Quick Start Guide
SK- 07787 , Rev B
March 2020

Rosemount™ 370XA Gas Chromatograph

Helium to Hydrogen Gas Conversion Kit

ROSEMOUNT™

EMERSON™

Safety and information notices

⚠ DANGER

WILL CAUSE DEATH

Failure to follow this warning will result in death or serious injury to personnel.

⚠ WARNING

DANGER TO PERSONNEL

Failure to follow this warning may result in serious injury to personnel.

⚠ WARNING

SAFETY COMPLIANCE

Repairs or alterations are not permitted on any flame-proof paths, features, or joints.

Failure to follow this warning may compromise the product's safety protection method and void the product certification.

NOTICE

Important messages will appear in this format.

Contents

1 Safety requirements

1.1 Rosemount 370XA Hydrogen Conversion Kit Gas Chromatograph safety warnings

Observe these safety messages for the Rosemount 370XA Hydrogen Conversion Kit Gas Chromatograph.

⚠ WARNING

EXPLOSION HAZARD

Failure to de-energize the analyzer may cause serious injury or death to personnel.

Do not open when energized or when an explosive atmosphere may be present.
Keep cover tight while circuits are live.

⚠ WARNING

EXPLOSION/FIRE HAZARD

Failure to observe this warning may cause serious injury or death to personnel.

Do not open when an explosive atmosphere may be present.
Do not open while energized.
Use supply cables or wires suitable for at least 176 °F (80 °C).

⚠ WARNING

BURN HAZARD

Internal components may be hot. Failure to allow the GC to cool down may result in injury to personnel.

Allow the GC to cool down before disassembling any components.
Always wear proper personal protective equipment (PPE) when disassembling the analyzer.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

2 Installation

2.1 Installing the Rosemount 370XA helium to hydrogen gas conversion kit

These are the instructions to install the hardware for the helium to hydrogen gas conversion kit for the Rosemount 370XA Hydrogen Conversion Kit Gas Chromatograph.

The installation kit (7A00003) contains the hardware necessary to convert helium to hydrogen gas for the GC.

⚠ WARNING

Explosion Hazard

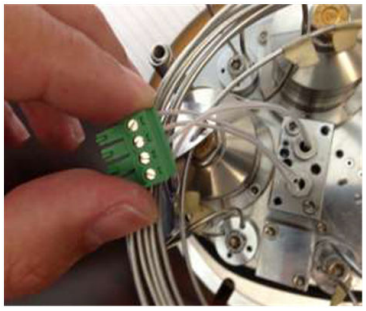
Before converting carrier gas to hydrogen, review local hazardous area requirements to ensure compliance.

The procedure to convert the Rosemount 370XA Gas Chromatograph from helium to hydrogen gas includes:

- Changing the thermistors (2-6-5000-084)
- Adding a carrier shut-off valve (2-4-4000-197)
- Purging the carrier gas
- Adjusting the carrier pressure (MON2000 2-3-9000-522)

The contents of the kit are listed in Helium Conversion Kit P/N 7A00003, Parts list and are illustrated in the Table 2-1.

Table 2-1: Hydrogen Conversion Kit Main Components

Carrier shut-off valve	Thermistors
	
P/N 2-4-4000-197 7A0003G02 - Field retrofit kit	P/N 2-5-1611-007

2.2 Installing the carrier shut-off valve

This procedure describes installing the carrier shut-off valve and tubing for hydrogen applications.

Refer to the Parts List and the following steps to perform this task.

⚠ WARNING

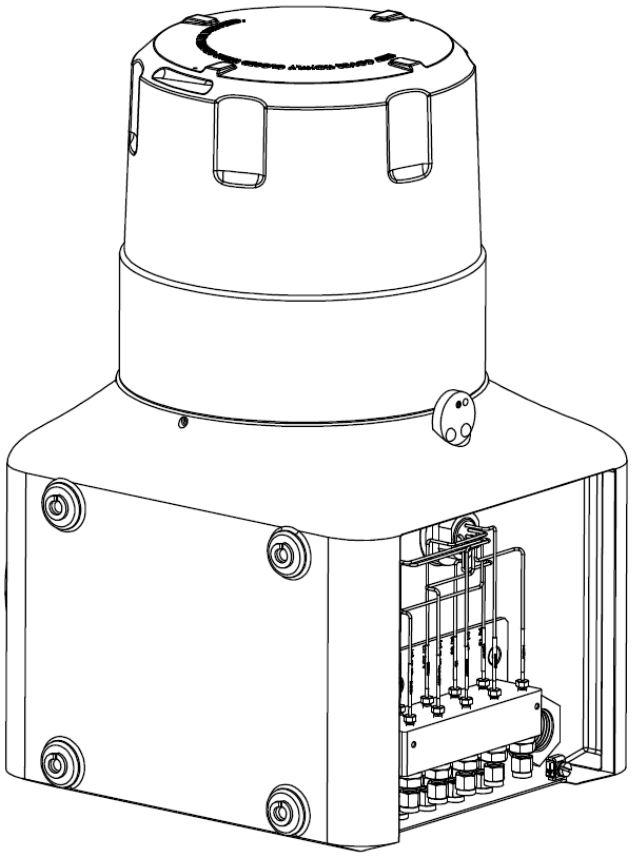
Explosion Hazard

Do not use hydrogen for valve actuation.

