

Introduction to Agilent 1290 Infinity Maintenance



Manuel Otero

Field Service Engineer

**Especialista en UHPLC y en
Sistemas Informáticos en Red**



Agilent Technologies

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Points of the Presentation

- ✓ Introduction of Agilent 1290 Infinity Series
- ✓ Maintenance Overview
- ✓ Lab Advisor
- ✓ Degasser Maintenance
- ✓ Pump Maintenance
- ✓ Autosampler Maintenance
- ✓ Thermostat Column Compartment Maintenance
- ✓ DAD Maintenance
- ✓ Examples of LC Problems

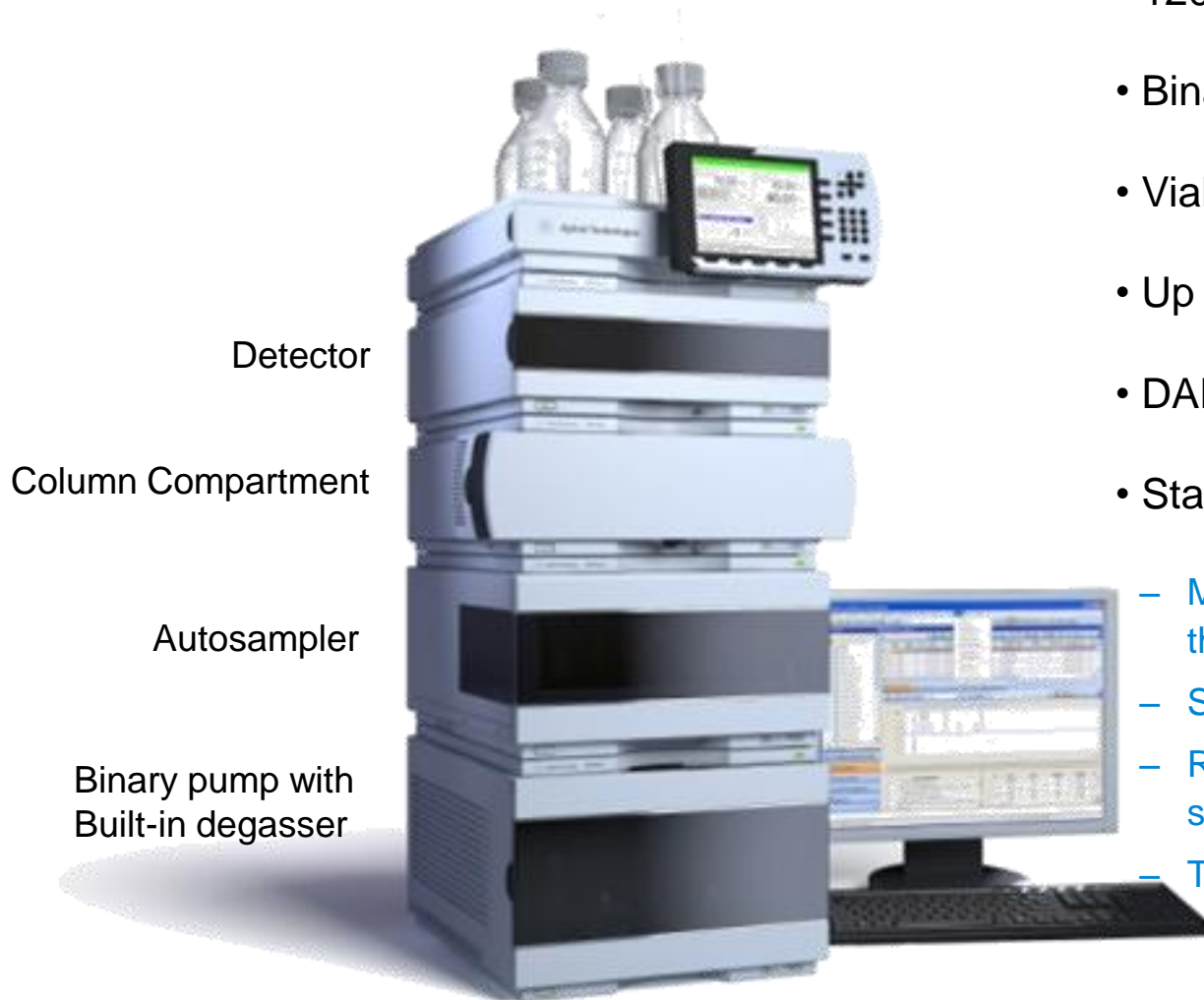
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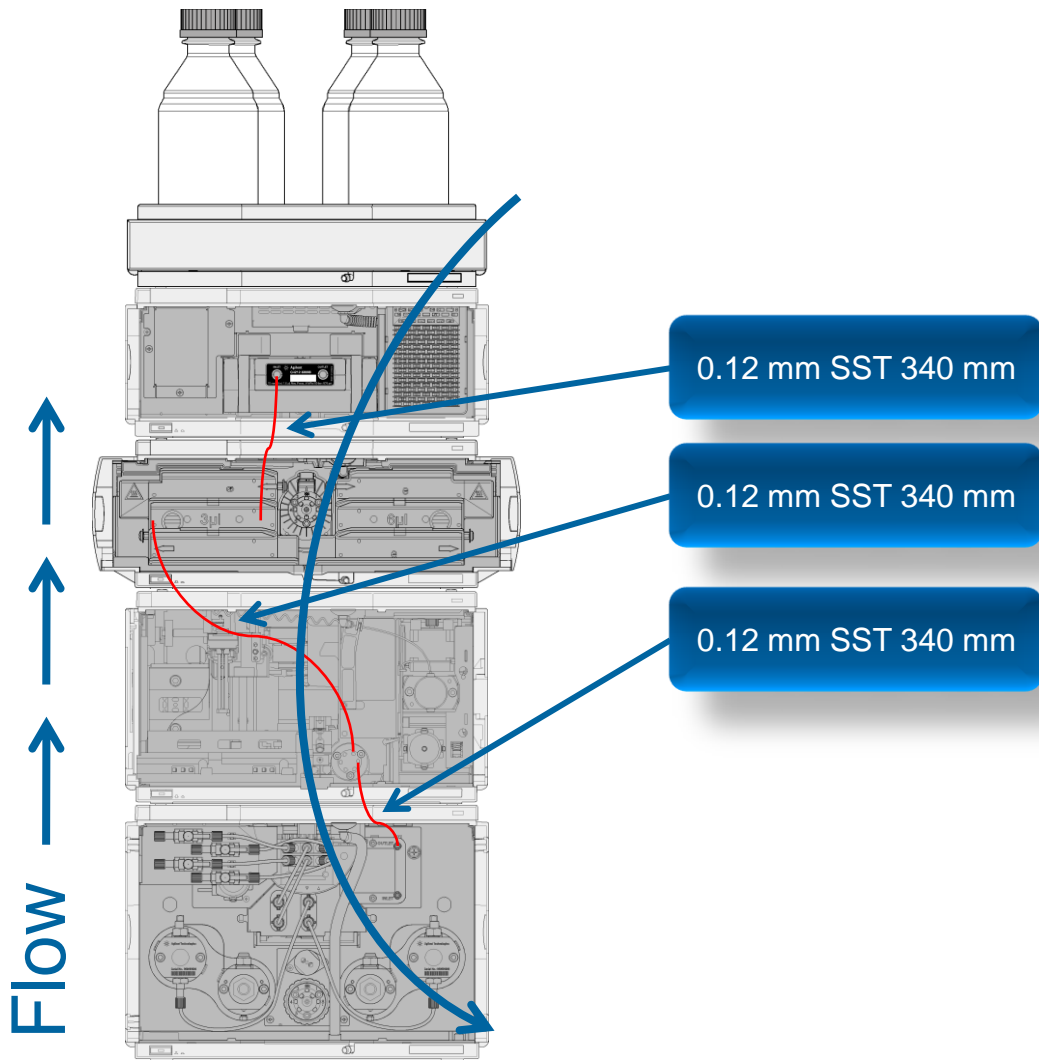


Agilent UHPLC 1290 Series



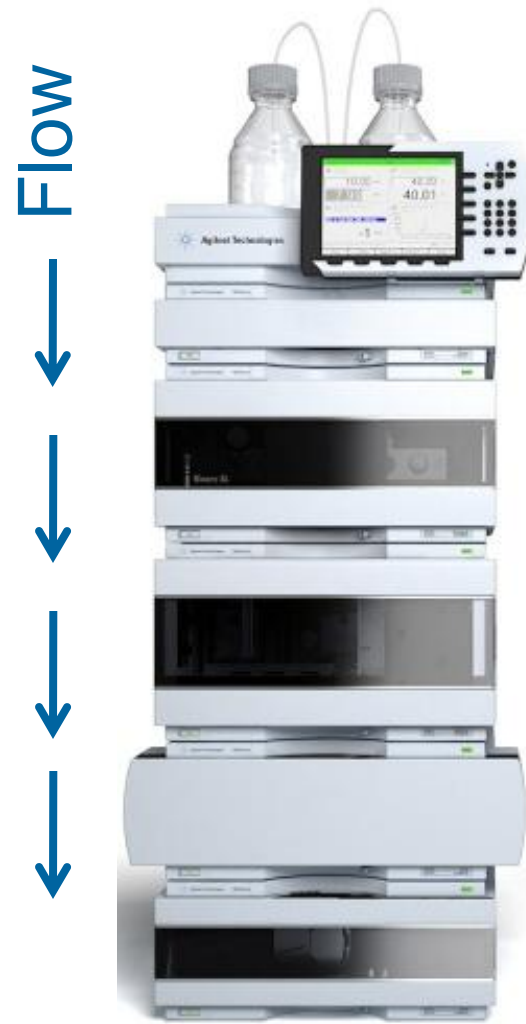
- Best in class for analytical and UHPLC applications
- 1200 bar
- Binary or quaternary pump
- Vials and microliter plates
- Up to 100°C column compartment
- DAD at 160 Hz
- Stack configuration different.
 - More stability – heavier modules on the bottom.
 - Shortest possible connections.
 - Requires longer inlet tubing from solvent reservoirs.
 - Tubing clips route connection tubing.

