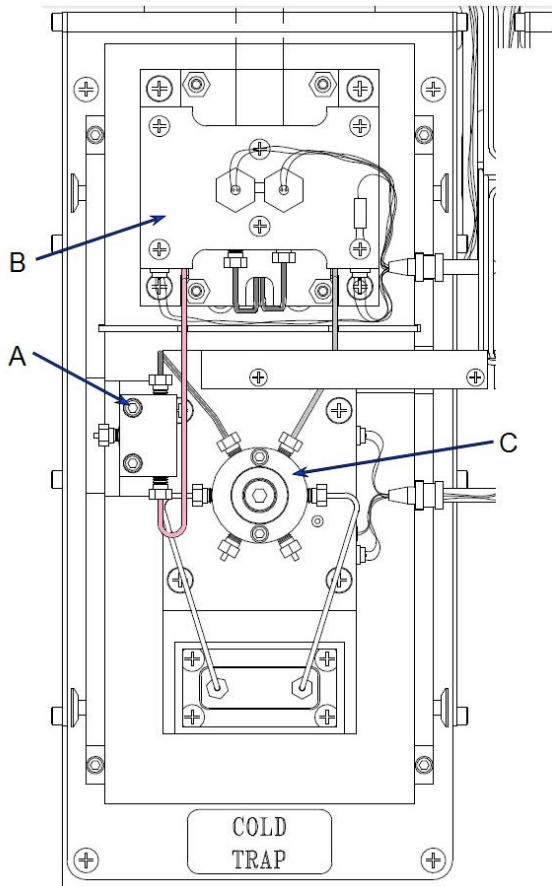
The mass spectrometer connector is located on the side panel of the analyzer.



- A. Side panel cover plate
- B. Hard plastic center cap



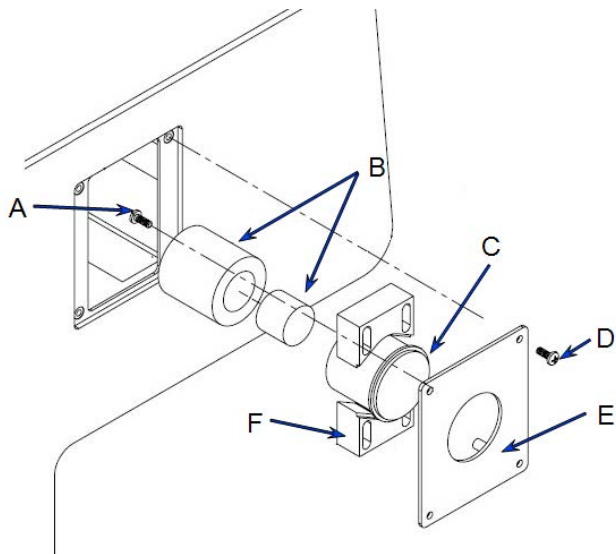
The TCD and Cold Trap valve zones of the AutoChem must be cool to allow safe handling of components. If necessary, allow a few hours for the zones to cool down after setting the zones to 20 °C. Removing the cover and insulation at the zones will speed the cooling process. The following illustration shows the original plumbing of the TCD/Cold Trap zone.



- A. Mass spectrometer connection TEE
- B. TCD assembly
- C. Cold trap rotary valve

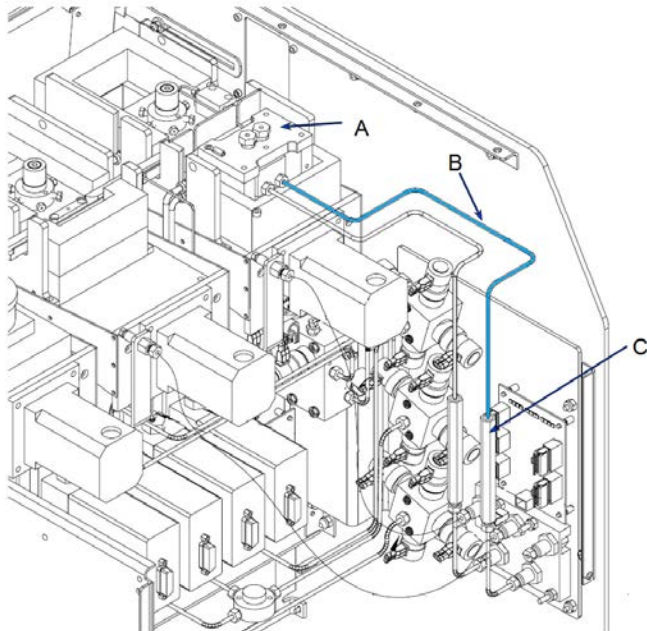
1. Remove the rear panel and the entire top panel of the analyzer to allow full access to the plumbing.

- Remove the aluminum metal plate which covers the tubes inside the grooved bar inside the heated zone. **NOTE:** This aluminum plate will not be re-used.
- Loosen the screws which retain the plastic hose clamps, remove the side panel cover plate, then remove the hard plastic center cap. Save the screws for later.



- A. Clamp retaining screws
- B. Insulation
- C. Remove plastic cap
- D. Cover plate screw
- E. Cover plate
- F. Adjustable clamps

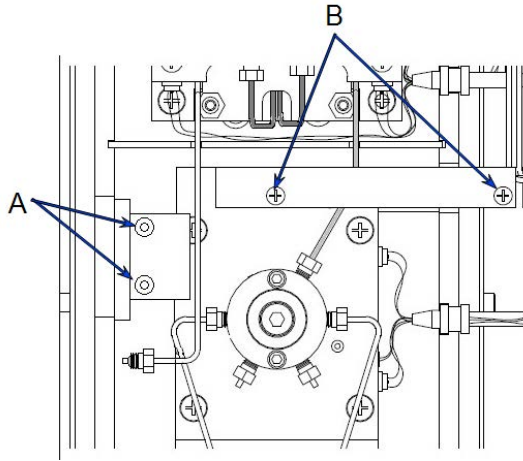
- Remove the 1/8 in. tube from the sample exhaust side of the TCD. Disconnect the other end at the hexagonal fitting, which is above the side panel exhaust ports.



- A. TCD
- B. Remove this tube (sample exhaust from TCD)
- C. Hexagonal fitting

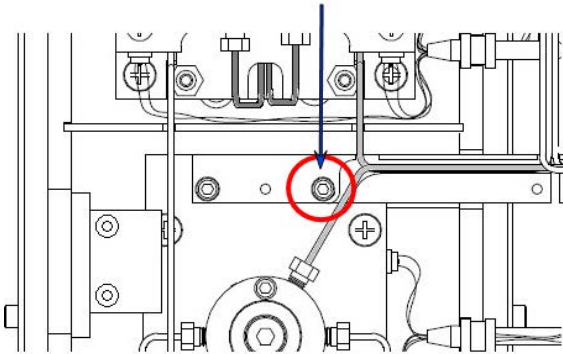
- Remove the two tubes that enter the ends of the TEE block. Remove the plug from the side of the TEE block.

6. Remove the screws that hold the TEE block to the heated plate. (An Allen wrench is provided in the parts and accessories kit.) Remove the two screws which hold the cover plate to a grooved channel. Remove the cover plate.



- A. Remove two screws holding TEE block
- B. Remove two screws and remove cover plate

7. Remove the screw from the grooved channel.

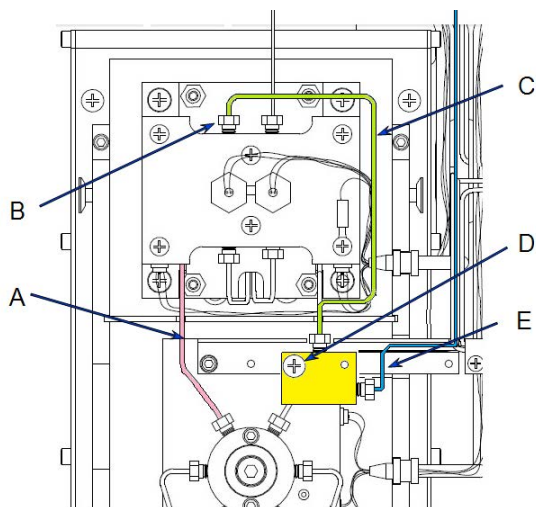


Remove the screw shown in the red circle.

- The tube that connected to the TEE (at the port that was closest to the front of the analyzer) must be connected to the rotary valve at the unoccupied port. This tube is shown on the left side of the following illustration.



The 1/16 in. tubes are longer than required. **Do not cut the tubes.** The tubing has been cut, deburred and cleaned. Further cutting will introduce small particles which can cause problems. If the tube is too long, either coil or zig-zag the tube to use the excess length.