Procedure

1. Shut off the carrier and actuation gas supply.
2. Wait until the carrier gas pressure gauge reads zero psi.
3. Disconnect the carrier gas tubing from the tee fitting that is connected to the carrier gas supply.

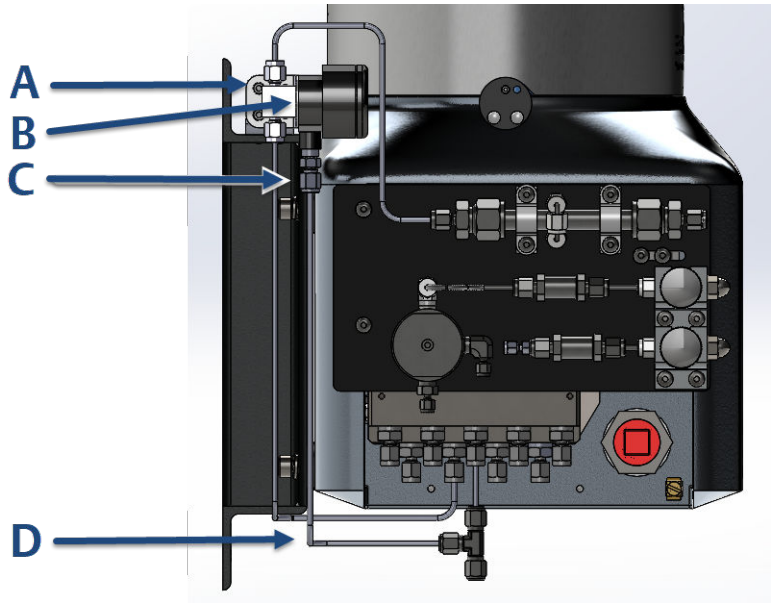
Figure 2-1: Current Carrier Gas Line Configuration Using Helium



Note
The tee fitting positioning may vary, but is often found at the inlet of the carrier gas regulator. A reducer is provided in the kit to make a connection directly from the carrier gas cylinder to take the tubing size down from ¼-in. to ⅛-in.

4. Mount the carrier shut-off valve to the bracket on the back frame rail.

Figure 2-2: Carrier Gas, Actuation Gas Line, and Shut-off Valve Connections

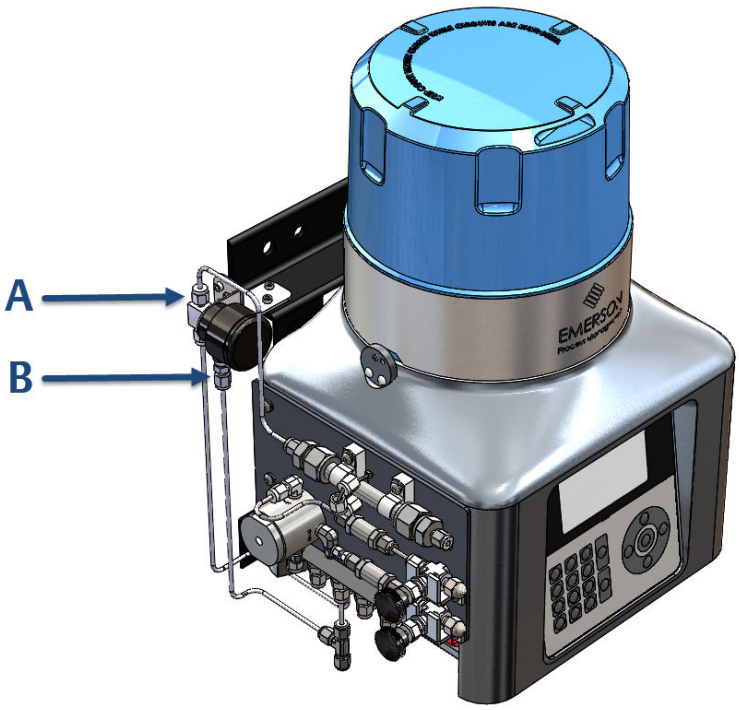


A. Bracket
B. Carrier shut-off valve
C. Actuation gas connection
D. Tee fitting and actuation gas line, stainless steel, ⅛-in. tubing

5. Connect a ⅛-in. tubing from the tee to the input port of the shut-off valve.

6. Use a ⅛-in. national pipe thread (NPT) to ⅛-in. Swagelok tee fitting to connect the carrier gas line located at the top port of the shut-off valve.

Figure 2-3: Carrier and Actuation Gas Tubing Connections



A. Carrier gas tubing input to shut-off valve
B. Actuation gas tubing input to carrier shut-off valve

7. Connect a piece of ⅛-in. tubing from the actuation port of the shut-off valve to the ⅛-in. bulkhead fitting.
8. Connect the actuation line (N2) to the ⅛-in. input port.
9. Ensure that all tube fittings are properly connected. Then label the new actuation gas inlet and reconnect gases to their appropriate entries.

2.3 Purging the carrier gas lines

Use this procedure to purge the gas chromatograph's gas lines.