Capillary Connections



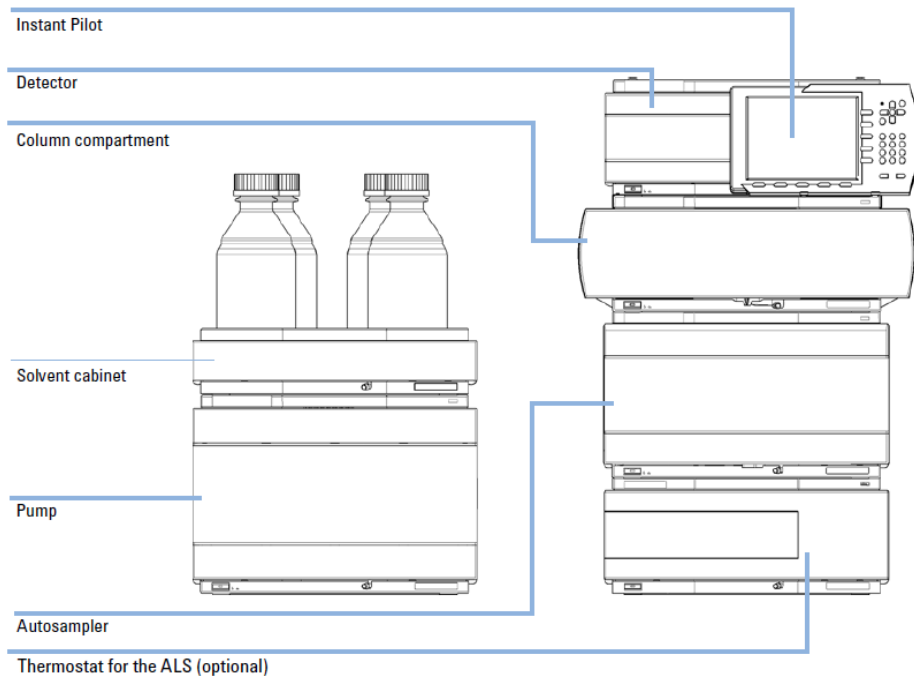
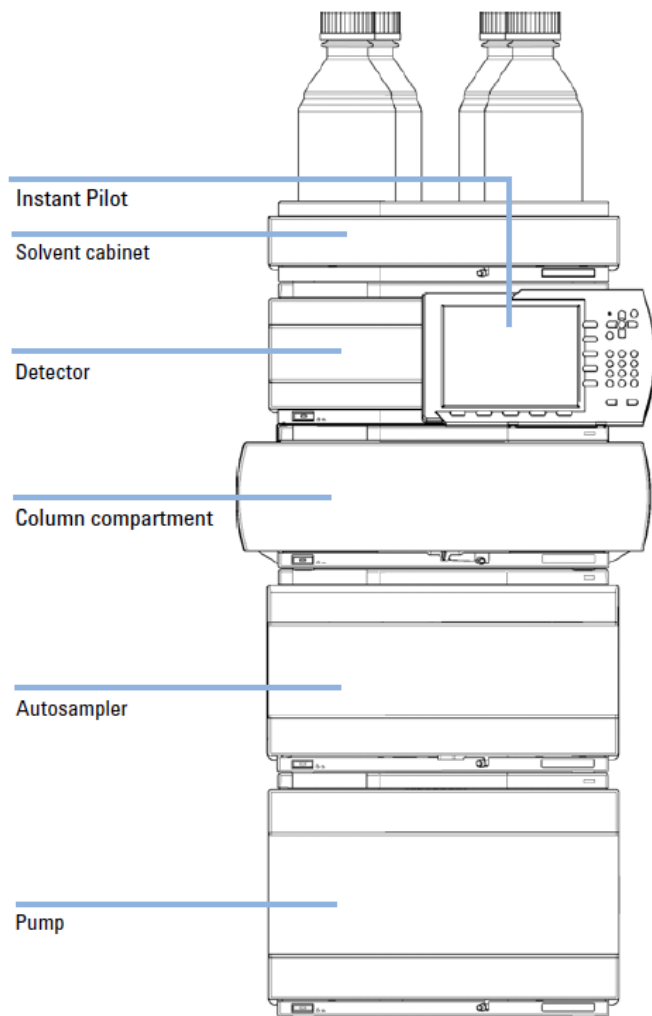
Agilent 1290

Tubing diameters depend on delay volume configuration - from 0.12 to 0.17 mm i.d.



Agilent 1260

Stack Configurations Agilent 1290



Mobile Phase Recommendations

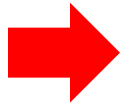
- Contaminated solvents or microbial growth in the solvent bottle may plug the solvent inlet filter, reducing pump performance.
 - If possible, use sterile solvent bottles.
 - *Filter solvents through sterile filters (< 0.4 μm).*
 - Replace the solvents every two days or refilter.
 - Avoid exposure to direct sunlight or use brown glass bottles.
 - Consider adding 0.1 to 1 mM sodium azide or 5-10% organic to the aqueous mobile phase to inhibit microbial growth.



pH Considerations

- In general, Agilent Infinity modules operate over a pH range 1 to 12.5.
- pH < 2.3
 - Solvents must not contain acids that attack stainless steel.
- pH > 9.5
 - Replace standard (Vespel) rotor seals in all rotary valves with either Tefzel or PEEK seals.
 - Replace the standard glass solvent inlet filters with stainless steel inlet filters.
 - Be aware that quartz flow cell windows are slowly etched. Do not let high pH solvents stand in the flow cell for long periods.

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Maintenance Overview

Solvent inlet	Pump	Autosampler	Detector
<p>Clean or Replace:</p> <p>Solvent inlet filter</p>	<p>Replace:</p> <p>PTFE frit or high pressure filter</p> <p>Pump seals or pump heads</p> <p>Outlet ball valve</p> <p>AIV Cartridge</p> <p>Passive inlet valve</p>	<p>Replace:</p> <p>*Needle</p> <p>*Needle seat</p> <p>Rotor seal</p> <p>Check:</p> <p>Leak Sensor</p> <p>Drain tube</p>	<p>Replace:</p> <p>*Lamp</p> <p>*Cell window</p> <p>*Cartridge</p> <p>Clean:</p> <p>Flow Cell or cartridge</p>
<p>Column Compartment</p>	<p>Wash seals</p> <p>Clean:</p> <p>Pistons</p> <p>Support ring</p> <p>Check:</p> <p>Leak Sensor</p> <p>Drain tube</p> <p>Piston springs</p>	<p>* ... if necessary</p>	<p>Check:</p> <p>Leak sensor</p> <p>Drain tube</p>

Note there are variations from instrument model to instrument model.

Recommended Tests to Conclude Maintenance

Pump

Pressure test
Leak test

Column compartment

Thermostat test
Pressure test (if column valve present)

Autosampler

Pressure test (mainpass, bypass)
Inject standards

Detector

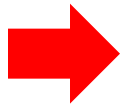
Lamp Intensity
Wavelength Calibration
Detector Specific Tests

Lab Advisor Provides System Monitoring and Test Tools
Don't forget to monitor the pump ripple found in the Actuals.

Points of the Presentation

✓ Introduction of Agilent 1290 Infinity Series

✓ Maintenance Overview



✓ Lab Advisor

✓ Degasser Maintenance

✓ Pump Maintenance

✓ Autosampler Maintenance

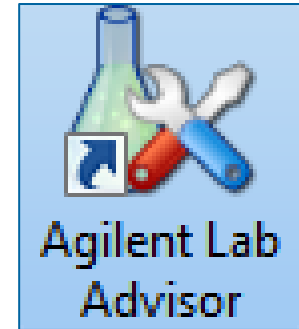
✓ Thermostat Column Compartment Maintenance

✓ DAD Maintenance

✓ Examples of LC Problems

Agilent Lab Advisor

Desktop Icon



Diagnostic Software not depended of CDS installed

Agilent Lab Advisor-Advanced

- Maintenance and Diagnostic capabilities
- Monitoring and Alerting features
- Status Report
- Advanced Early Maintenance Feedback
- Firmware updates.
- Apps
- Multiple Instrument Control (dependent upon purchased licenses)



License needed

Agilent Lab Advisor-Basic

- Limited Diagnostic Capabilities
- Monitoring and Alerting features
- Status Report
- Control 1 instrument at a time



Included with Infinity pumps – Free of Charge

System Overview- Instrument Connected

LC# - Agilent Lab Advisor

Agilent Lab Advisor for LC & CE System Overview Basic Version

Tasks

- Lab Advisor
 - System Overview
 - Configuration
 - Apps
 - Firmware Update
 - Logs & Results
- LC#
 - Service & Diagnostics
 - Instrument Control
 - EMFs
 - Status Report
- Help
 - Context Help (F1)
 - Help Topics
 - What's New?

System Name	System Information	EMF	Status
LC#	Agilent LC / 10.3.0.19	EMF?	Not Ready Disconnect
G1312B BinPump SL	Serial # DEABM0103 Firmware: A.06.34 [001]	EMF?	Drive off
G1367E 1260 HiP ALS	Serial # DEAA00653 Firmware: A.06.32 [006]	EMF?	Wellplates (none, none) Syringe Tag (Size 100 µl, Maximum Allowed P... Metering Parameter (Loop Size 100 µl, Seat C...
G1316C 1290 TCC	Serial # DEBAC00806 Firmware: A.06.32 [005]	EMF?	Thermo off
G4212B 1260 DAD	Serial # DEAA300799 Firmware: B.06.33	EMF?	Max-Light Cell Flow Cell (Product# G4212-60008, Serial# D... UV Lamp (Product# 5190-0917, Serial# 0615...
G4208A 1200 Instant Pilot	Serial # DE64458986 Firmware: B.02.11	EMF?	

On startup

Connection Address: 10.3.0.19 Version B.02.01 [026] - Basic | Licenses 4/10

Log & Results

View system or individual module by selecting tab.