- A. TCD inlet connects directly to valve instead of connecting to TEE
- B. Reducer fitting used on TCD sample outlet
- C. New tube from TCD outlet to TEE
- D. TEE in new location, with longer screw (cover plate heated channels is not used)
- E. Exhaust from TEE

- Before attaching the TEE block to the heated path, install one of the two 10.5 in. long tubes [part number 004-03388-11, Hastelloy-C tubing 1/16 in. diameter × 10.5 in. long] from the center of the TEE to the exhaust port of the sample side of the TCD.



Note the orientation of the TEE. It will be installed **upside down** so that the counterbore for the original screw head is facing down.

- Using a 1/8 in. to 1/16 in. reducing union, connect the other end of this tube to the exhaust of the TCD.
- Install the 31 in. long tube [part number 004-03388-16, Hastelloy-C tubing 1/16 in. diameter × 31 in. long] from the right side of the TEE to the hexagonal fitting located above the exhaust ports where the 1/8 in. tube was removed.



A 1/8 in. to 1/16 in. reducing union is required.

12. Using the new screw [part number 004-28310-01, 6-32 × 1.5 Pan Head Phillips], attach the TEE as shown in the previous illustration.
13. Attach the new reducing union to the end of the mass spectrometer capillary heated hose fitting. Use the ferrules included with the reducing union.

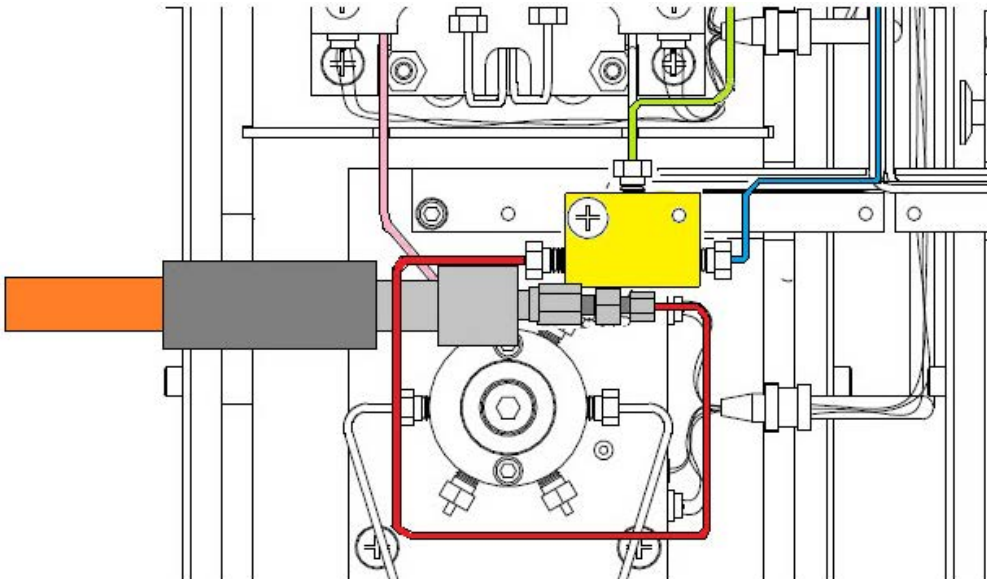


Slide reducing union onto the tip of the capillary tube

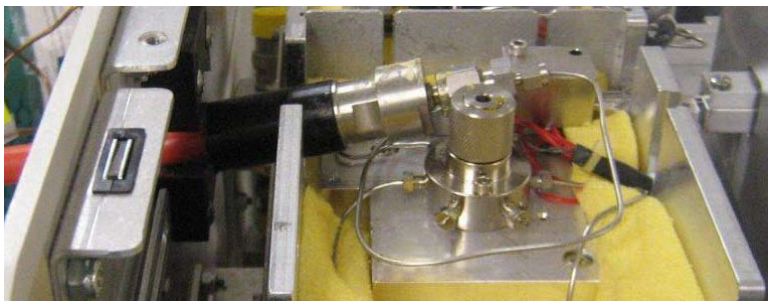
14. Pass the mass spectrometer capillary hose through the side panel cover plate. The black plastic clamps above and below the capillary hose can be adjusted to prevent the hose from being pulled out of the heated zone. The insulation rings may be used to prevent damage to the capillary hose insulation.
15. Re-attach the side panel cover plate, with the capillary hose passing through into the heated zone.

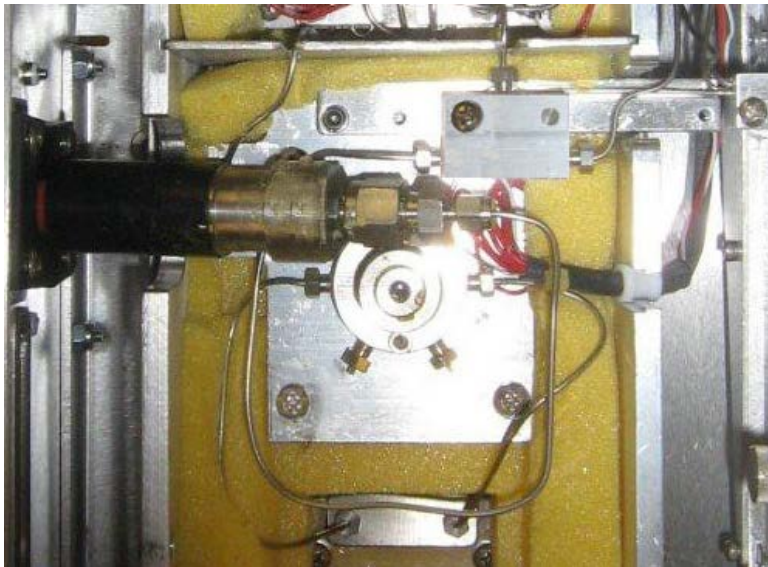


16. Install the other 10.5 in. long tube [part number 004-03388-11, Hastelloy-C tubing 1/16 in. diameter × 10.5 in. long] from the end of the capillary hose assembly (at the 1/16 in. end of the reducing union) to the left side port of the TEE. Nuts and ferrules are included in the accessories kit. The tube must be bent so that the metal connectors of the capillary hose are inside the heated zone.



The plumbing should now resemble the following photos:





17. Replace the yellow foam insulation and the metal box covering the zone. The insulation may be cut to fit around the mass spectrometer capillary hose.
18. Reset the heat zones to the preferred temperatures. Set the *Cold Trap Valve* heat zone to the proper temperature to ensure that the connection between the mass spectrometer end fitting is heated even though it is not directly clamped to the heated plates.



See [Connect AutoChem 2920 and 2950 Cables to the Mass Spectrometer on page 3 - 21](#) for instructions on connecting the cables from the mass spectrometer to the analyzer.

AUTOCHEM 2920 (SERIAL NUMBERS 701 AND ABOVE)

[Connect AutoChem 2920 and 2950 Cables to the Mass Spectrometer on page 3 - 21](#)
[Pin-outs for AutoChem 2920 and 2950 Mass Spectrometer Connectors on page 3 - 18](#)
[Software Installation and Operation Preparation on page 6 - 1](#)



Accessories kit [part number 292-33040-00] is required to complete this installation.

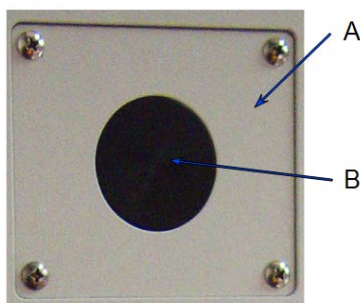


The equipment images in this topic may differ slightly from your equipment; however, the instructions are the same unless otherwise noted.

REQUIRED TOOLS

- Phillips head screwdriver
- 1/4 in. open-end wrench
- 3/8 in. open-end wrench
- 5/16 in. open-end wrench
- 7/16 in. open-end wrench
- 9/16 in. open-end wrench

The mass spectrometer connector is located on the side panel of the analyzer.



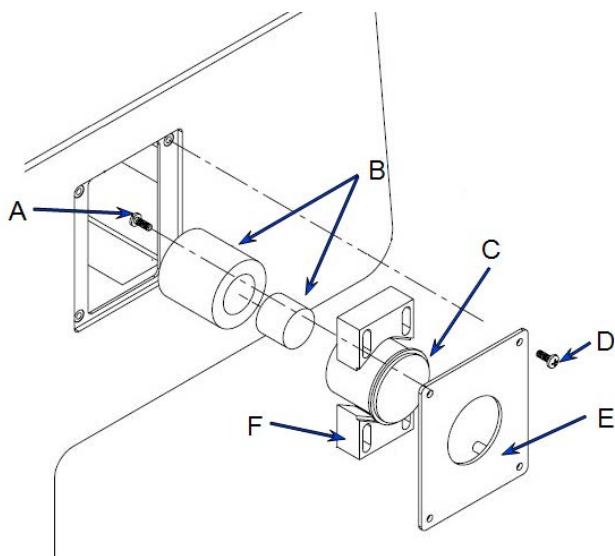
- A. Side panel cover plate
- B. Hard plastic center cap



The Cold Trap valve zone of the AutoChem must be cool to allow safe handling of components. If necessary, allow a few hours for the zone to cool down after setting the zone to 20 °C. Removing the cover and insulation at the zone will speed the cooling process.