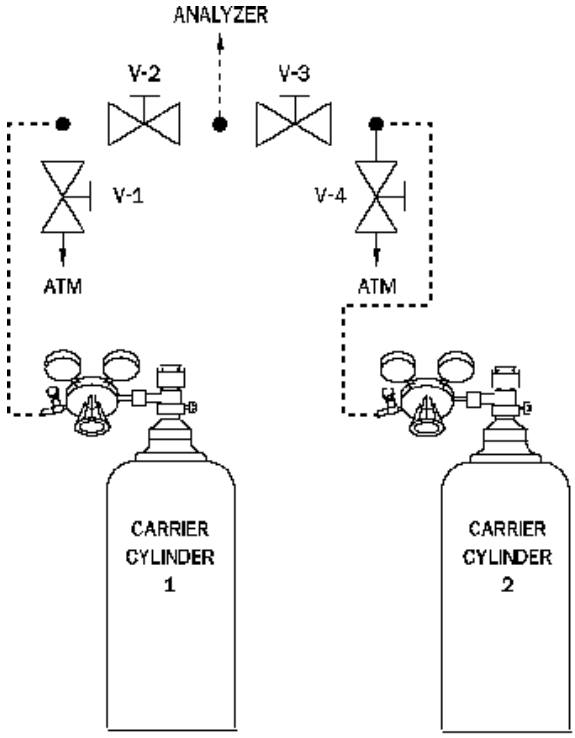
Refer to Figure 2-4.

Procedure

1. Close all valves and tighten all fittings.
2. Run tubing to the GC, but do not connect.
3. Back off pressure regulator (turn counterclockwise) fully.

Refer to Figure 2-4 to complete Step 4 through Step 12.

Figure 2-4: Carrier Gas Valve Configuration



4. Open cylinder valve for Carrier Cylinder 1.
   The pressure indicator will read the cylinder pressure.
5. Open the shut-off valve attached to the carrier regulator.
6. Regulate pressure out of the cylinder to 20 psig; then close the cylinder valve.
7. Open V-1 (bleed valve) and let the carrier gas bleed to atmosphere until both gauges read 0 psig and then close V-1.
8. Repeat Step 4 and Step 5 twice to purge the line to V-2.
9. Purge the line to V-3 by repeating Step 2 through Step 6, but this time, use bleed valve V-4 and Carrier Cylinder 2.

10. With valves 1-4 closed, open both cylinder valves and regulate both carriers to approximately 10 psig.
11. Open V-2 and V-3 simultaneously; then turn both cylinder valves off and let the carrier gases bleed through the line to the GC until all gauges read 0 psig.
12. Repeat Step 8 and Step 9 twice to purge the line to the GC.
13. Leak check all the fittings carefully.
14. Let the GC run overnight before calibrating.

2.4 Changing the thermistors

Use this procedure to remove the helium thermistors and install the hydrogen compatible thermistors.

⚠ WARNING

EXPLOSION HAZARD

Failure to observe this warning may cause death or serious injury to personnel.

Hydrogen is potentially explosive. Use extreme caution when using hydrogen as the gas chromatograph's carrier gas.

To prevent ignition of hazardous atmospheres, disconnect from supply circuit before opening the enclosure. Keep tightly closed when circuits are alive. For division installations using a conduit, a sealing device must be connected within 18 in. (460 mm).

2.4.1 Removing the thermistors

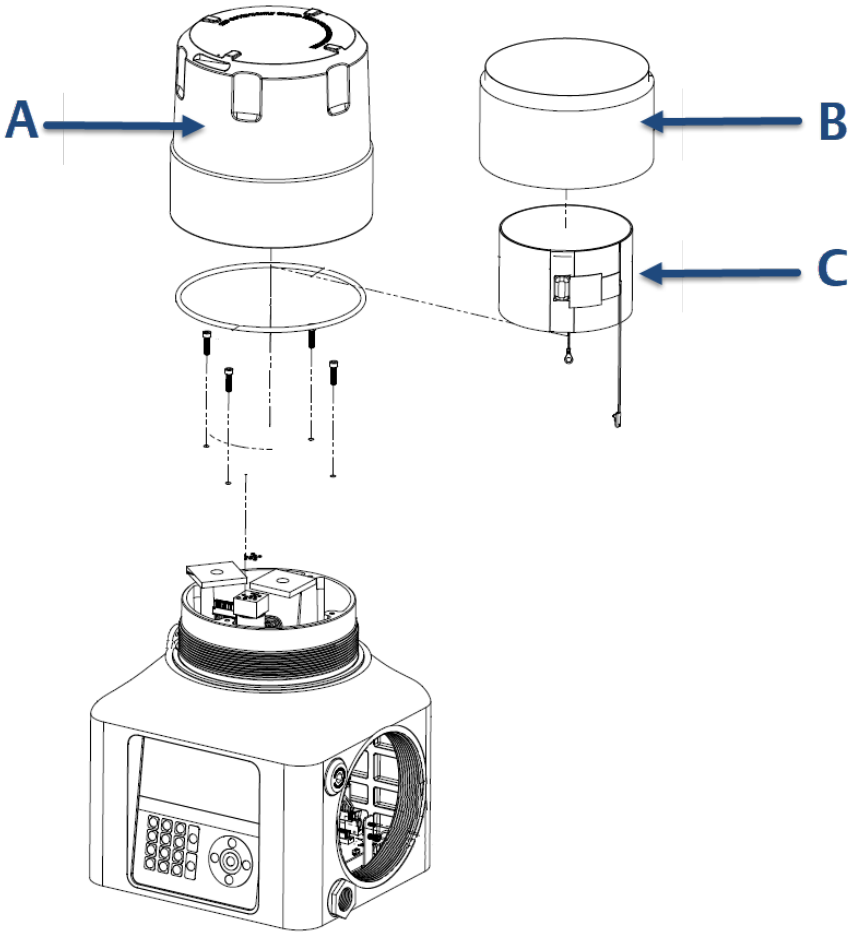
Use this procedure to remove the helium thermistors.