Agilent Lab Advisor for LC & CE | **Logs & Results** | **Advanced Version**

Filter

Instruments: All connected Systems, LC2, Not System assigned

Devices: All, G1312B:DE60555177, G1367C:DE60555138, G13168:DE60555164, G1315C:DE55055142, G4208A:DE64458986

Source: All, Result, Error, Maintenance, FW Revision, EMF

Time: All, Last Hour, Last 24 Hours, Last 7 Days, Last 30 Days

LC2

Source	Message	Time
G1312B BinPump SL	FW Revision A.06.34 [001]	10/11/2011 10:47:18 AM
Serial # DE60555177	Error Pressure above upper limit(EE2014,461)	8/30/2011 2:36:29 PM
	Maintenance Pump (A) seals replaced (24136)	8/30/2011 1:35:30 PM
	Error Pressure above upper limit(EE2014,444)	5/23/2011 12:01:07 PM
	FW Revision A.06.10 [020]	12/14/2010 12:31:30 PM
	Maintenance	6/16/2010 1:31:59 PM
	FW Revision A.06.10 [005]	5/6/2010 2:18:19 PM
	FW Revision A.05.10 [002]	5/6/2010 2:03:30 PM
	FW Revision A.06.10 [005]	2/25/2010 2:37:23 PM
	FW Revision A.06.01 [002]	2/25/2010 2:26:25 PM
	Maintenance Purge valve frit replaced	5/6/2009 2:09:51 PM
	FW Revision A.06.10 [005]	4/23/2009 2:59:52 PM
	FW Revision A.05.12 [002]	4/23/2009 1:56:32 PM
	FW Revision A.06.10 [005]	9/18/2008 12:31:53 PM
	FW Revision A.05.10 [002]	9/18/2008 11:57:30 AM
	FW Revision A.06.03 [001]	9/13/2006 12:17:09 PM
G1367C HiP ALS SL	FW Revision A.06.34 [008]	10/11/2011 10:47:57 AM
Serial # DE60555138	Error Pressure above upper limit(EE1305,169) (9911)	8/30/2011 1:55:28 PM

Buttons: Load external data, Export filtered data, Add Log Entry, Print Result, Review Result

Connection Address: 10.3.0.15 | Version B.02.01 [028] - Advanced | Licenses 8/10

Service and Diagnostics

View all functions or uncheck to filter any combinations of Tests, Calibration and Tools

The screenshot shows the Agilent Lab Advisor interface for Service & Diagnostics. The 'Filter' section at the top has three checkboxes: 'Tests' (checked), 'Calibrations' (checked), and 'Tools' (checked). A red arrow points to this section. The main panel displays a list of instrument components for LC2:

Component	Model	Serial #
	G1312B BinPump SL	DE60555177
	G1367C HiP ALS SL	DE60555138
	G1316B TCC SL	DE60555164
	G1315C DAD SL	DE55055142
	G4208A 1200 Instant Pilot	DE64458986

The right panel shows details for the selected 'Thermostat Test':

Thermostat Test

- Temperature Calibration
- Temperature Two Point Calibration
- Diagnostic Buffers
- Module Infos

Name: **Thermostat Test**
Approx. Time: 6 min
Description: Evaluates the cooling and heating performance of the two peltier elements.

Buttons: more... Run

Connection Address: 10.3.0.15 | Version B.02.01 [028] - Advanced | Licenses 8/10

Early Maintenance Feedback

LC3 - Agilent Lab Advisor

Agilent Lab Advisor for LC & CE EMFs Basic Version

Tasks Filter

All Counters Counters with Limit

Lab Advisor

- System Overview
- Configuration
- Apps
- Firmware Update
- Logs & Results

LC3

- Service & Diagnostics
- Instrument Control
- EMFs**
- Status Report

1 Modules Monitored

Title	Value	Unit	Limit
G1312B BinPump SL Serial # DEABM0103	Liquimeter (B)	0.914	L 400
	Inlet Valve Switches (B)	16470	Count 0
	Outlet Valve Switches (B)	16462	Count 0
	Liquimeter (A)	0.884	L 400
	Inlet Valve Switches (A)	12408	Count 0
	Outlet Valve Switches (A)	12400	Count 0
	Seal Wear (B)	605	None 800000
	Seal Wear (A)	369	None 371
	Solvent Selection Valve (SSV) Switch...	0	Count 0
	Solvent Selection Valve (SSV) Switch...	0	Count 0
G1367E 1260 HiP ALS Serial # DEAA00653	Needle Into Blocked Seat Counter	0	Count 1000
	Needle Into Seat Counter	44	Count 30000
	Needle Wash Pump On-Time	0.01	h 3000
	Injection Valve Switches	111	Count 60000
G1316C 1290 TCC Serial # DEBAC00806	Valve Switches	0	Count 40000
G4212B 1260 DAD Serial # DEAA300799	Accumulated UV Lamp On-Time	36.72	h 2000
	Number of UV Lamp Ignitions	25	Count 26
	Current UV Lamp On-Time	1.38	h 0
G4208A 1200 Instant Pilot Serial # DE64458986			

2 Usage

Preview Activate EMF Deactivate EMF Refresh Counters

Connection Address: 10.3.0.19 Version B.02.01 [028] - Basic | Licenses 4/10

EMF in ChemStation

The screenshot displays the ChemStation software interface for 'Instrument 1 (online): Method & Run Control'. The main panel shows the status of four detectors: ALS (Idle), QuatPump (Standby), TCC (Not Ready), and DAD (Idle). The DAD detector's status is highlighted with a red box and a red arrow pointing to a yellow lightbulb icon with a question mark, indicating an EMF warning. A red text box at the bottom of the interface states: 'Warns, but does not prevent you from continuing your work.' The interface also shows a sequence list on the left, a data table at the bottom, and various control buttons and indicators.

Location	Sample Name	Sample Info	Datafile	Data Dir.	Inj. per Vial	Dose	Total
				C:\data\		0	0

Status Report

Create PDF for Email to Agilent Support

Local Area

LC3 - Agilent Lab Advisor

Agilent Lab Advisor for LC & CE Status Report Basic Version

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Report Name: Agilent System Report

Contact Information

Name:

Phone:

Email:

Company:

Included Information

Logs and results: Include last 24 hours of data

Include PC information

Include instrument actuals

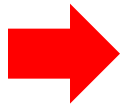
Comments:

Create Report

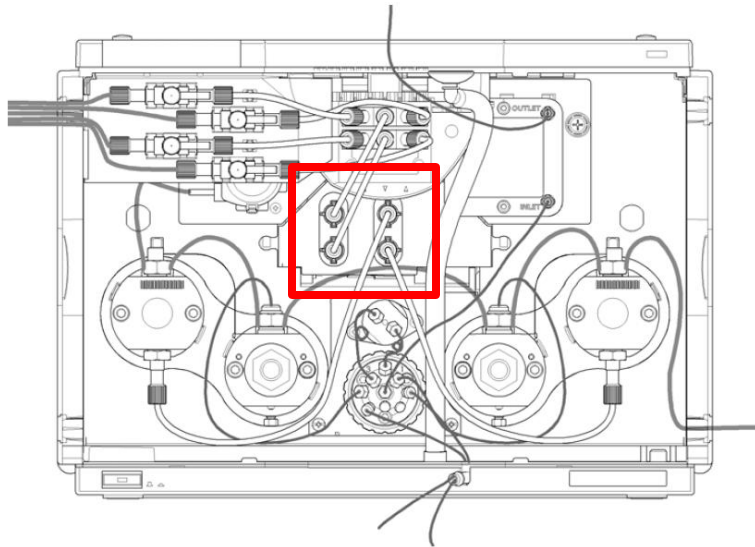
Connection Address: 10.3.0.19 Version B.02.01 [028] - Basic | Licenses 4/10

Points of the Presentation

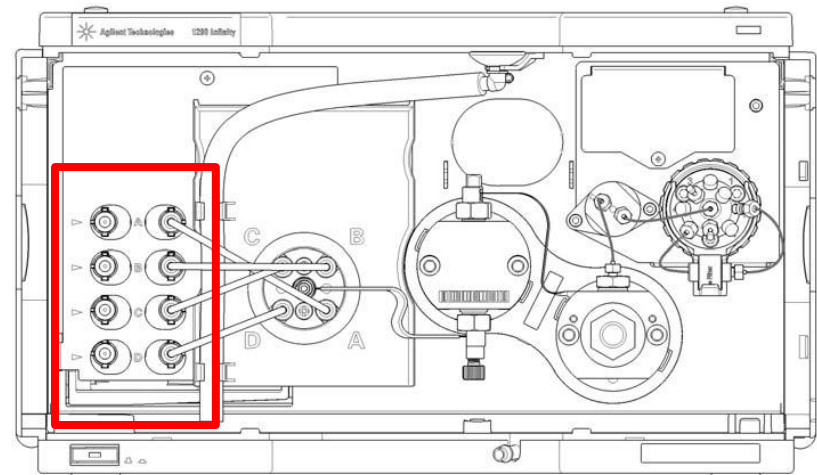
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Integrated Degassing Systems



1290 Infinity Binary Pump



1290 Infinity Quaternary Pump

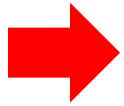
Maintenance of Degassers

- Clean the degasser lines by flushing with isopropanol.
- When using buffers, flush with water, then with isopropanol.
- Check for air bubbles in outlet lines.
- Be aware of the possibility of microbial growth in aqueous phases.
- Unused channels should be left in isopropanol.
- May have to exchange the vacuum pump, sensor, solenoid valve, or vacuum chamber – standard and microdegassers.
- Integrated degassers require unit replacement with malfunction.