1. Open the top panel of the analyzer to allow access to the plumbing.

- Loosen the screws that retain the plastic hose clamps, remove the side panel cover plate, and remove the hard plastic center cap shown in the following illustration. Save the screws for later.

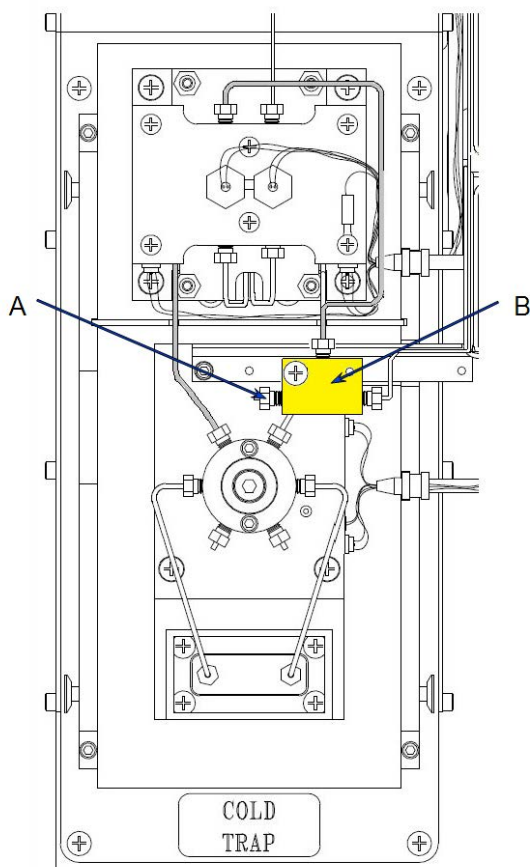


- A. Clamp retaining screws
- B. Insulation
- C. Remove plastic cap
- D. Cover plate screw
- E. Cover plate
- F. Adjustable clamps



The 1/16 in. tubes are longer than required. **Do not cut the tubes.** The tubing has been cut, deburred and cleaned. Further cutting will introduce small particles which can cause problems. If the tube is too long, either coil or zig-zag the tube to use the excess length.

With the covers and insulation removed, the mass spectrometer TEE connection block may be accessed.



- A. Plug to be removed for mass spectrometer connection
- B. TEE block for mass spectrometer connection

3. Remove the plug from the left side of the TEE.
4. Attach the new reducing union to the end of the mass spectrometer capillary heated hose fitting. Use the ferrules included with the reducing union.

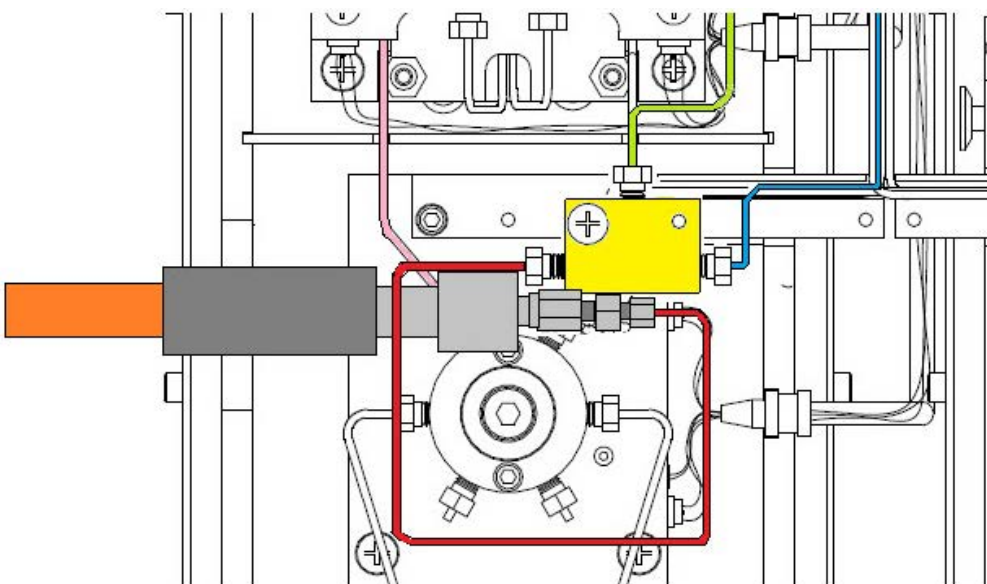


Slide reducing union onto the tip of the capillary tube

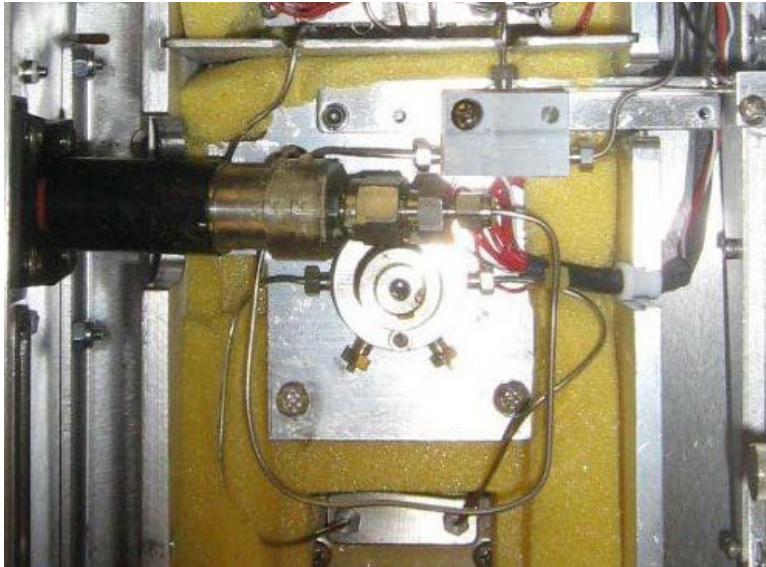
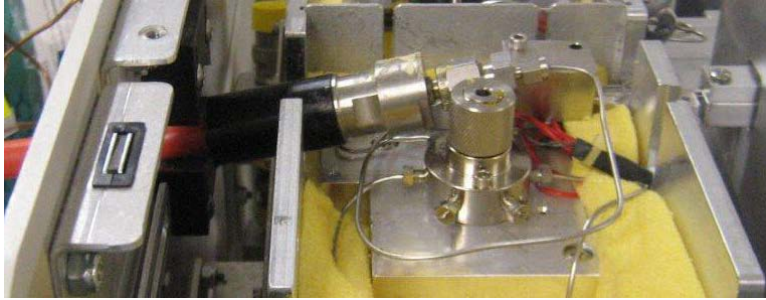
5. Pass the mass spectrometer capillary hose through the side panel cover plate. The black plastic clamps above and below the capillary hose can be adjusted to prevent the hose from being pulled out of the heated zone. The insulation rings may be used to prevent damage to the capillary hose insulation.
6. Re-attach the side panel cover plate, with the capillary hose passing through into the heated zone.



7. Install one 10.5 in. long tube [part number 004-03388-11, Hastelloy-C tubing 1/16 in. diameter \times 10.5 in. long] from the end of the mass spectrometer capillary hose assembly (at the 1/16 in. end of the reducing union) to the left side port of the TEE. Nuts and ferrules are included in the kit. The tube must be bent so that the metal connectors of the capillary hose are inside the heated zone.



The plumbing should now resemble the following photos:



8. Replace the yellow foam insulation and the metal box covering the zone. The insulation may be cut to fit around the mass spectrometer capillary hose.
9. Reset the heat zones to the preferred temperatures. Set the *Cold Trap Valve* heat zone to the proper temperature to ensure that the connection between the mass spectrometer end fitting is heated even though it is not directly clamped to the heated plates.

AUTOCHEM HP 2950

[Connect AutoChem 2920 and 2950 Cables to the Mass Spectrometer on page 3 - 21](#)
[Pin-outs for AutoChem 2920 and 2950 Mass Spectrometer Connectors on page 3 - 18](#)
[Software Installation and Operation Preparation on page 6 - 1](#)

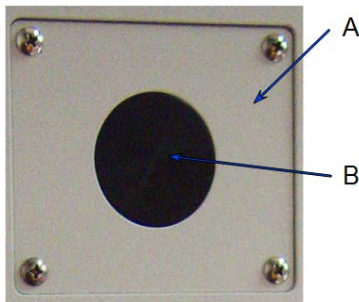


Accessories kit [part number 295-33040-00] is required to complete this installation.