Procedure

1. Turn off power to the gas chromatograph.
2. Remove the dome cover (P/N 7P00057H01).
3. Remove the upper enclosure insulation cover (P/N 7A00058G01).

4. Lift the analytical heater assembly (P/N 7A00005G01) and allow it to hang by the heater strap.

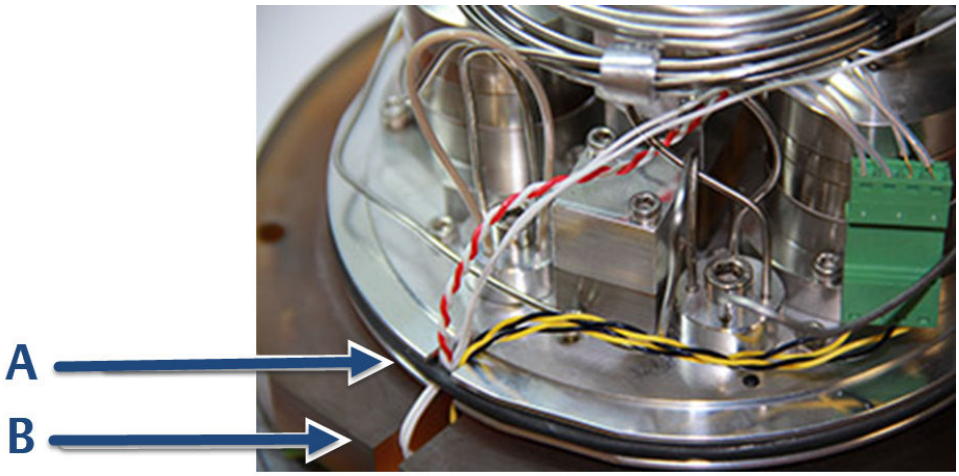
Figure 2-5: Removing the Dome Cover, Insulation Cover, and Heater Assembly



A. Dome cover
B. Insulation cover
C. Analytical module heater assembly

5. Remove the O-Ring from the valve mounting plate groove.

Figure 2-6: Mounting Plate Slot

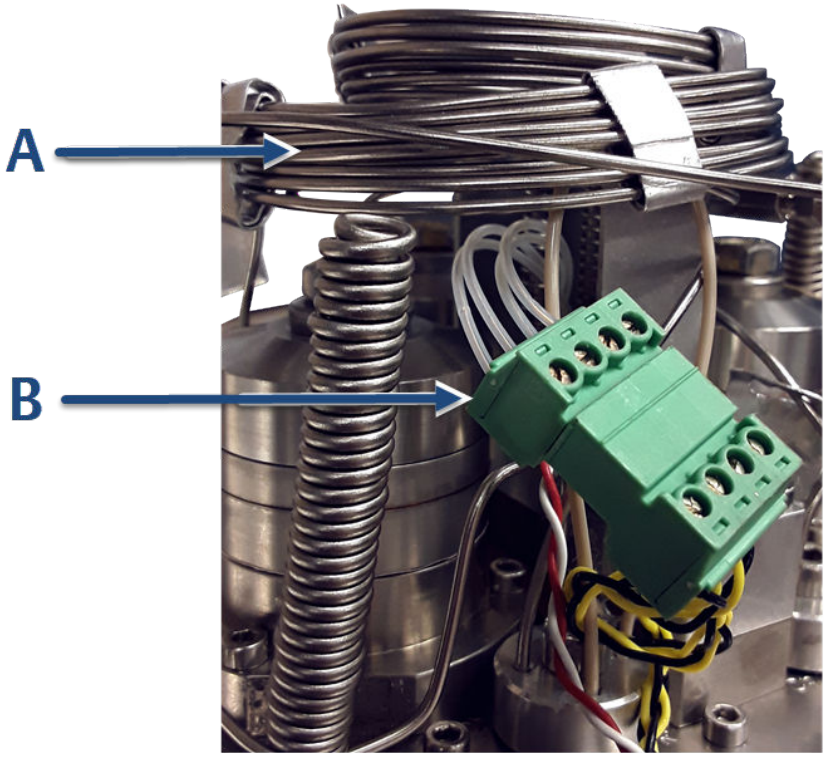


A. O-Ring
B. Valve mounting plate slot

See Figure 2-7 and Figure 2-8 for Step 5 through Step 12.