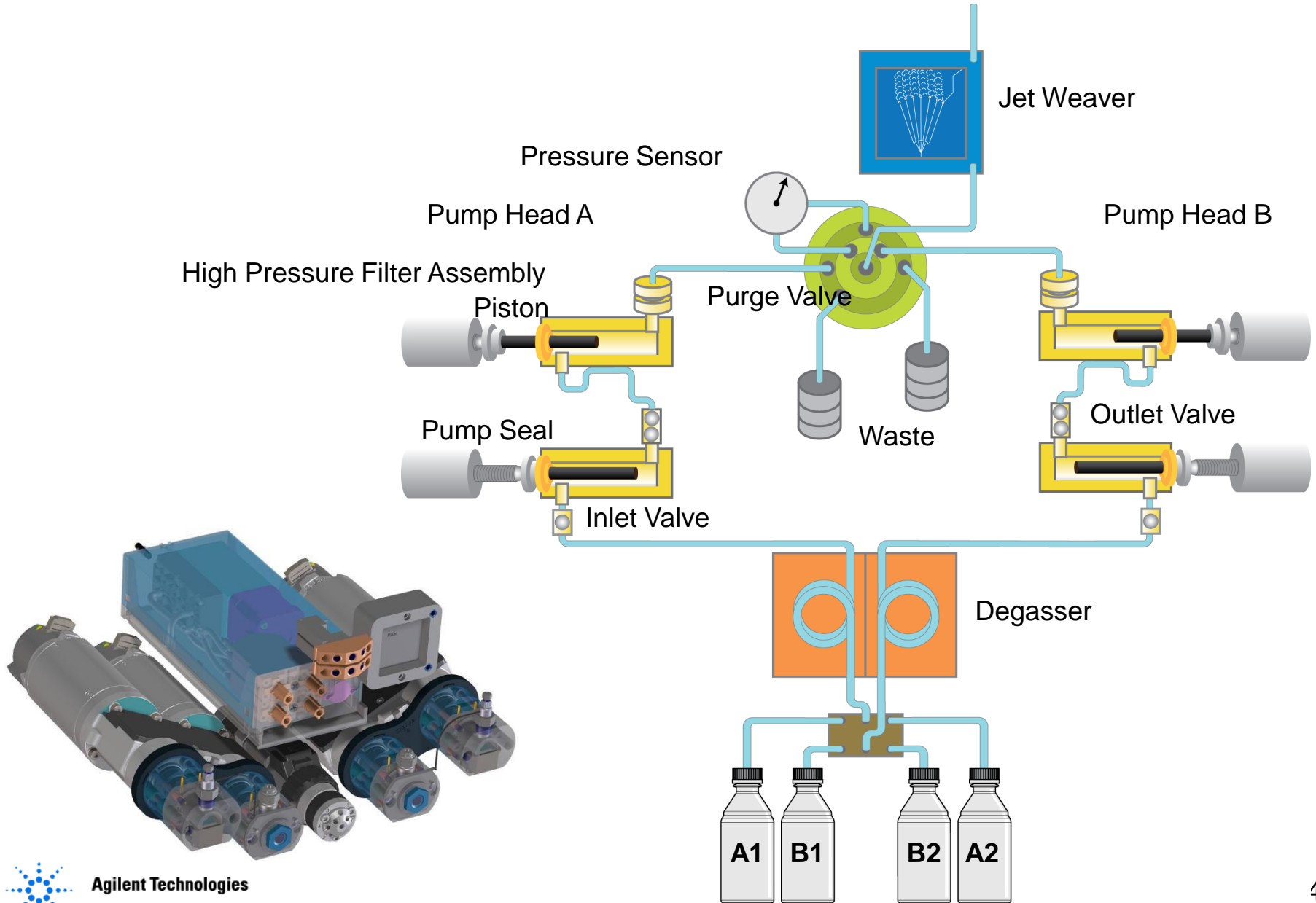


Points of the Presentation

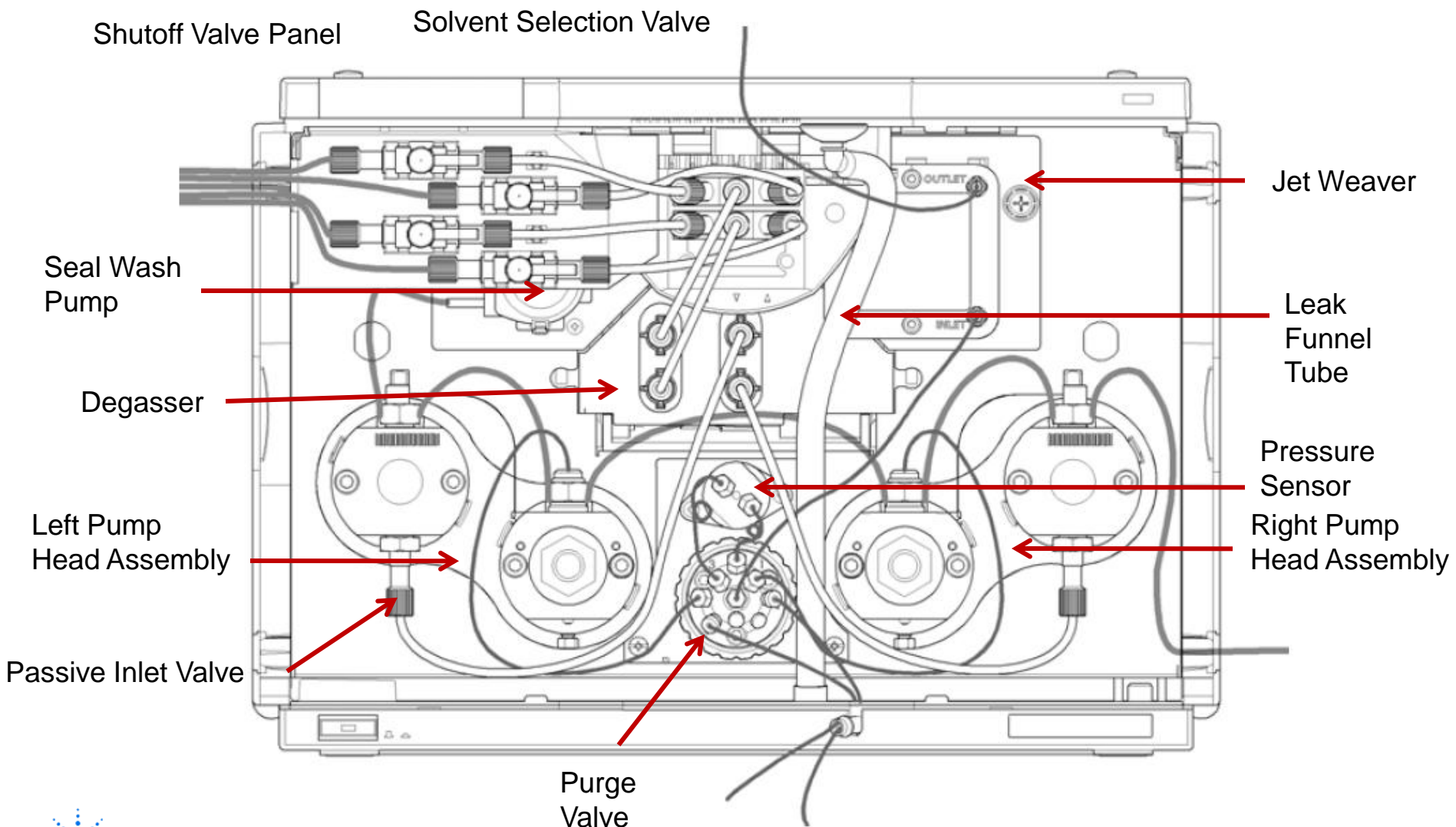
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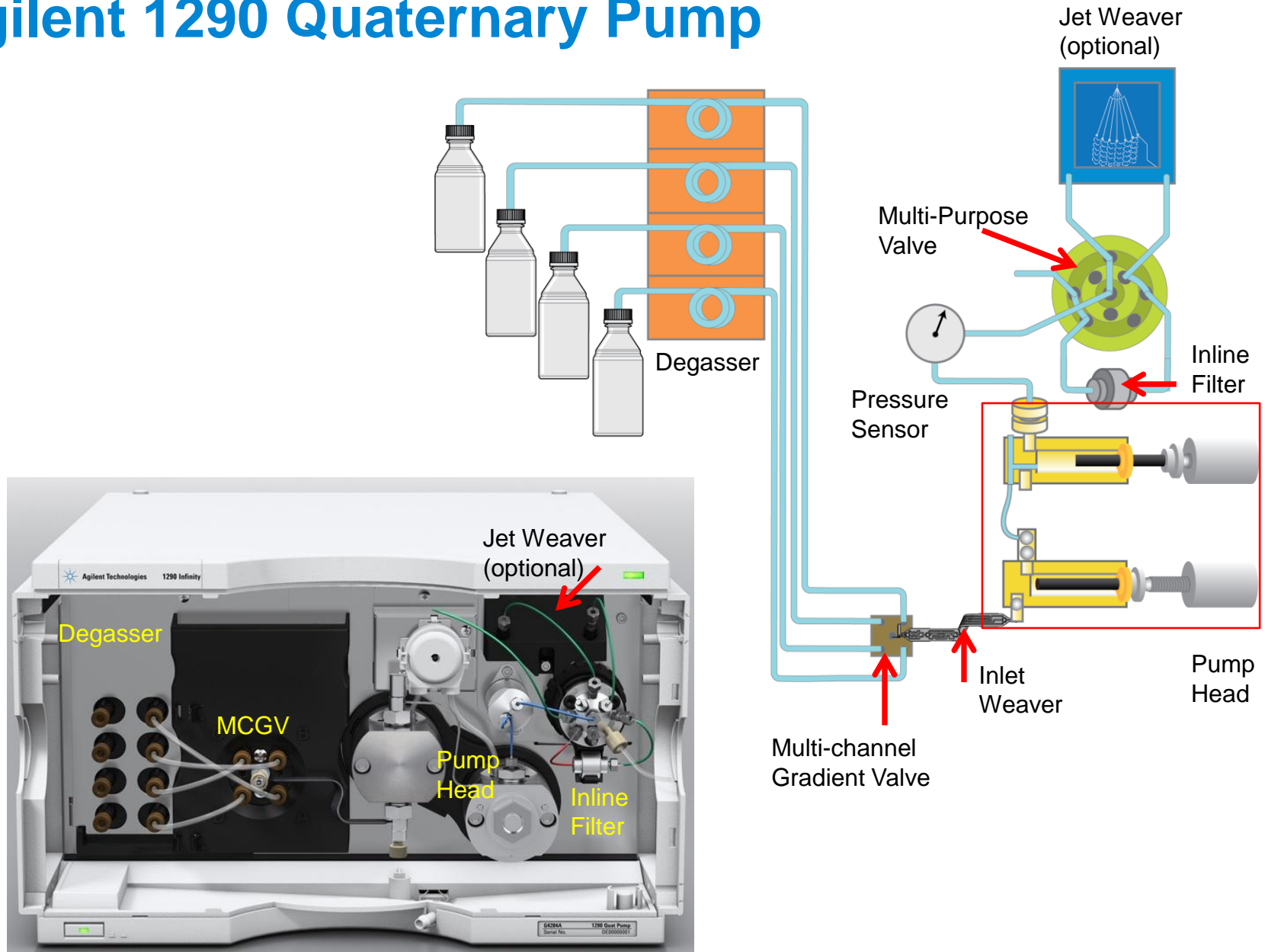
Agilent 1290 Solvent Delivery System



1290 Binary Pump



Agilent 1290 Quaternary Pump



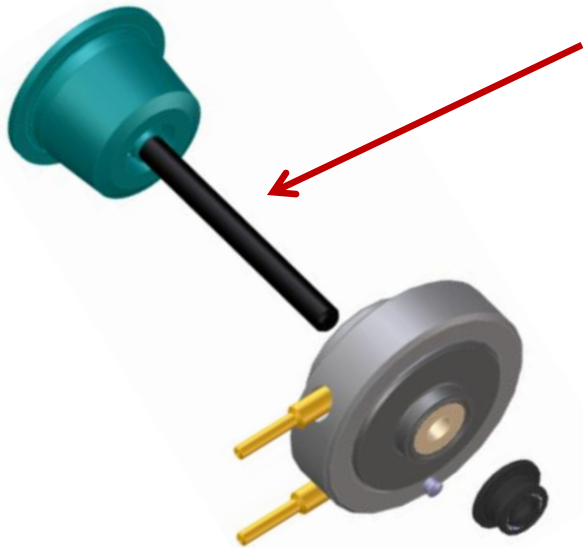
1290 Infinity LC Binary Pump

New Piston Material:

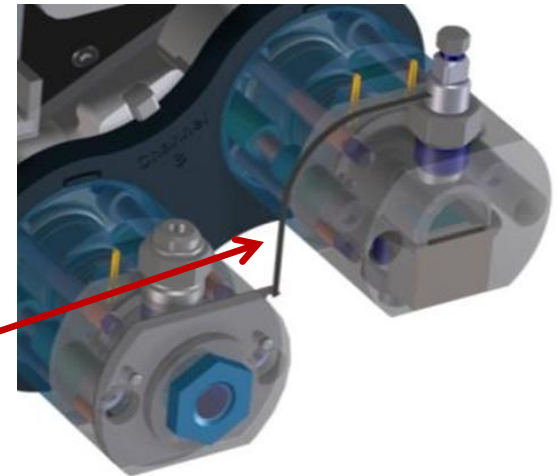
SSiC (Sintered Silicon Carbide)

Optimized heat dissipation enables

- Higher pressure x flow rates (1200 bar at 2 mL/min.)
- Longer seal lifetime / maintenance intervalls (>150 L).
- One seal for reversed and normal phase.