REQUIRED TOOLS

- Phillips head screwdriver
- 1/4 in. open-end wrench
- 5/16 in. wrench
- 9/16 in. open-end wrench

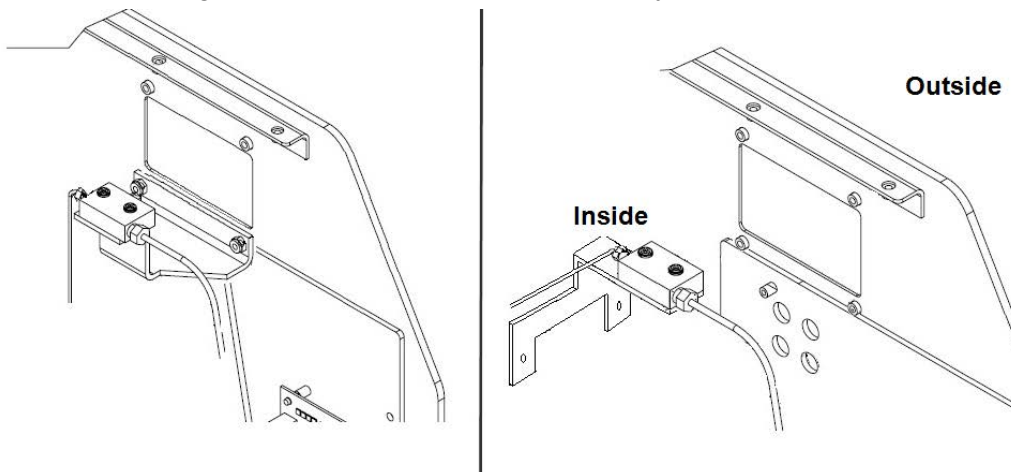
The mass spectrometer connector is located on the side panel of the analyzer.



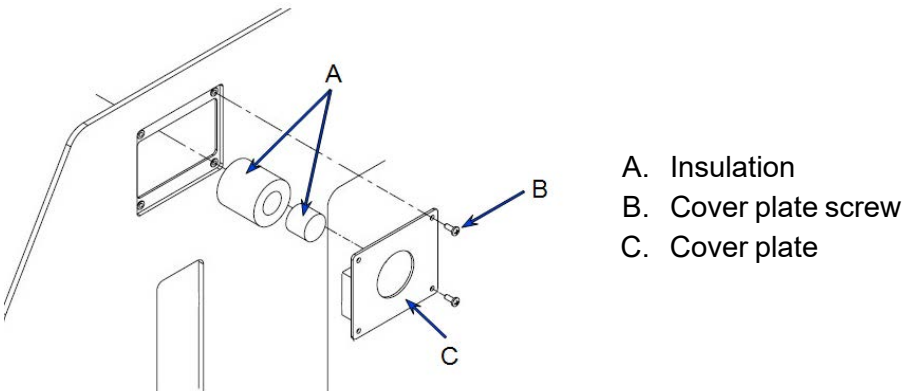
- A. Side panel cover plate
- B. Hard plastic center cap

1. Remove the top cover panel and the upper rear panel of the analyzer.

2. Locate the mass spectrometer connection TEE block. It is mounted to a bracket behind a cover plate on the upper back of the left side panel. There are two types of brackets, depending upon the serial number of the analyzer.

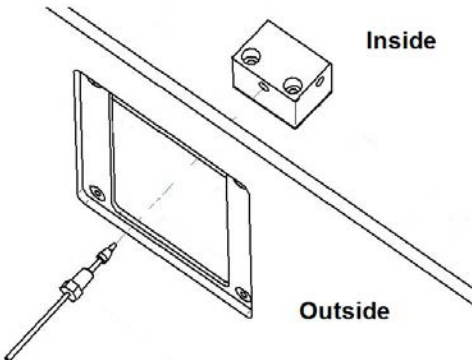


3. For serial numbers below 200, remove the two nuts which hold the mass spectrometer bracket to the side panel. Save the nuts for later.
4. Remove the side panel cover plate. Discard the insulation rings and the cover plate. Save the screws for later.

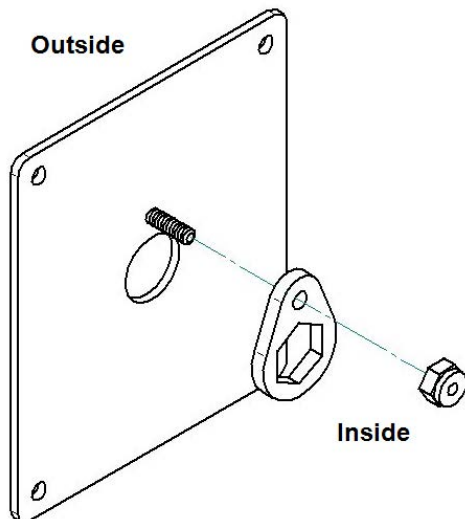


5. Remove the plug from the mass spectrometer TEE block.

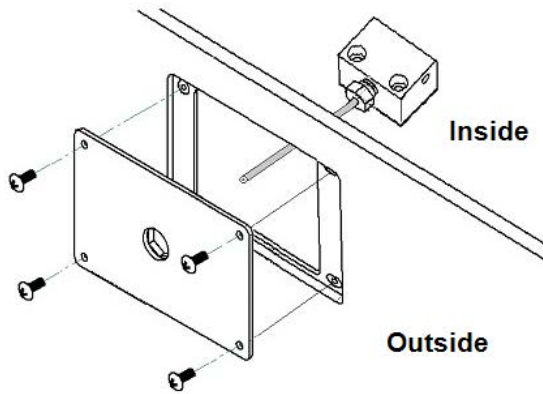
6. Place a 1/16 in. swaging nut and ferrule onto the mass spectrometer port tube (from the accessories kit) and insert the tube into the TEE block. Ensure that the tube is fully seated. Use 1/4 in. wrench to tighten the swaging nut.



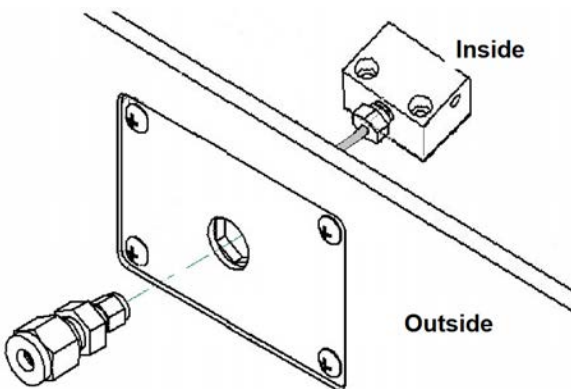
7. Mount the retaining ring onto the threaded stud located on the back of the mass spectrometer port plate. Secure with the locking nut [part number 004-28205-00, nylon locking nut, 6-32]. Do not tighten the nut completely.



8. Attach the new port plate to the analyzer using the screws saved from an earlier step.



9. For analyzers below serial number 200, re-attach the mass spectrometer TEE bracket to the side panel using the nuts previously saved.
10. Insert the 1/4 in. to 1/16 in. tube reducing union into the port plate and onto the port tube. Ensure all are aligned, then complete the tightening of the nylon locking nut on the retaining ring.



11. Use a 5/16 in. wrench to tighten the reducing union onto the port tube. The ferrules are already installed inside the reducing union.
12. Insert the 1/4 in. tube at the end of the mass spectrometer hose into the reducing union.
13. Use a 9/16 in. wrench to tighten the nut on the reducing union.
14. Re-install the rear panel and the analyzer top panel.

PIN-OUTS FOR AUTOCHEM 2920 AND 2950 MASS SPECTROMETER CONNECTORS

Analog

The 15-pin analog connector provides two output signals and two input signals.

Output signals:

- The TCD signal (could be as high as 12 volts —positive or negative)
- The sample temperature signal, which is a buffered voltage from the sample thermocouple. The voltage ranges from -0.365 V at -40 °C; 0 V at 0 °C; to 10.88 V at 110 °C. The signal follows the type-K thermocouple nonlinear characteristic.

The signals are available at these pins:

TCD (+) 7
TCD (–) 5
Temp (+) 8
Temp (–) 6

Input signals:

The inputs are available for connection to other detectors, such as a mass spectrometer. The voltage range is -15 to 15 volts. The analyzer application can record these signals at the same time as it records TCD and sample thermocouple data.

The signals connect to these pins:

Auxiliary input 1 (+) 4
Auxiliary input 1 (–) 3
Auxiliary input 2 (+) 2
Auxiliary input 2 (–) 1

All other pins in the 15-pin connector are floating (not connected). Connect the metal shell of the connector to the chassis ground and cable shield to maintain shielding of the signals.

Digital

The 25-pin digital connector provides floating signals to control and monitor external hardware — such as auxiliary detectors or chart recorders.

The outputs consist of four sets of latching relay contacts and four opto-coupled photo transistors. The inputs are two optically isolated photo couplers.