6. Remove the columns.

Figure 2-7: Removing the Columns and Disconnecting the Thermistor Wires

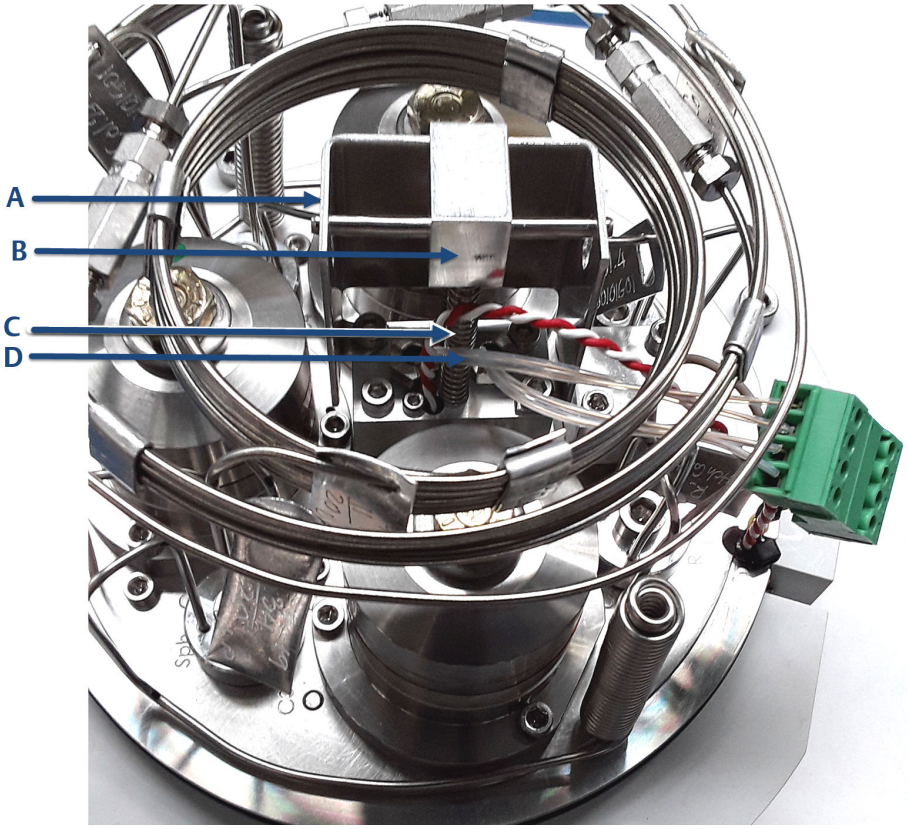


A. Columns
B. Thermistor wiring sensor harness screws

7. Remove the heat pipes spring block.
8. Remove the two heat pipe springs.
9. Remove the two heat pipe bracket screws from the TCD block.
10. Use a standard flathead or a Phillips screwdriver and loosen the four thermistor wiring screws in the sensor harness.
11. Remove the two ⅜-in. thermistor nuts.

12. Remove the thermistors and the PTFE seals (P/N 2-6-5000-084) from the detector block.

Figure 2-8: Thermistor disassembly

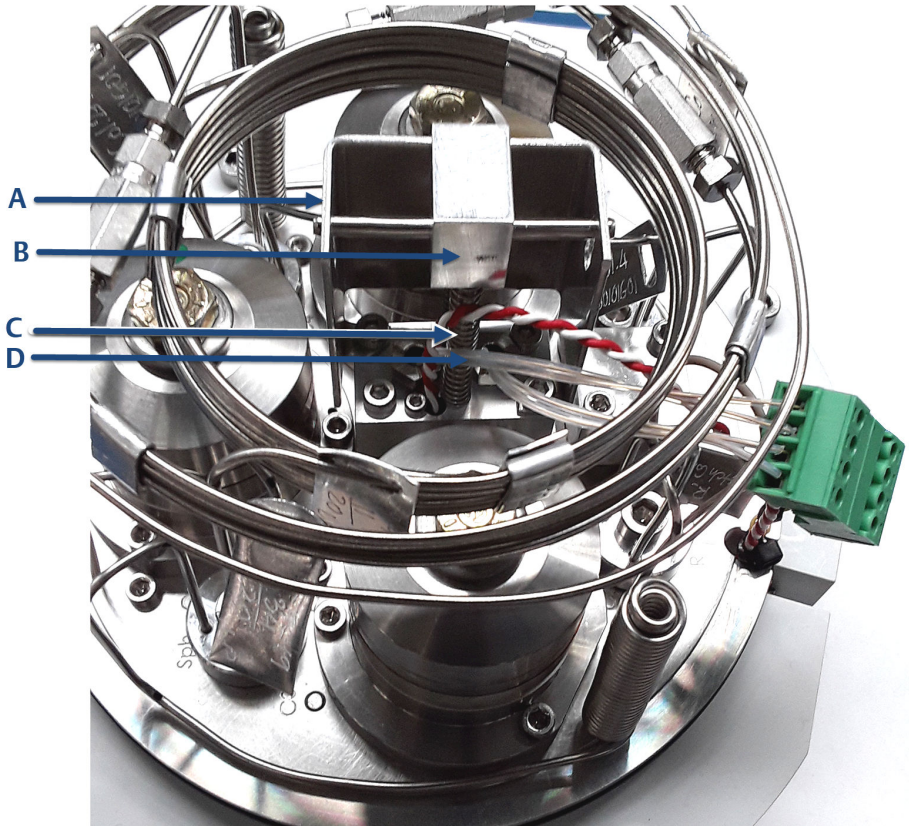


A. Heat pipe bracket
B. Heat pipe spring block
C. Heat pipe springs
D. Thermistors

2.4.2 Installing the hydrogen thermistors

Use this procedure to install the hydrogen thermistors.