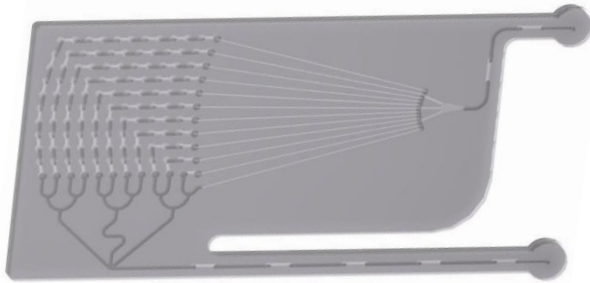
Multi-layer capillary for optimized heat exchange between pump heads.



Agilent Jet Weaver

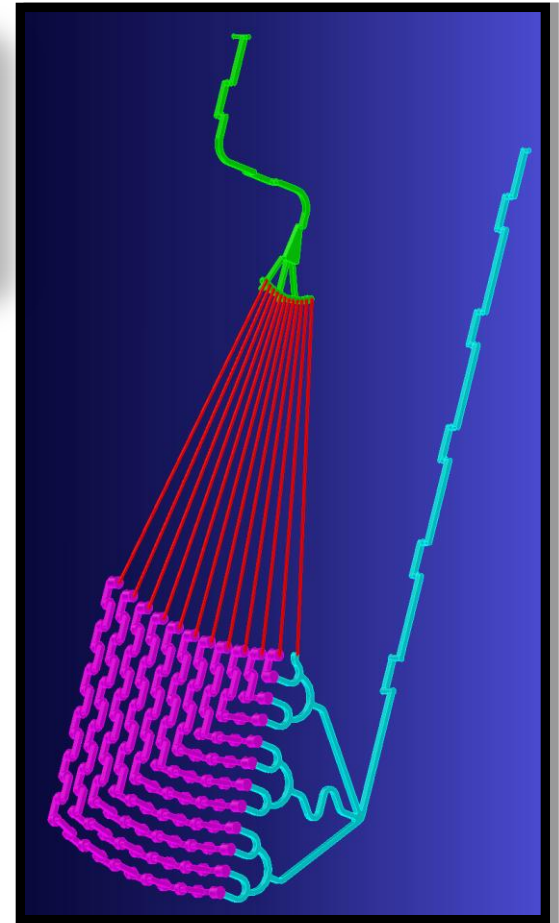
Highest Mixing Efficiency at lowest Volume

- 35 μl for standard UV Applications
- 100 μl for TFA Applications



Technology:

- Proprietary multi-layer, microfluidics technology.
- Diffusion bonded stainless steel, edged structures (100 x120 μm).
- Connection line has edged lines to reduce dispersion.

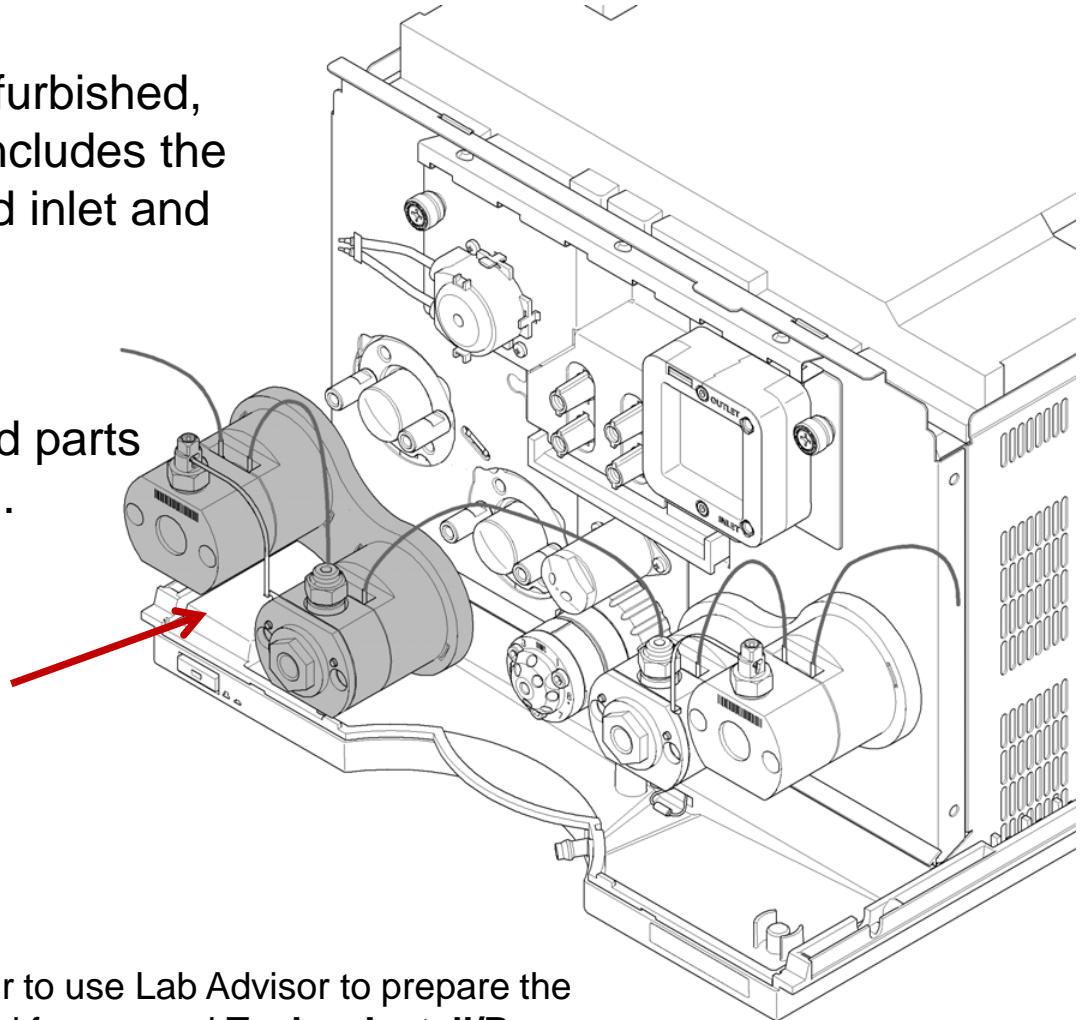


Replace Pump Head Agilent 1290 Binary or Quaternary Pumps

Replace pump heads with refurbished, 100% tested pump heads. Includes the filter, pump seals, pistons and inlet and outlet valves.

Disassembly is discouraged.
A kit with the correct tools and parts must be purchased and used.

Exchange Complete Head

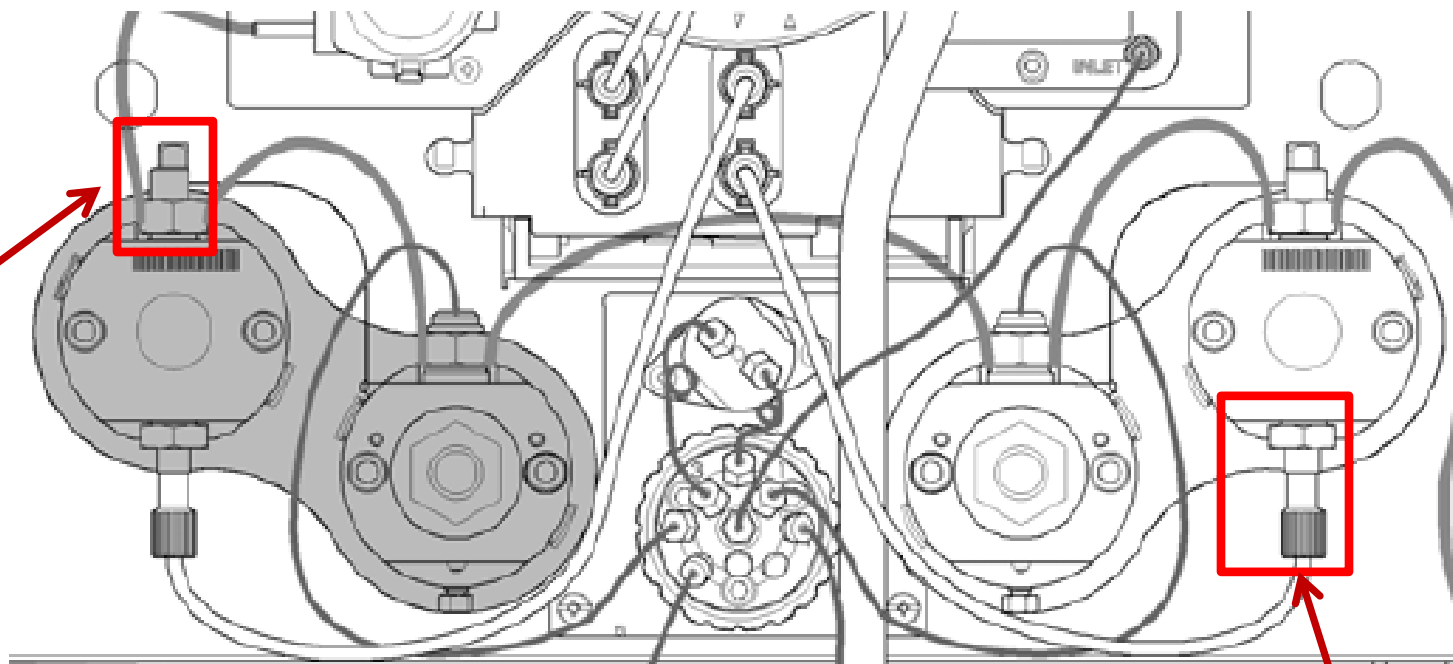
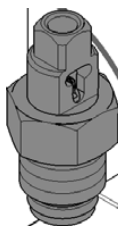


Remember to use Lab Advisor to prepare the Pump head for removal **Tools > Install/Remove Pump Head. Requires a torque hex key.**

Outlet Ball Valve and Passive Inlet Valves

Outlet Ball Valve

G4220-60028

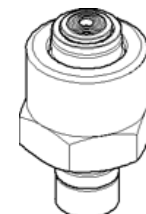


- Replace when leaking.
- May try to clean in a sonic bath for 5 – 10 min. Place upright in a beaker with alcohol.
- Torque wrench required for 1290.