The analyzer application sets these as logic 1 or logic 0 — as defined by the analysis step. They are displayed on the analyzer schematic.

A logic 1 causes the relay to connect the *common* contact to the *normally open* contact. The relay will retain this condition even when power to the analyzer is disconnected. A logic 0 causes the relay to connect the *common* contact to the *normally closed* contact.

A logic 1 to the opto-coupled outputs causes the NPN photo transistor to be turned on. A logic 0 turns the NPN photo transistor off.

The two opto-coupled inputs are read by the instrument as logic 1 (when current flows through the opto-coupler photo diodes) or logic 0 (when no current is flowing).

Electrical Specifications

Relays	<ul style="list-style-type: none"> ■ Maximum voltage: 250V~, 48 VDC ■ Maximum switching current: 4A at 250V~; 3A at 30 VDC ■ Maximum switching current: 100 mA at 100 VDC
Opto-coupled outputs	<ul style="list-style-type: none"> ■ Maximum voltage, VCE = 70 VDC ■ Maximum reverse voltage, VCE = 7 VDC ■ Maximum current = 10 mA
Opto-coupled inputs	<ul style="list-style-type: none"> ■ Maximum reverse voltage = 3 VDC ■ Nominal forward voltage = 1.3 VDC at 10 mA ■ Minimum current required to be recognized by the 2950 analyzer = 1 mA

Digital Connector Pin Designations

Pin	Type	Function
1	Relay 1	normally closed
2	Relay 1	common
3	Relay 1	normally open
4	Relay 2	normally closed
5	Relay 2	common
6	Relay 2	normally open
7	Relay 3	normally closed
8	Relay 3	common
9	Relay 3	normally open
10	Relay 4	normally closed
11	Relay 4	normally open
12	Relay 4	normally open
13	Not Used	not used
14	Opto output 1	collector
15	Opto output 1	emitter
16	Opto output 2	collector
17	Opto output 2	emitter
18	Opto output 3	collector
19	Opto output 3	emitter
20	Opto output 4	collector
21	Opto output 4	emitter
22	Opto input 1	anode (+)
23	Opto input 1	cathode (-)
24	Opto input 2	anode (+)
25	Opto input 2	cathode (-)

CONNECT AUTOCHEM 2920 AND 2950 CABLES TO THE MASS SPECTROMETER

1. Plug one end of the power cord into the connector on rear panel of the mass spectrometer and the other end into an appropriate power source. See the MKS Cirrus hardware manual for electrical specifications.
2. Connect one end of a shielded Ethernet cable to the RGA COMMS port on the rear panel of the mass spectrometer and the other end to an Ethernet port on the computer.



The Analog/Digital I/O interface cable is comprised of two cables tethered together: one cable has a 15-pin connector (for the Analog I/O connection) and the other a 25-pin connector (for the Digital I/O connection).

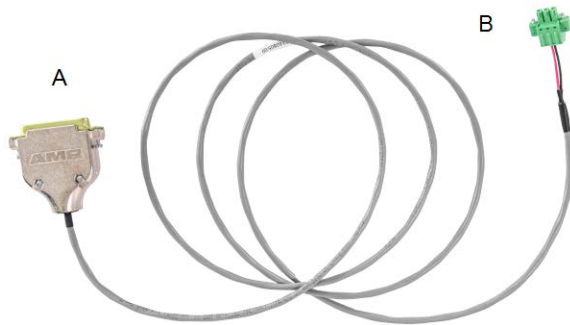
3. On the rear panel of the mass spectrometer, attach the 15-pin and 25-pin connectors labeled *Cirrus* to their appropriate connections. Tighten the retaining screws.
4. On the side panel of the AutoChem, attach the 15-pin and 25-pin connectors labeled *AutoChem* to their appropriate connections. Tighten the retaining screws.



AutoChem 2920 and AutoChem 2950 side panel

AUTOCHEM III

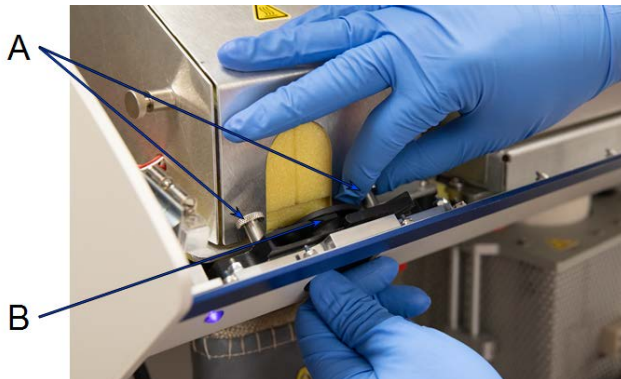
[Software Installation and Operation Preparation on page 6 - 1](#)



MKS Cirrus 3 - AutoChem III cable

- A. 25-pin connector - connect to the MKS Cirrus 3
- B. Terminal block plug - connect to the AutoChem III

1. Connect the MKS Cirrus 3 cable to the rear of the MKS Cirrus 3 by inserting the 25-pin cable end into the port labeled Digital I/O. Secure the retaining screws on the connector plug.
2. Connect the MKS Cirrus 3 cable to the front of the AutoChem III by inserting the terminal block plug end into the port labeled Mass Spec. Secure the retaining screws on the connector plug..
3. Open the AutoChem III top cover.
4. Loosen the knurled thumb screws to open the black plastic clamps. Open the clamps and remove the hard plastic center cap covering the Mass Spec port. Keep the clamps open at this time.

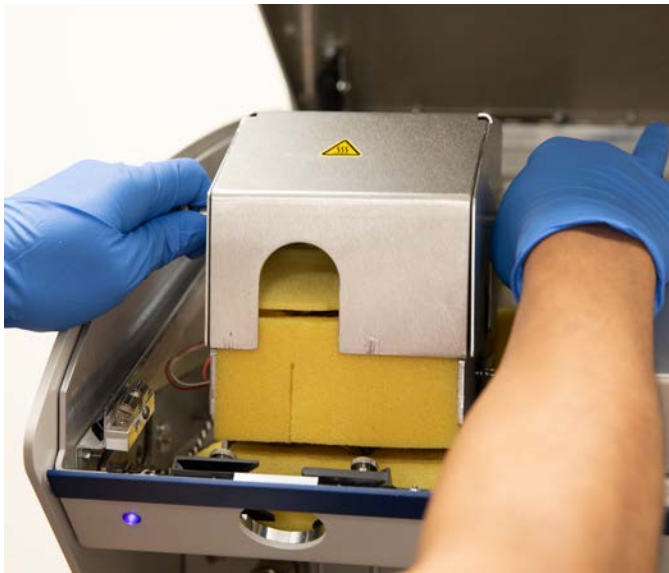


- A. Knurled thumb screws
- B. Plastic cap



- A. Knurled thumb screws
- B. Plastic cap

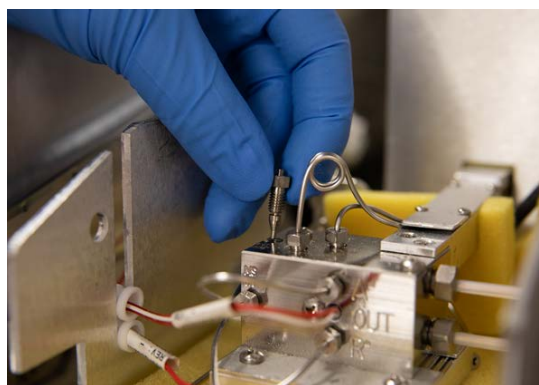
5. Remove the detector block cover by pulling the plungers out and lifting the cover.



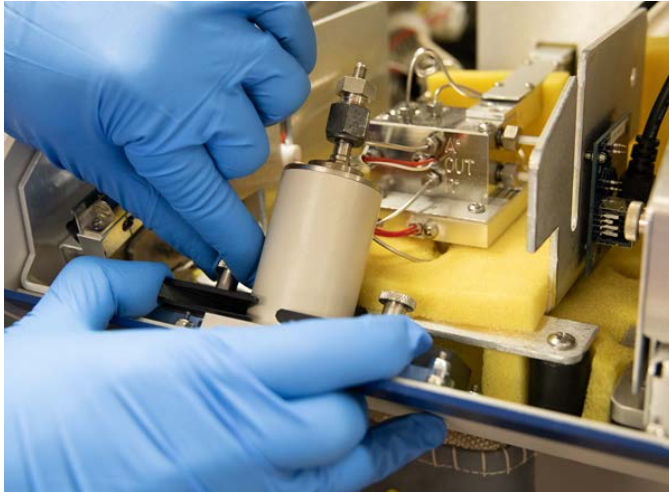
6. Carefully remove the insulation.