Figure 2-9: Thermistor disassembly



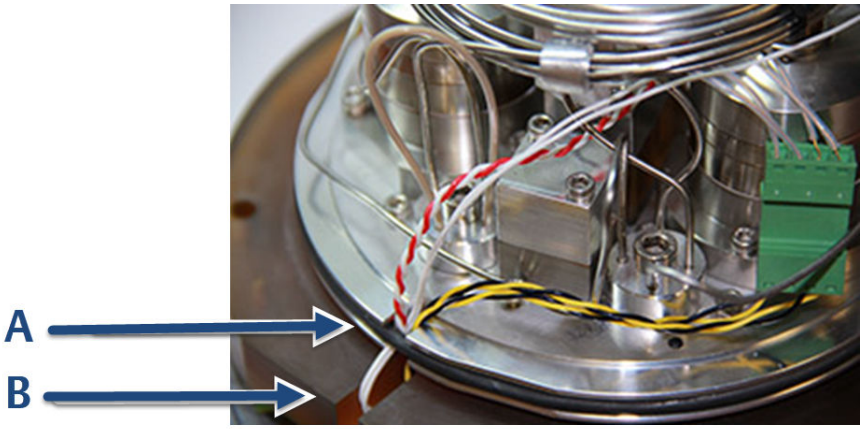
A. Heat pipe bracket
B. Heat pipe spring block
C. Heat pipe springs
D. Thermistors

Procedure

1. Replace the thermistor seals and the thermistors (P/N 2-5-1611-007) that shipped with the retrofit kit.
2. Thread the thermistors through the two ⅜-in. thermistor nuts and tighten the nuts. Using the proper wrench, apply 20 ft.-lb. of torque.
3. Attach the thermistors into the sensor harness connector and tighten the four screws.
4. Reinstall the two heat pipe bracket screws into the TCD block.
5. Reinstall the two heat pipe springs.
6. Reinstall the heat pipes spring block.
7. Reinstall the columns.

8. Make sure all of the wires are not pinched and are in the mounting plate slot. See Figure 2-10.
9. Install the O-Ring (P/N 7C00030-366) over the columns and wires and fit into the valve mounting plate groove.

Figure 2-10: Mounting Plate Slot



A. O-Ring
B. Valve mounting plate slot

10. Reinstall the heater insulation cover.
11. Reinstall the dome cover and ensure it is tightly sealed.
12. Turn on the gas chromatograph power.

2.5 Adjusting the carrier pressure

This section describes the manual carrier pressure adjustment after performing the helium to hydrogen gas conversion.

Procedure

1. Adjust the carrier pressure to approximately half of what it was with the helium.
2. Make a single run with calibration gas and see how close the chromatogram is when compared to the chromatogram with helium. If it is too fast, reduce the carrier pressure. If it is too slow, increase the carrier pressure.
3. Continue to make single runs and adjust the carrier pressure until it looks close to what it was with the helium carrier.
4. If necessary, make any required valve timing changes to bring the GC back to full function.

   Use the following guide to help in valve adjustments. The guide is specific to C6+ BTU analysis, backflush to measure, dual column arrangement, but can be used for any valve timing adjustments required using the appropriate valve and component.