Passive Inlet Valve

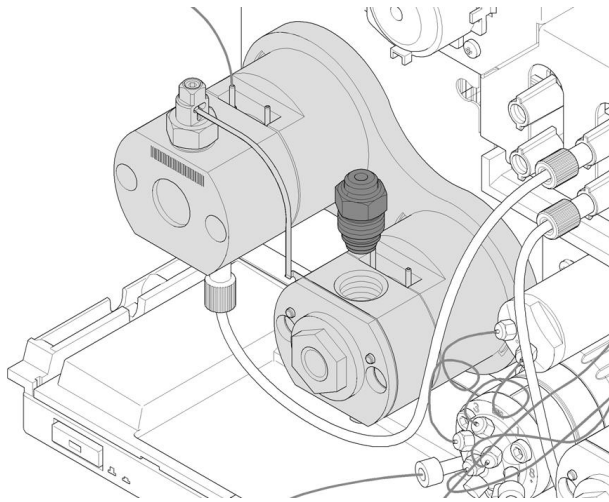
1290 Binary – G4220-60202

1290 Quaternary – G4204-60022



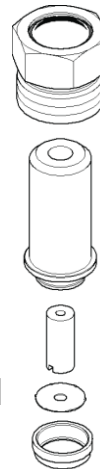
1290 – replace if leaking, flush if stuck.

Agilent 1290 High Pressure Filter Assembly



The filter frit in the outlet valve should be replaced regularly depending on the system usage.

Quaternary Pump



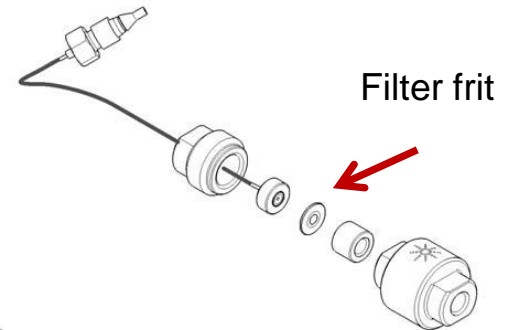
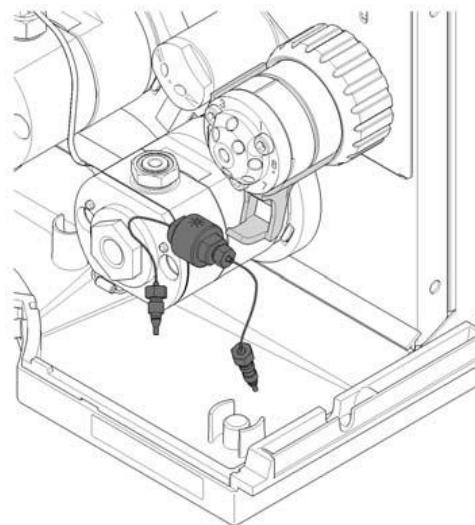
Gold Seal

Filter Frit

Cap

Binary Pump

01018-22707 PTFE frit (pack of 5)
5001-3707 Gold seal, outlet
5042-1346 Cap



System Pressure Test

- Determines the leak rate of the system between the pump outlet valves and a blank nut.
- The blank nut can be positioned at different locations before the detector flow cell.
- Perform the test at the normal operating pressure of the system.

The screenshot displays the 'System Pressure Test' configuration window. The main window has tabs for 'General', 'Limits', and 'Signals'. The 'General' tab is active, showing the following details:

Test Name	System Pressure Test	Description	No description
Module	G4220A:LP00000005		
Approx. Time	5 min		
Status	Running		

Below the details is a progress bar and a 'Test Procedure' section with the following steps:

1. Prepare pump pressure test ✓
2. Enter the test pressure ✓
3. Configure purge process and parameter ✓
4. Insert blank nut ✓
5. System checking leak rate of system (active)
6. Evaluate results
7. Restore system configuration

An overlaid dialog box titled 'System Pressure Test' is shown, containing the following fields and controls:

- Enter the test pressure
- Enter the pressure at which the test will be executed: 1200 bar
- OK button
- Cancel button

System Pressure Test (Lab Advisor)

Test:

Name:

Approx. Time:

Description:

Binary Pump SL Pressure Test Description

Description

The pressure test is a quick built-in test designed to demonstrate the leak tightness of the system. The test involves monitoring the flow profile while the Binary Pump SL delivers against a blank nut. The result is presented as the leak rate of the pump and provides information about the leak tightness of the system between the outlet ball valves of the Binary Pump SL and the blank nut.

NOTE The blank nut can be positioned anywhere between the purge valve of the pump and the detector inlet to pressure test the desired part of the system.

NOTE Never include the flow cell in the pressure test as it can cause leaks or bursting (FLD, RID) of the flow cell.

Step 1

The test begins with the initialization of both pump heads. After initialization and the required flow rate is constantly monitored and adjusted. The Binary Pump SL pressure of around 600 bar is reached.

Step 2

Thursday, August 12, 2010 7:56:44 AM

Test Explanation.

Test Procedure Steps.

Test Results.

Test Name	Pressure Test	Description	No description
Module	G1312B:DE60555149		
Status	Passed		
Start Time	8/12/2010 8:14:17 AM		
Stop Time	8/12/2010 8:23:34 AM		

Test Procedure

- ✓ 1. Initializing pump...
- ✓ 2. Preparing test...
- ✓ 3. Purging air out of the system...
- ✓ 4. Stop purging...
- ✓ 5. Preparing test...
- ✓ 6. Close Purge Valve...
- ✓ 7. Running pressure test method
- ✓ 8. Open Purge Valve...


	Name	Value
Leakrate		2.81 µl/min
Current flow		0.000 ml/min

Begin Test.

Pump Head Leak Test (1290)

General Limits Signals

Test Name Pump Head Leak Test **Description** No description
Module G4220A:LP00000005
Approx. Time 5 min
Status **Running**



Test Procedure

- ✓ 1. Checking pre-requisites (pump on etc.)
- ✓ 2. Enter the test pressure
- ✓ 3. Configure purge process and parameter
- 🔊 4. System checking leak tightness in channel A
5. System checking leak tightness in channel B
6. Evaluate results
7. Restore system configuration

Result

Name	Value
Maximum system pressure	1200 bar
Channel A2	Done
Channel B2	Done
Remaining purge time	0 min 0 sec

Pump Maintenance Review 1290 Binary and Quaternary Pumps

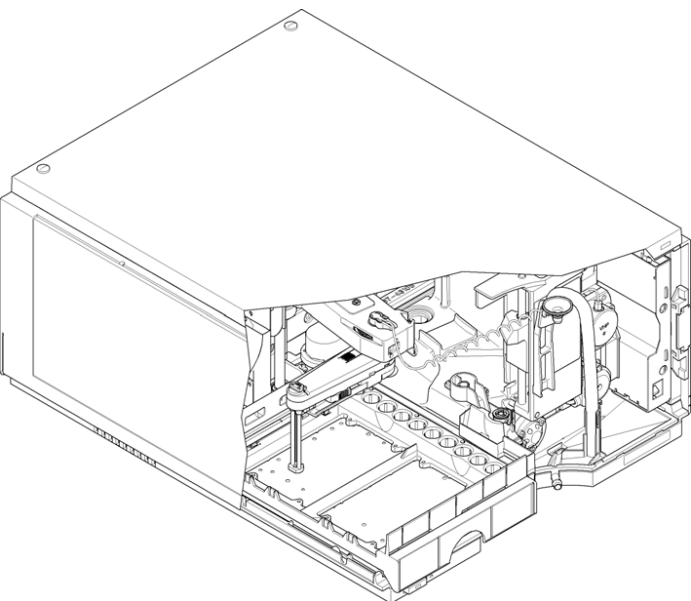
Procedure	Instrument		Notes
	1290 B	1290 Q	
Replace or Clean Solvent Inlet Filter	√	√	Solvent Inlet Filter blocked, gradient performance or pressure fluctuations.
Replace multi-channel gradient valve		√	Valve may be damaged by buffer deposits.
Replace Inlet Weaver		√	When blocked.
Replace the Inlet Valve	√	√	Pressure ripple unstable due to internal leakage .
Replace the Outlet Ball Valve	√	√	Pressure ripple unstable due to internal leakage
Replace Outlet Filter		√	
Multipurpose Valve Rotor Seal	√	√	When solvent dripping out of waste outlet even though valve closed.
Replace Pump Seals		√	Retention times and pressure ripple unstable due to internal leakage, verify with Pump Leak Test.
Replace the Pistons (plungers)		√	When scratched. Check when replacing pump seals.
Replacing Pump Heads as unit	√	√	Retention times and pressure ripple unstable due to internal leakage, verify with Pump Leak Test.
Replace the High Pressure Filter Assembly	√		Replace regularly to prevent downtime due to blockage.
Replace Inline Filter		√	When blocked. Collects seal wear material.

Points of the Presentation

- ✓ Introduction of Agilent 1290 Infinity Series
- ✓ Maintenance Overview
- ✓ Lab Advisor
- ✓ Degasser Maintenance
- ✓ Pump Maintenance
- ✓ Autosampler Maintenance
- ✓ Thermostat Column Compartment Maintenance
- ✓ DAD Maintenance
- ✓ Examples of LC Problems