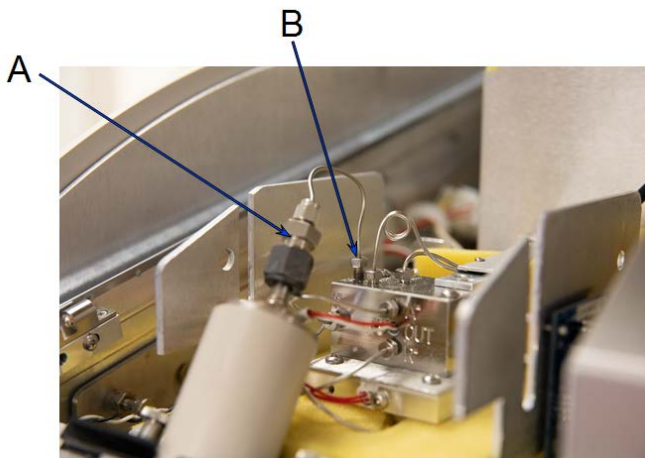
7. Use a 1/4 in. wrench to remove the 1/16 in. stainless steel plug.



- Slide the mass spec capillary hose through the opening on the front cover and secure in place using the black plastic clamps.



- Use a 1/4 in. wrench to connect the 1/16 in. stainless steel tube to the end of the mass spec hose and the port where the plug was previously removed. Use two wrenches to connect the mass spec to the mass spec connection port.



- Connect the 1/16 in. stainless steel tube to the mass spec hose.
- Connect the other end where the plug was removed.

10. Replace the foam insulation and detector block cover. Ensure there is no gap between the foam and the mass spec hose.



11. Close the AutoChem III top cover.

4 FLEX 3500 CHEMISORPTION

[Software Installation and Operation Preparation on page 6 - 1](#)



Accessories kit [*part number: 350-33050-00*] is required to complete this installation.

1. Remove the plug attached to the mass spectrometer connector port (1/4 in. Swagelok fitting on the back of the analyzer).



The mass spectrometer connector port and the exhaust port are interchangeable on the Flex 3500 Chemisorption analyzer.

2. Connect the mass spectrometer hose to the mass spectrometer connector port on the back of the analyzer using ferrules and a 9/16 in. nut to secure the connection.

PIN-OUTS FLEX 3500 CHEMISORPTION CABLE

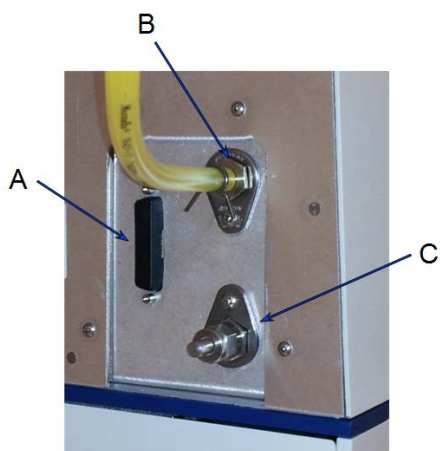
The rear panel has a 25-pin D connector with female contacts. It is designed to allow a 25-pin D cable with male connector pins on both ends to directly connect to a MKS Cirrus mass spectrometer.

Pin 6. Normally open contact of the Flex relay.

Pin 10. The common pole of the Flex relay.

Other pins are not used.

CONNECT FLEX 3500 CHEMISORPTION CABLE TO THE MASS SPECTROMETER



- A. 25 pin connector
- B. Exhaust port
- C. Mass spectrometer connector

1. Plug one end of the power cord into the connector on the rear panel of the mass spectrometer and the other end into an appropriate power source. See the *MKS Cirrus Hardware Manual* for electrical specifications.
2. On the rear panel of the mass spectrometer, attach the 25-pin connector of the straight-thru cable to its appropriate connection. Tighten the retaining screws.
3. On the rear panel of the analyzer, attach the 25-pin connector of the straight-thru cable to its appropriate connection. Tighten the retaining screws.

5 BTA AND FR-SERIES FLOW REACTORS

[Software Installation and Operation Preparation on page 6 - 1](#)



Initially, the BTA and FR-series analyzers are configured to use an address that begins with *168.12* and the Cirrus 3 is set to automatically configure the computer's IP address. Once a connection to the Cirrus 3 is established, it can be configured to use a static IP address that begins with *168.12*. Refer to the MKS Cirrus 3 instruction manual.



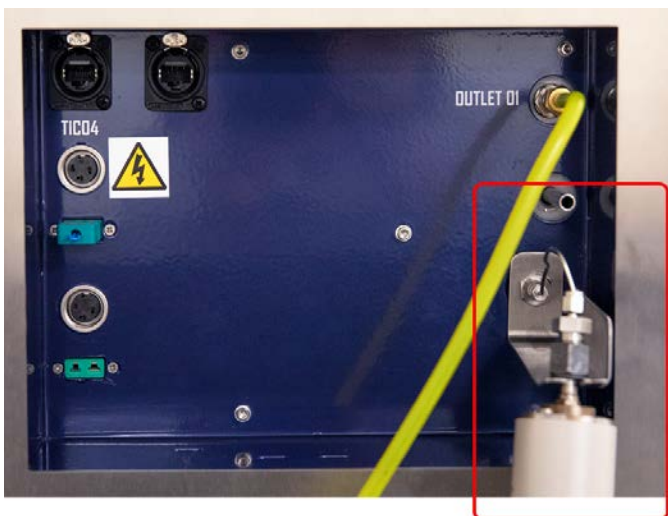
Accessories kit [*part number 810-33010-00*] is required to complete this installation.

The mass spectrometer capillary hose attaches to a bulkhead connector on the left side of the analyzer.



This tubing is supplied with the MKS Cirrus 3 mass spectrometer.

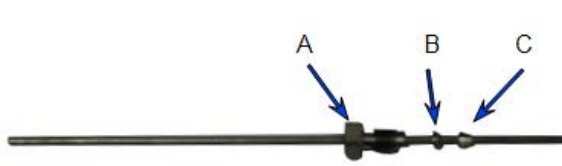
1. Slide the mass spectrometer support bracket onto the bulkhead port on the left side of the analyzer.



Bulkhead port with mass spectrometer support bracket

2. Secure the bracket to the port using the jam nut from the adapter kit.

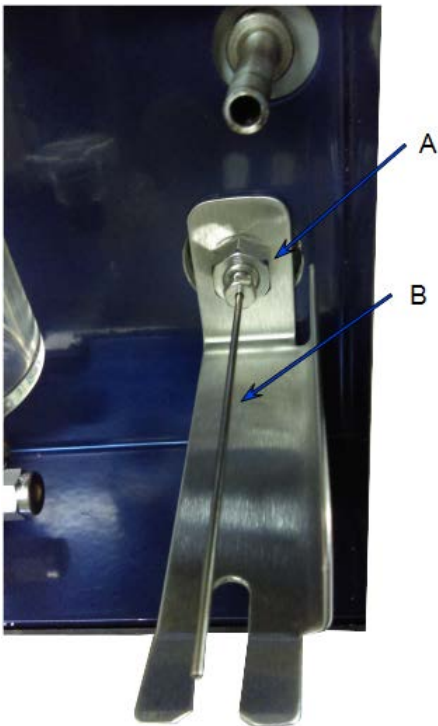
3. Assemble the 1/16 in. mass spectrometer tubing (this tubing is supplied with the MKS Cirrus 3 mass spectrometer).



Mass spectrometer tubing

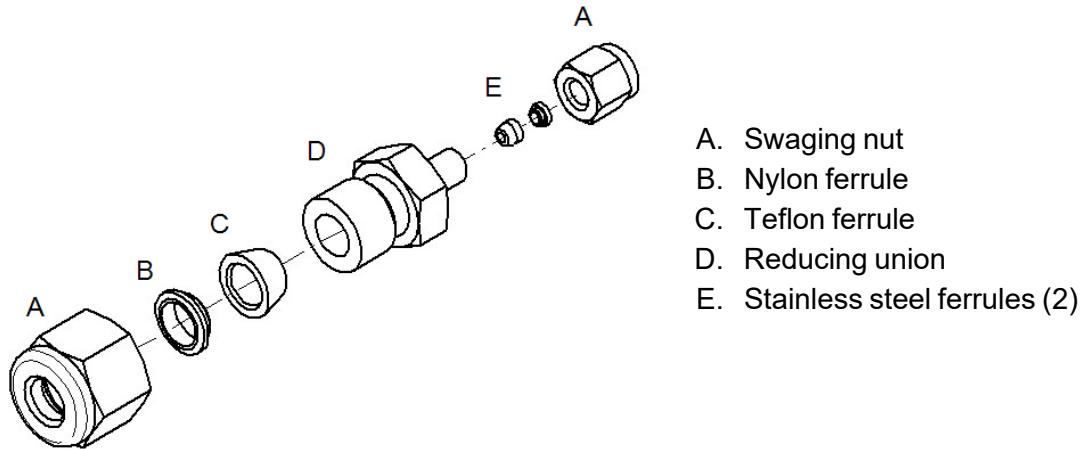
- A. Swaging nut
- B. Stainless steel ferrule
- C. Stainless steel ferrule (cone)

- a. Slide the Swaging nut onto the 1/16 in. mass spectrometer tubing.
 - b. Slide the stainless steel ferrule onto the mass spectrometer tubing.
 - c. Slide the second stainless steel ferrule onto the tubing with the cone facing away from the Swaging nut.
4. Insert the mass spectrometer tubing into the bulkhead port and secure the tubing by tightening the Swaging nut.