Figure 2-11: Backflush Valve Timing

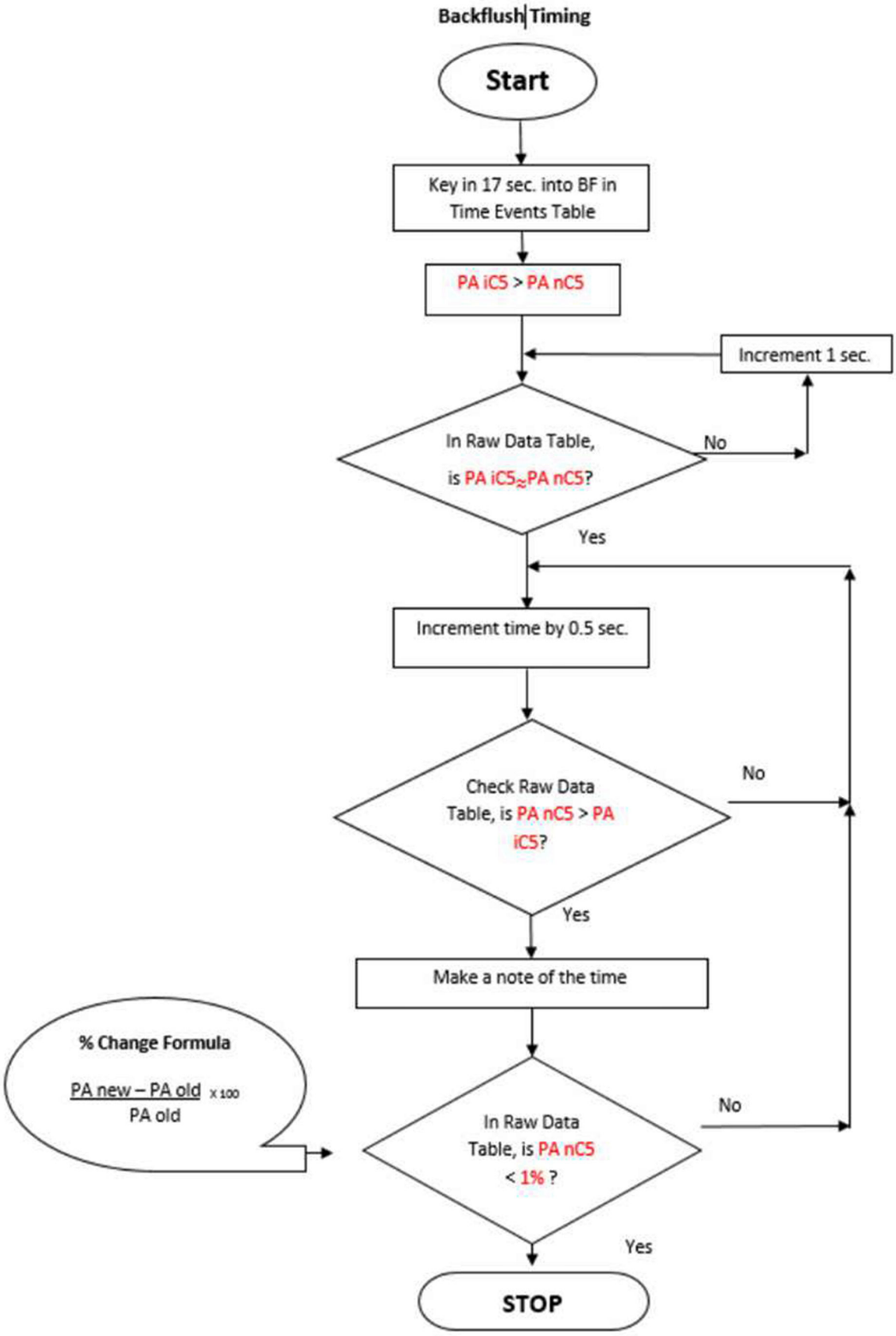


Table 2-2: Example Backflush Valve Timing

			PA Old
RT	**BF TIME**	**PA n-Pentane**	**% Change**
219	20	76822312	
219	21	82954542	7.982355439
219	22	85914053	3.567629847
219	24	88965346	3.551564492
219	25	92305383	3.754312381
219	26	93208291	0.978174805
219	27	94027248	0.878631065
219	28	93370502	0.698463492
219	29	94646236	1.36631374

Figure 2-12: Dual Column Valve Timing

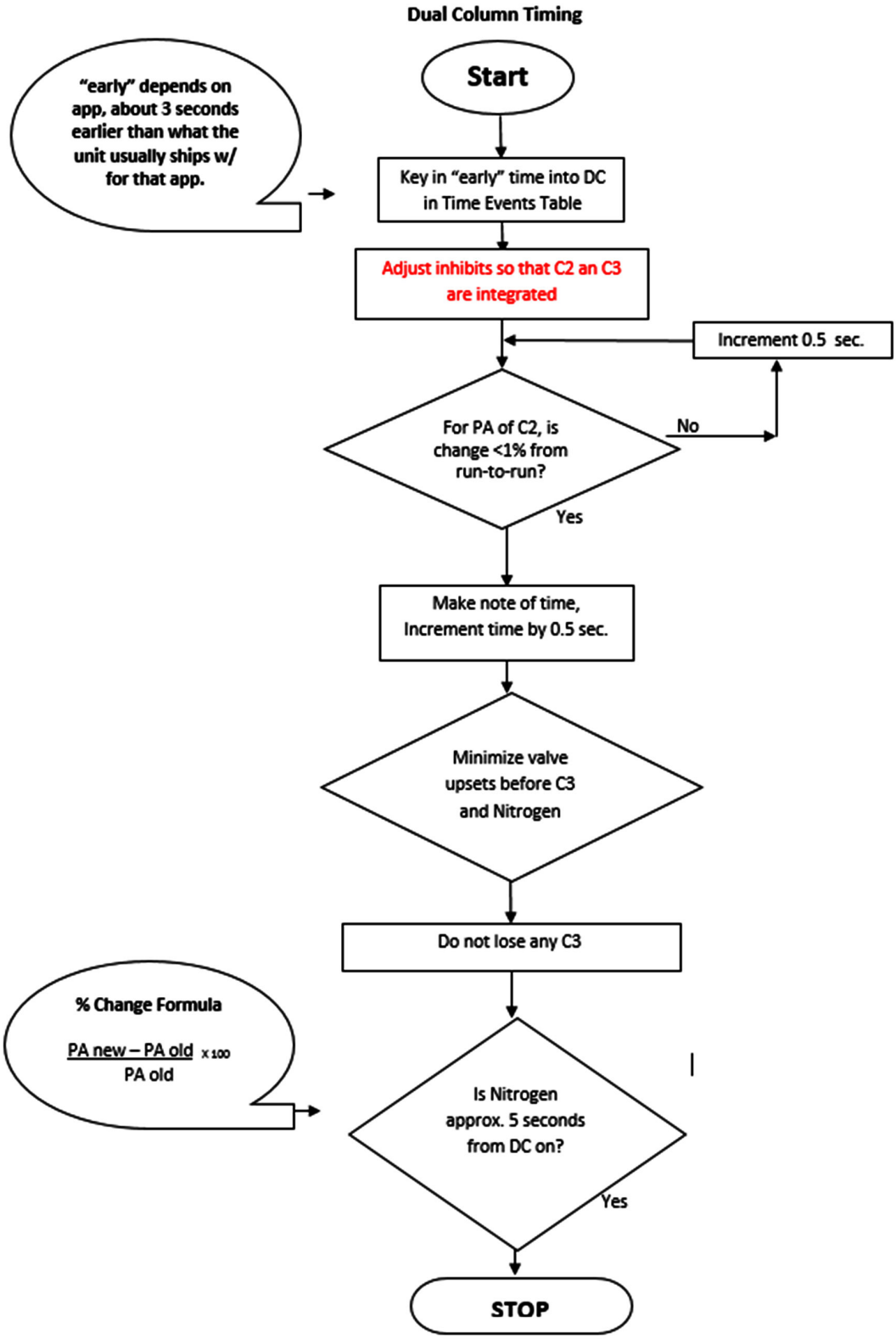


Table 2-3: Example Dual Column Valve Timing

BF TIME	PA C3	PA C2	% Change
38	7.62+E08	5.60E+08	N/A
39	8.399+08	6.32E+08	12.85714
40	8.129+E08	6.70E+08	6.012658
41	N/A	6.87E+08	2.537313
42	N/A	6.95E+08	1.164483
43	N/A	6.98E+08	0.431655
44	N/A	7.01E+08	0.429799