Agilent 1290 Infinity Autosampler Specifications

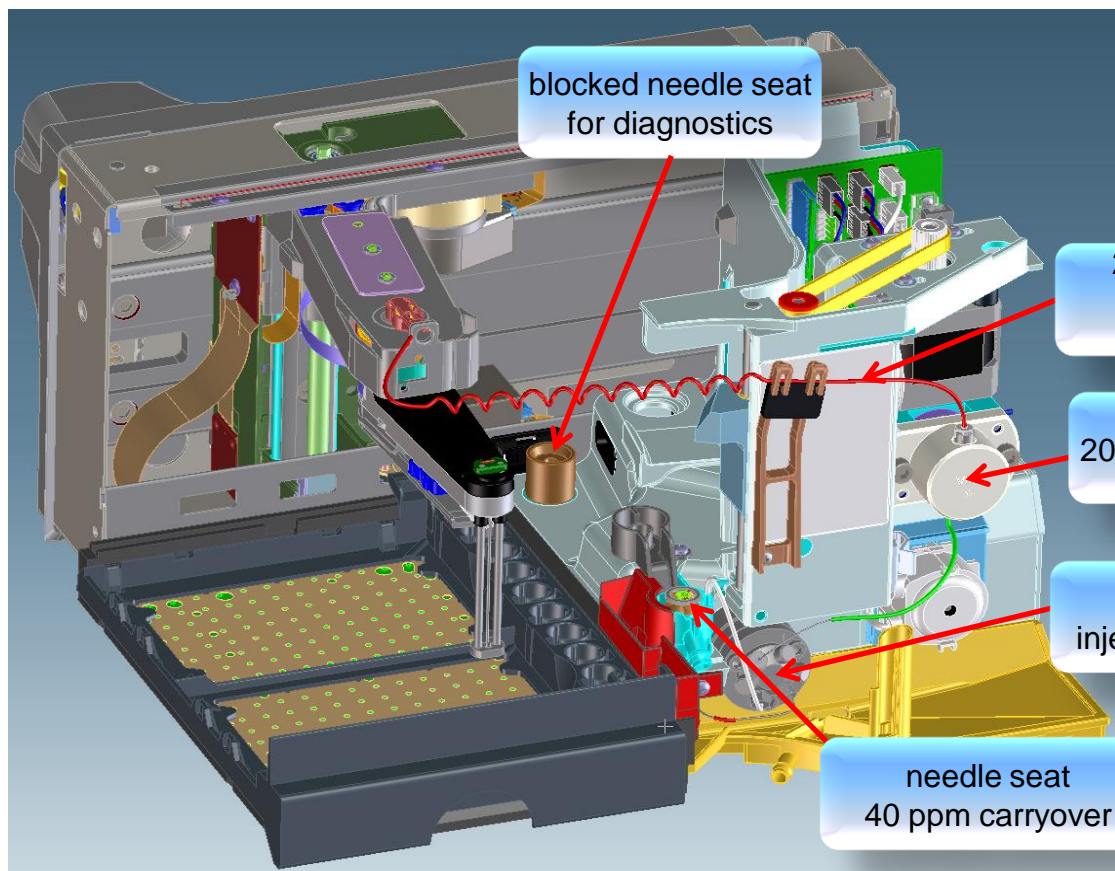


Specification Type	Specification
Injection Range	0.1 - 20 μ L in 0.1 μ L increments
Precision	Typically < 0.25% RSD from 5 - 20 μ L Typically < 0.5% RSD from 2 - 5 μ L Typically < 0.7% RSD from 1 - 2 μ L
Pressure Range	Up to 1200 bar
Sample Viscosity Range	0.2 - 5 cp
Sample Capacity	2 x well plates (MTP) + 10 x 2 mL vials 108 x 2 mL vials in 2 x 54 vial plate plus 10 additional 2 mL vials, 30 x 6 mL vials in 2 x 15 vial plate 100 Micro vial tray plus 10 additional 2 mL vials 54 Eppendorf tubes (0.5/1.5/2 mL) in 2 x 27 Eppendorf tube plate.
Injection Cycle Time	Typically < 21 s using following standard conditions: Default draw speed: 100 μ L/min; Default eject speed: 100 μ L/min; Injection volume: 5 μ L
Carry-over	Typically < 0.004%

Also available:

- Thermostat
- HTS
- HTC

Agilent 1290 High Performance Autosampler



blocked needle seat
for diagnostics

20 µl loop
capillary
(in box)

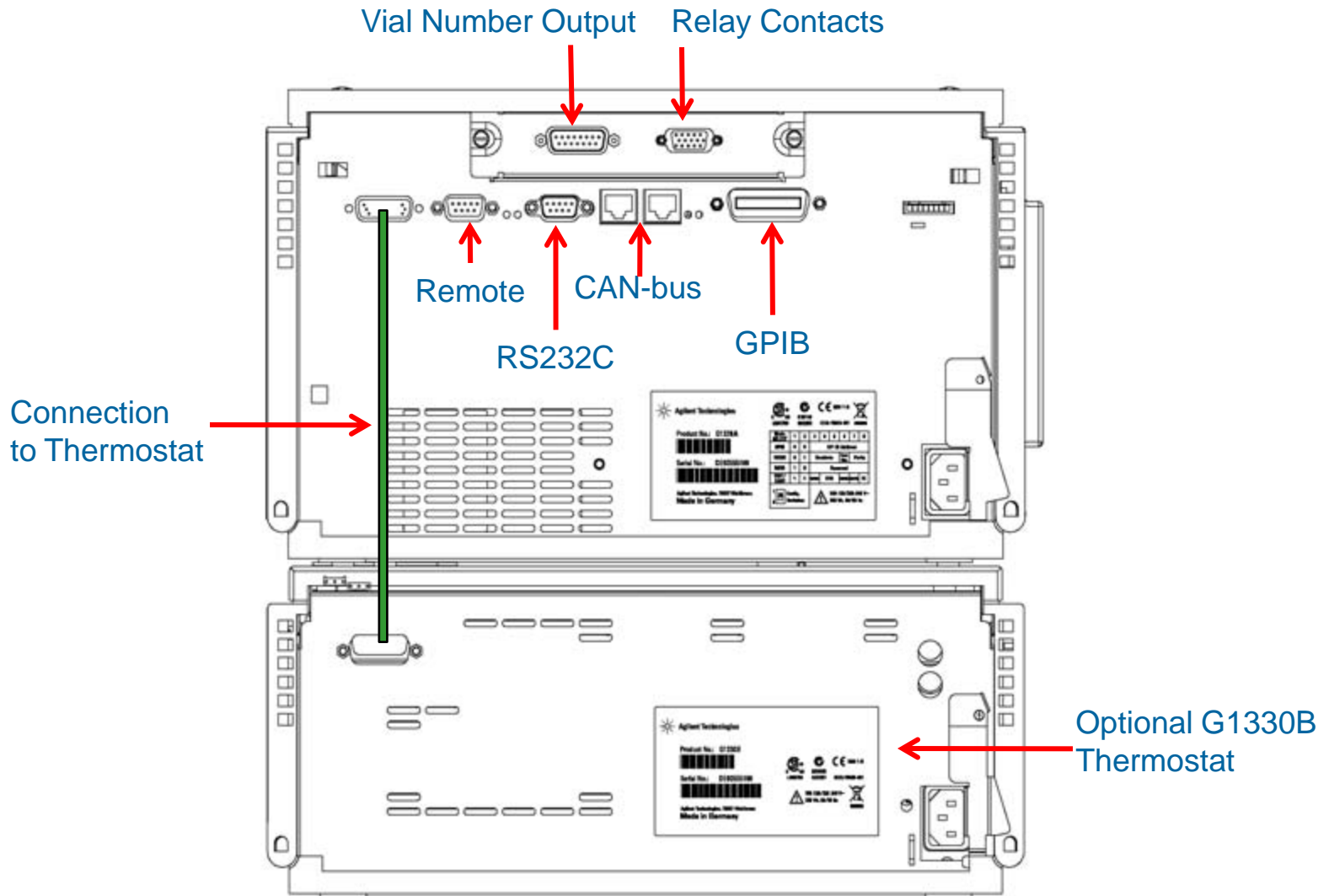
20 µl analytical Head

1200 bar
injection valve

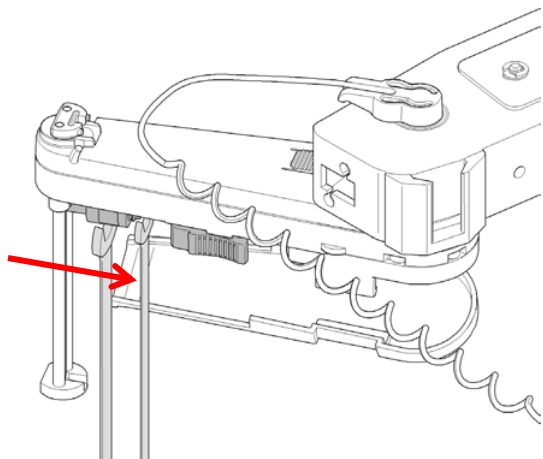
needle seat
40 ppm carryover

Procedure	Frequency
Change Needle/Needle Seat	60,000 needle into seat
Change Metering Seal	30,000 injections
Peristaltic Pump Cartridge	3000 hours
Change Rotor Seal	30,000 injections

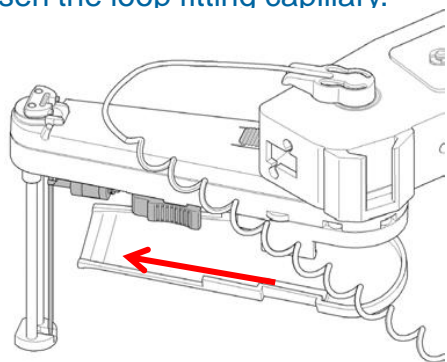
1260 Standard Autosampler



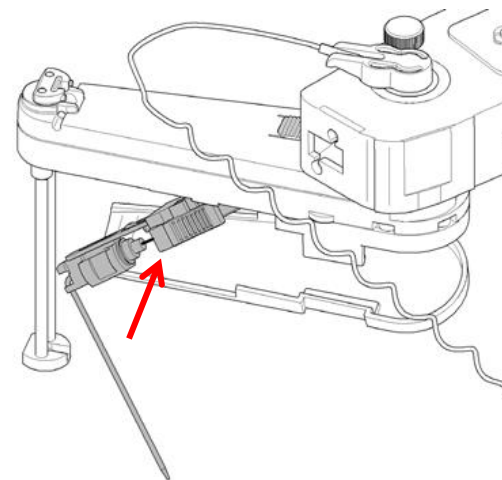
Replace Needle – Agilent 1290 Autosampler



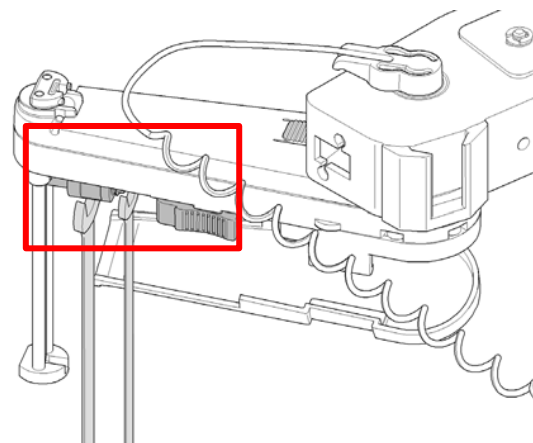
1. Turn the needle carrier 90° clockwise.
2. Flip the leak guide open.
3. Hold the needle assembly in position and loosen the loop fitting capillary.