- A. Swaging nut assembly
- B. Mass spectrometer tubing

5. Disassemble the reducing union assembly and discard the steel ferrules.

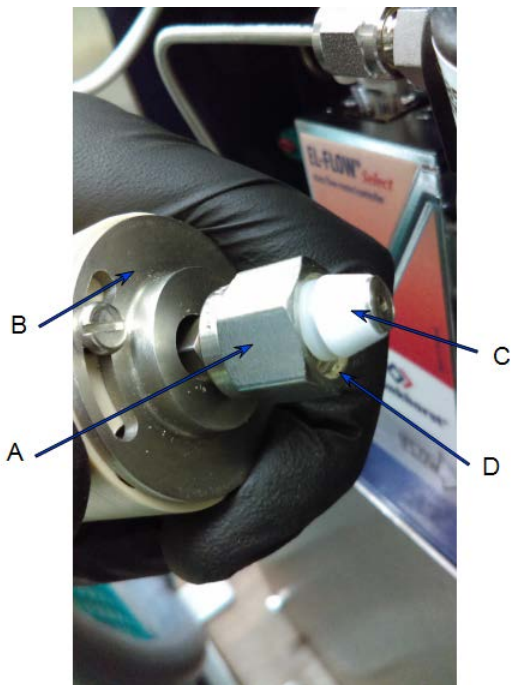


a. Slide the reducing unit 1/4 in. nut onto the tip of the mass spectrometer capillary tube.



Slide reducing union onto the tip of the capillary tube

- b. Slide the nylon ferrule onto the tip of the capillary tube.



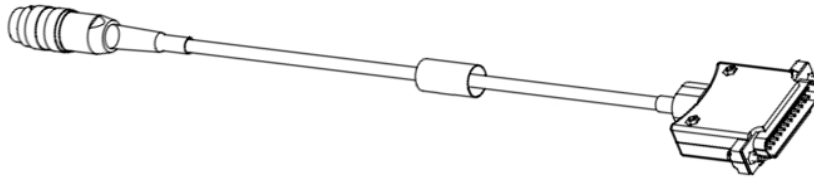
- A. 1/4 in. nut of the union
B. Mass spectrometer capillary tubing
C. Teflon ferrule with small end of cone facing away from nylon ferrule
D. Nylon ferrule

- c. Slide the Teflon ferrule onto the capillary tube with the cone facing away from the reducing unit 1/4 in. nut.
6. Insert the end of the capillary tube with the nut onto the end of the metal mass spectrometer tubing previously installed.
7. Tighten the reducing union so that it is secure on the metal mass spectrometer tubing.

8. Use your hands to gently bend mass spectrometer tubing assembly into the slots of the support bracket. Secure the assembly between the insulator and the mass spec tubing.



CONNECT BTA OR FR-SERIES CABLES TO THE MASS SPECTROMETER



1. Connect the 4 pin din plug of the trigger cable into the GC1 port on the rear panel of the analyzer.
2. Connect the 25 pin connector of the trigger cable to the Digital I/O port on the rear panel of the MKS Cirrus 3 [*part number P07-60802-00* in the accessory kit].


6 SOFTWARE INSTALLATION AND OPERATION PREPARATION



Ensure the MKS Cirrus 3 mass spectrometer is powered on before installing the software so that the software can auto-detect the analyzer. Powering on the MKS Cirrus 3 mass spectrometer only allows communications between the analyzer and software. See [Set Up and Prepare for Operation on page 6 - 6](#) to learn how to power on the MKS Cirrus 3 mass spectrometer pumps and heaters. Also see the *MKS Cirrus Hardware Manual*.

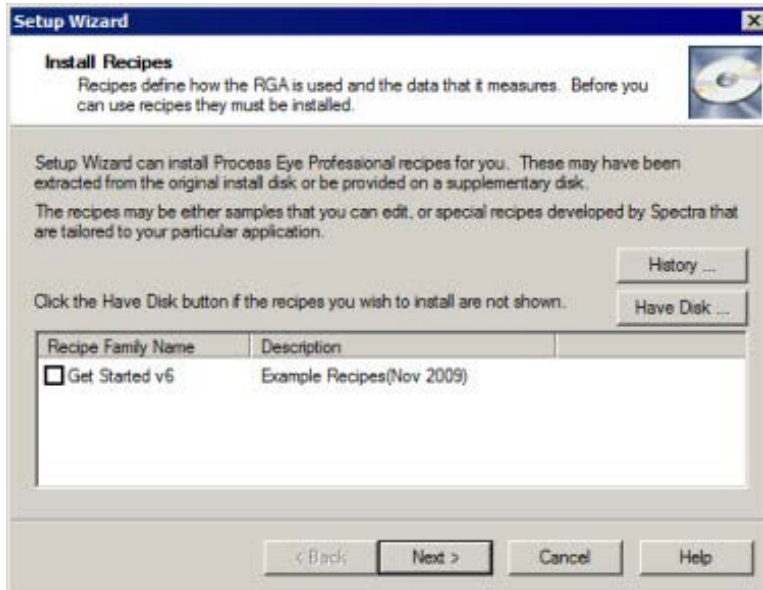
Two software applications must be installed for the mass spectrometer hardware to work effectively with specific Micromeritics analyzers:

Required Software Applications

Application Name	Description
Process Eye Professional	 <p>The MKS <i>Process Eye Professional</i> software must be installed prior to installation of the <i>Micromeritics Custom Recipe</i> disk.</p> <hr/> <p>Use the installation disk labeled <i>RGA Software</i> to install the <i>Process Eye Professional</i> software. All supporting documentation is located on the <i>MKS User Manuals</i> disk.</p>
Micromeritics Custom Recipe disk	<p>After installation of the <i>Process Eye Professional</i> software, a user setup utility is used for installation of the <i>Micromeritics Custom Recipe</i> disk.</p>

MICROMERITICS CUSTOM RECIPE INSTALLATION

1. Insert the Micromeritics Custom Recipe installation media into the media drive.
2. Go to **Start > All Programs > MKS RGA Applications > Tools > User Setup**.
3. The *Setup Wizard* displays. Click **Next**.
4. On the *Install Recipes* window, click **Have Disk**.

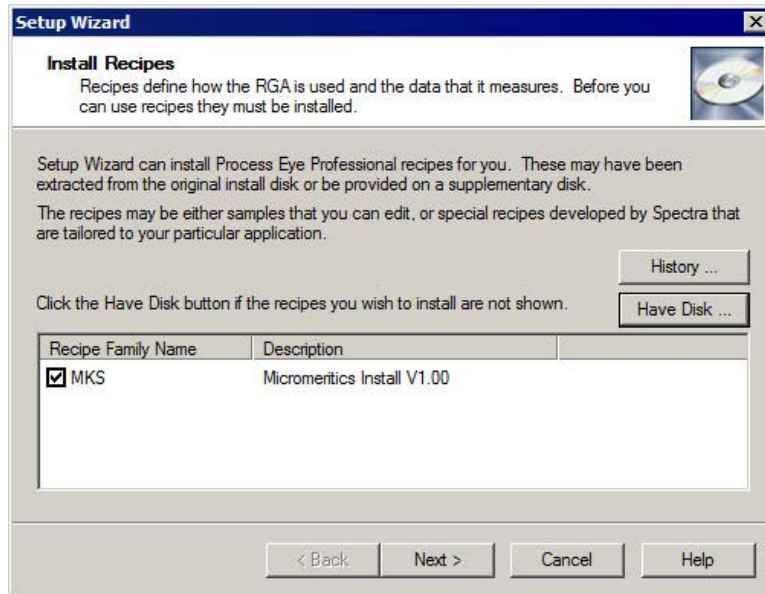


5. On the *Select a Drive Location* window, click the down arrow to the right of the text field, select **Browse**, then click **OK**.