5. Input the proper retention times into the Component Data Table.
6. Run forced calibration.

Postrequisites

After performing the manual carrier pressure adjustment, run MON2020 to Configure the valve timing.

Important
Only make adjustments to the values at the direction of an Emerson Customer Care technician.

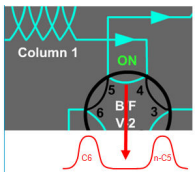
2.6 Configure the valve timing

Use this feature to set and adjust the valve timing.

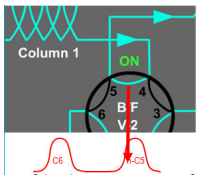
Note
Auto valve timing is only available with the Rosemount™ 370XA Gas Chromatograph.

The function of valve timing is to switch the analytical flow path after the peak of a *lighter* component has left a column, but before the next component comes out. The first image below shows the valve timing occurring in-between the C6+ and n-Pentane peaks correctly on a standard 4-minute C6+ application. The second image shows what happens when the valve timing is too early and cuts off some of the first peak. The third image shows what happens when the valve timing is too late and cuts of some of the second peak. In the last two examples, not all of the component will reach the detector at the expected time, and therefore will not be measured correctly.

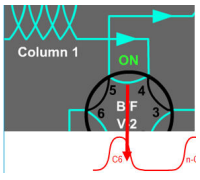
Table 2-4: The effect of valve timing on component leaks.



Correct timing



Early valve timing error



Late valve timing error

Historically, a technician monitors the peak areas of the two affected peaks while making changes to the valve timing, and determine the correct timing using personal judgment. The intention of the auto valve timing (AVT) process is to automatically make the adjustments and monitor the peak areas to determine the correct valve timing automatically, reducing the load on the technician to just selecting when to initiate the AVT process.

The AVT is a process that runs on the calibration gas stream. The process consists of the following activities:

- Correctly identify all the component peaks.
- Adjust the timed events based on peak retention times.
- Automatically adjust the valve time.
- Run a calibration cycle after the adjustments have been made.
- Check the range and order of response factors.

Procedure

1. Select **Control** → **Auto Valve Timing** to open the **Start Auto Valve Timing** dialog.
2. If you are installing a new module, select the **Factory Defaults** checkbox; otherwise, select the **Use Current** checkbox.
3. Click **OK**.
   The AVT process will run. When it completes, it will generate and display an *Auto Valve Timing* report.

Figure 2-13: Auto Valve Timing sample report

Auto Valve Timing

Date-Time: 10/15/08 09:29 Analysis Time: 350 Cycle Time: 360
Stream: 4 Cal MODE: FCAL Cycle Start Time: 09:23
Analyzer: Houston Strm Seq:1,3,2
Houston
S/N: 000001 SO: 000001

Valve 2 - OFF
EVC Component n-Pentane
LVC Component C6+(47/35/17)

Time	EVC Area	% Change	LVC Area	% Change
19	883624	-	606288	-
19.5	1.21677E+06	37.7%	421916	-30.4%
20*	1.24228E+06	1.8%	416836	-1.2%
20.5	1.25552E+06	1.1%	396148	-5.0%
21	1.25318E+06	-0.2%	336532	-15.0%

Valve 3 - OFF
EVC Component Ethane
LVC Component Propane

Time	EVC Area	% Change	LVC Area	% Change
38	883624	-	506288	-
38.5	1.11677E+06	32.7%	321916	-35.4%
39*	1.14256E+06	1.4%	316836	-1.4%
39.5	1.15534E+06	1.0%	396148	-4.8%
40	1.15378E+06	-0.4%	236532	-15.0%

ACTIVE ALARMS

3 Ordering information

3.1 Parts list

Part number	Description	Required	Units
2-6-5000-084	Seal, thermistor PTFE	2	EA
2-5-1611-007	Thermistor matched pair 9K double dipped (GOWMAC instruments only)	1	EA
2-6-5000-487	Tubing, 1/8 in. ODX .085 ID	4	FT
9C00012-008	SHCS, M4X0.7X8MM, 18-8 SST	4	EA
7C00129-001	Fitting, Tee, 1/8" Tube, Swagelok SS-200-3	1	EA
2-4-5000-395(1)	Reducer 1/4 T X 1/8 SS	1	EA
2-4-9500-012	Connector, male 1/8 T X 1/8 NPT SS, SS-200-1-2	1	EA
7P00214H01	Bracket, hydrogen shut-off valve, 370XA	1	EA
2-4-4000-197	Valve, carrier shut-off	1	EA
7A00003G02	Kit, hydrogen shut-off valve, 370XA, field retrofit	1	EA

(1) The reducer is provided if a ¼-in. direct connection from the carrier gas cylinder to the ⅛-in. tee fitting is configured.

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