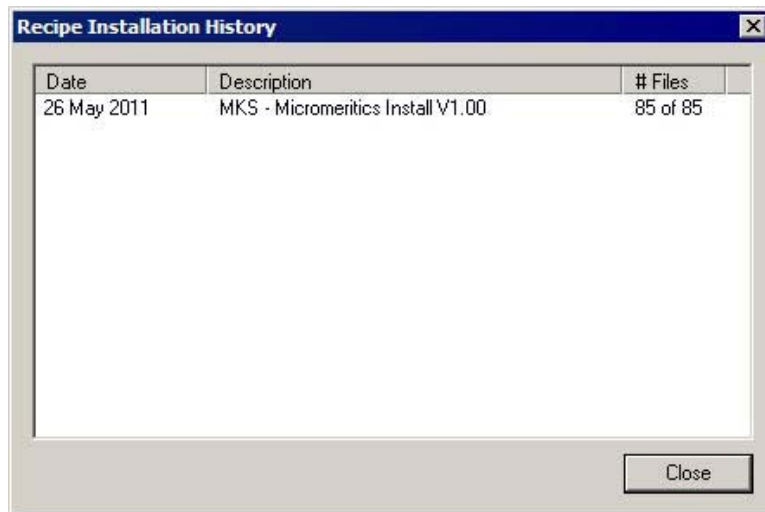


6. Navigate to the *Micromeritics/MKS/Software* directory on the installation disk. Select the *Micromeritics Install V[n].lst* file, then click **Open**.

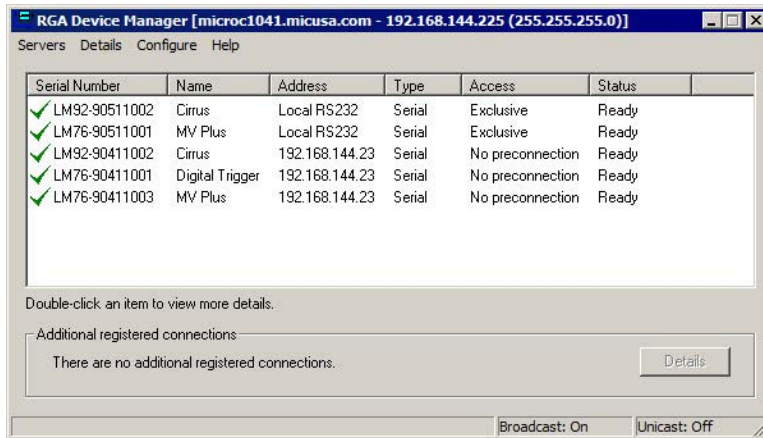
- The *Install Recipes* window displays the installed recipes. Select the *MKS* check box, then click **Next**.



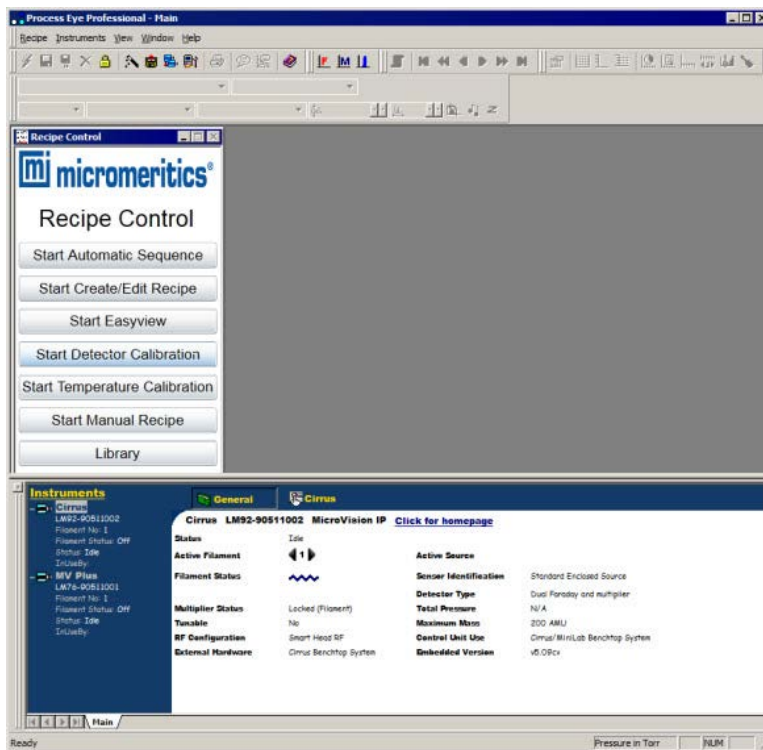
- On the *Hardware Setup* window, ensure the *Skip Hardware Auto-Detection* option is selected, then click **Next**.
- Verify the *Setup Wizard* has enough information to complete the installation, then click **Finish**.
- On the *Recipe Installation History* window, click **Close**.



11. Go to **Start > All Programs > MKS RGA Applications > RGA Device Manager**.
12. On the *RGA Device Manager* window, locate your unit. Right-click and select **Access**.



13. On the *Instrument Access* window, click **OK** to complete installation.
14. Go to **Start > All Programs > MKS RGA Applications > Process Eye Professional**.





If a prompt displays to install *Microsoft Silverlight*, then *Microsoft Silverlight* is not installed. The *Process Eye Professional* application requires *Microsoft Silverlight* for operating the interface software.

To install from the Internet, click [Click now to install](#) to install the program. After installation is complete, press **F5** to display the *Recipe Control* menu.

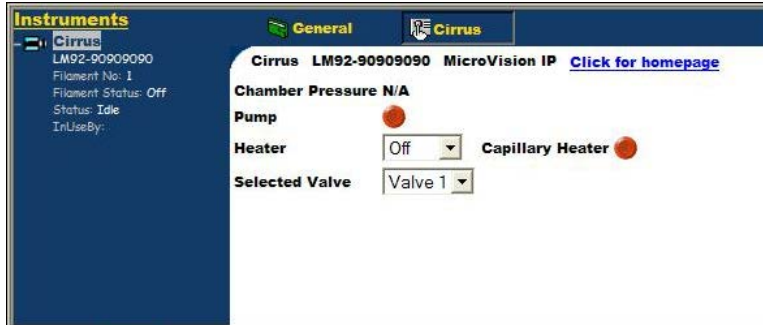
To install from the Windows Explorer display, minimize the *Process Eye Professional* window, then navigate to *C:\Micromeritics\MKS\Microsoft Silverlight*. After installation is complete, maximize the *Process Eye Professional* window and press **F5** to display the *Recipe Control* menu.

SET UP AND PREPARE FOR OPERATION



The MKS Cirrus 3 mass spectrometer pumps are powered on using the MKS *Process Eye Professional* software. Powering on the pumps (to allow them to get to full performance) and powering on the heaters should be done before using the MKS Cirrus mass spectrometer.

1. Click the *Cirrus* tab on the *Status* window to access and begin component operation.



2. Use the analyzer schematic to begin the flow of an inert gas (such as helium, argon, and nitrogen) to remove residual gases from the analyzer and for the next steps.
3. Click **Pump** to start the pump. The button changes to yellow to indicate that the internal molecular drag pump is accelerating. After the turbo is up to speed, the button will change to green and the chamber pressure will display.



To avoid damaging the pump, do not move the unit after the turbo pump has begun operating.

The pressure should be less than $2E-5$ Torr before switching on a filament or the quadrupole. The trip contact on the cold cathode gauge is connected to the external trip on the RGA control unit to prevent filament operation until the pressure falls below this level. This level should be attained within 20 minutes after starting the vacuum system.

4. Use the *Warm/Bake* options in the *Heater* drop-down list. Do not operate the secondary electron multiplier (SEM) detector with the *Bake* option.
5. Use the *Capillary Heater* to lessen the chance of vapor condensing in the capillary leading to memory effects or blockage. Whether or not the capillary needs to be heated depends on the application and the nature of the gases being sampled. The MKS Cirrus 3 is designed to allow the capillary heater to be run continuously.

BAKE THE SYSTEM

Before the system can be started properly, it will need to run a sufficient amount of time to allow the partial pressure peaks of moisture and other airborne gasses to drop to an acceptable level. This time can be significantly reduced by baking the system. This should be done after the system has run for at least an hour to allow the pressure in the system to drop below 2E-5 Torr. The gas flow rate should be at least 20 sccm.

A dry, inert gas should be flushed continuously through the capillary inlet during bake out. The quadrupole should be running with the filament on but only using the Faraday detector. The multiplier detector will be unavailable during baking.

The total pressure may gradually start to rise during the *Bake* cycle as the system outgases; bake the system until the pressure starts to fall. In normal operation, an initial bake of at least 24 hours is recommended, although, in general, the longer the system is baked the better. If the MKS-Cirrus3 is powered off, it will vent to atmosphere introducing water vapor and should be baked again.

The *Warm/Bake* option should be set to *Bake* for the initial bake-out to reduce the water background. After this period, running at the lower temperature of *Warm* is adequate in preventing the condensation of vapors in the vacuum chamber which could lead to memory effects.

Often it is not necessary to have the system heater on at all, but this will depend on the application. The MKS-Cirrus 3 is designed to allow continuous operation with the system heater set to *Warm*.

Refer to the MKS Cirrus hardware manual for additional information on the *Warm/Bake* option.

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