7. Pinch the holder clamp and reinsert the needle assembly into the needle carrier.



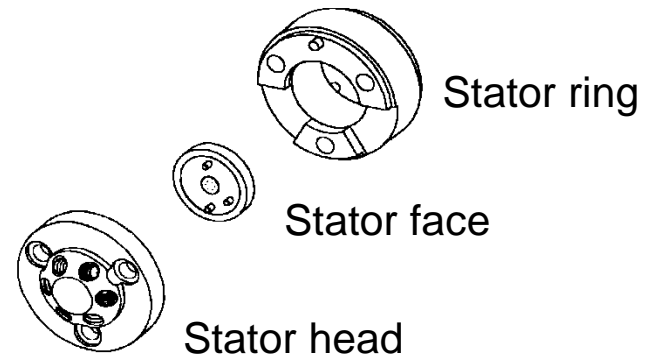
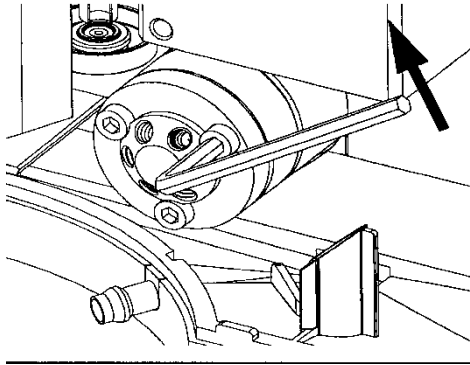
4. Pinch the holder clamp, pull back and remove the loop capillary from the needle assembly.
5. Push the silicon safety tube over the needle.
6. Insert the loop capillary into the needle assembly and tighten by hand.



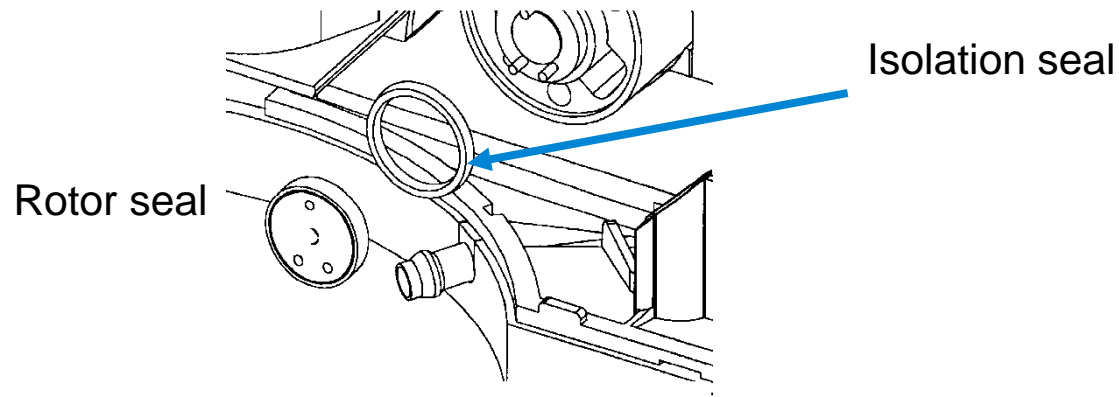
8. Tighten the fitting.

Replacing the Rotor Seal - I

1. Remove all capillaries.
2. Remove stator screws.
3. Remove stator head, stator face and stator ring

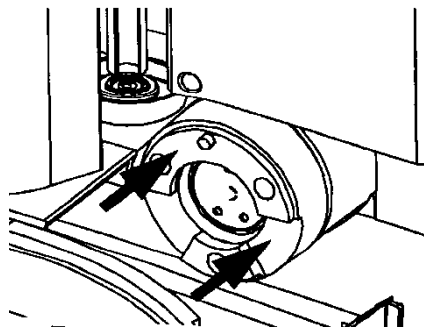


4. Remove defective rotor seal
5. Reinstall isolation seal (spring towards the valve body)
6. Reinstall the rotor seal (grooves facing outward)

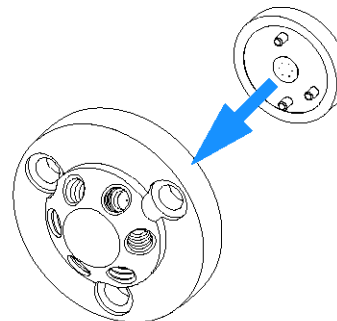


Replacing the Rotor Seal - II

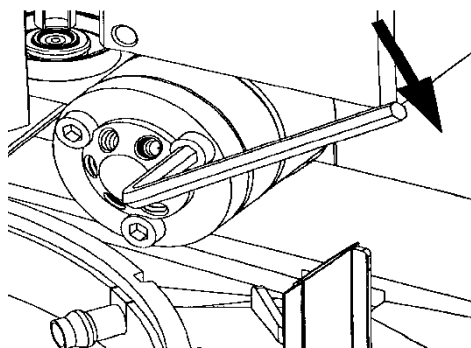
7. Install the stator ring (note the orientation).



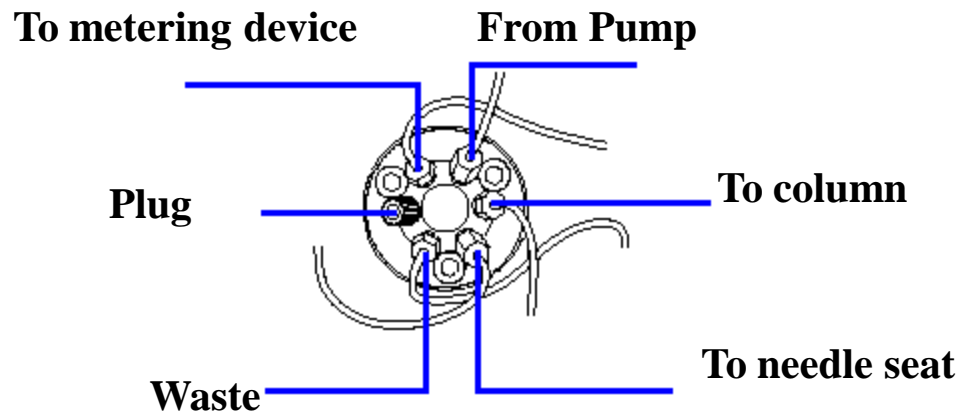
8. Place the stator face on the stator head. Install them together onto the valve.



9. Replace stator screws and tighten alternately, two turns at a time.



10. Reconnect all capillaries.



Tests for Agilent Infinity 1290 Autosampler

1. In Lab Advisor, Select Tests.
2. Click on module for available tests.

Agilent 1290 Autosampler Tests

System Pressure test

Sampler Leak Test

Sample transport Self Alignment

ChemStation

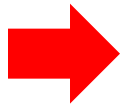
Temperature Mainboard

The screenshot displays the 'General' tab of a test configuration window. The test name is 'System pressure test for Aladdin' with a description of 'Preliminary system pressure test for Aladdin'. The module is 'G4220A:LP00000003', the approximate time is 'Not defined', and the status is 'Passed'. A progress bar shows 10 green segments. The 'Test Procedure' section lists 8 steps, each with a green checkmark. The 'Result' section contains a table with one entry: 'System leak' with a value of '2.1 bar'.

Name	Value
System leak	2.1 bar

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Agilent 1290 – G1316C TCC

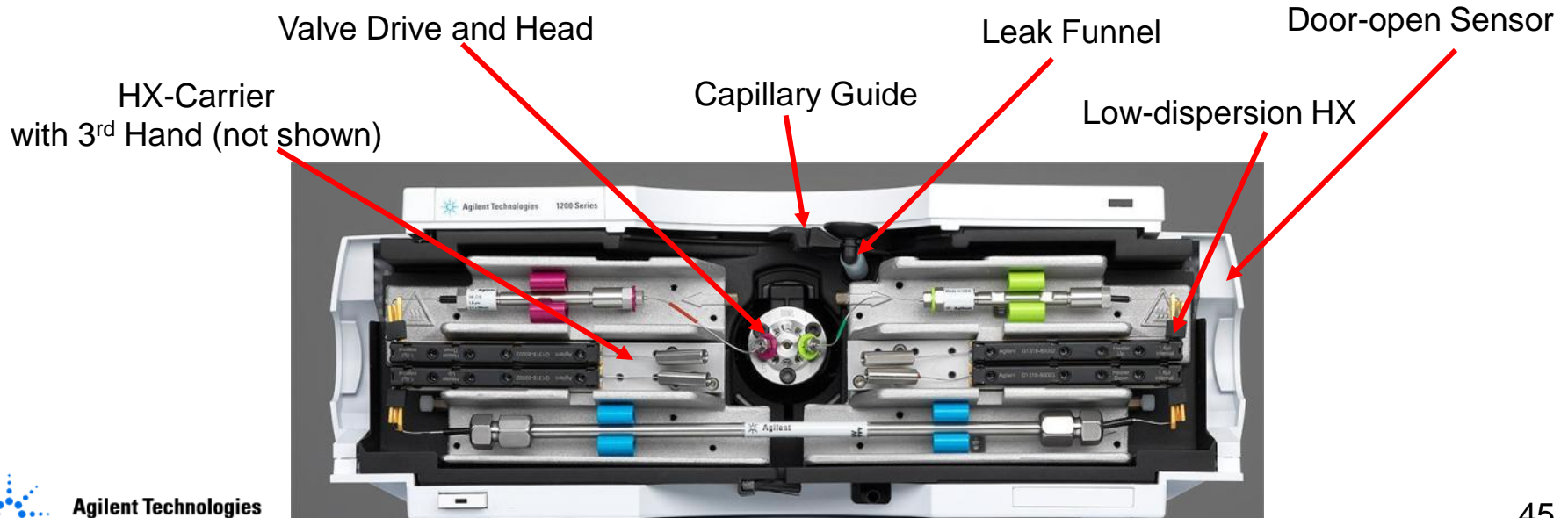
Temperatures up to 100° C

- to reduce pressure in fast separations
- to support high temp. applications (certain sugars, polymer separ. with viscose eluents)
- door w/ improved insulation and door sensor (different than G1316B)

1200 bar support for built-in valves

- available:

- 2ps/6prt valve, 1200 bar
- 2ps/10prt micro valve, 1200 bar
- 8ps/9prt inlet method development valve, 1200 bar
- 8ps/9prt outlet method development valve, 400 bar



Thermostat Function Test

Tests heating and cooling performance.

The screenshot displays the Agilent Lab Advisor interface for a 'Thermostat Test'. The test is currently running, as indicated by the 'Status' field and the progress bar. The interface includes a 'Heater Function' section with a description, a 'Diagnostic Results' panel with 'Stop Test' and 'Print Results' buttons, and a 'Test Descriptions' panel. The 'Test Evaluations' panel shows the test is for module G1316A/B/C. The 'Temperatures' graph shows the temperature of the left and right peltier elements over time, both starting at approximately 25.5°C and decreasing to about 20°C after 2.15 minutes.

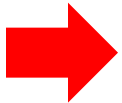
Test Name: Thermostat Test
Module: G1316B:DE60555168
Approx. Time: 6 min
Status: Running

Description: Evaluates the cooling and heating performance of the two peltier elements.

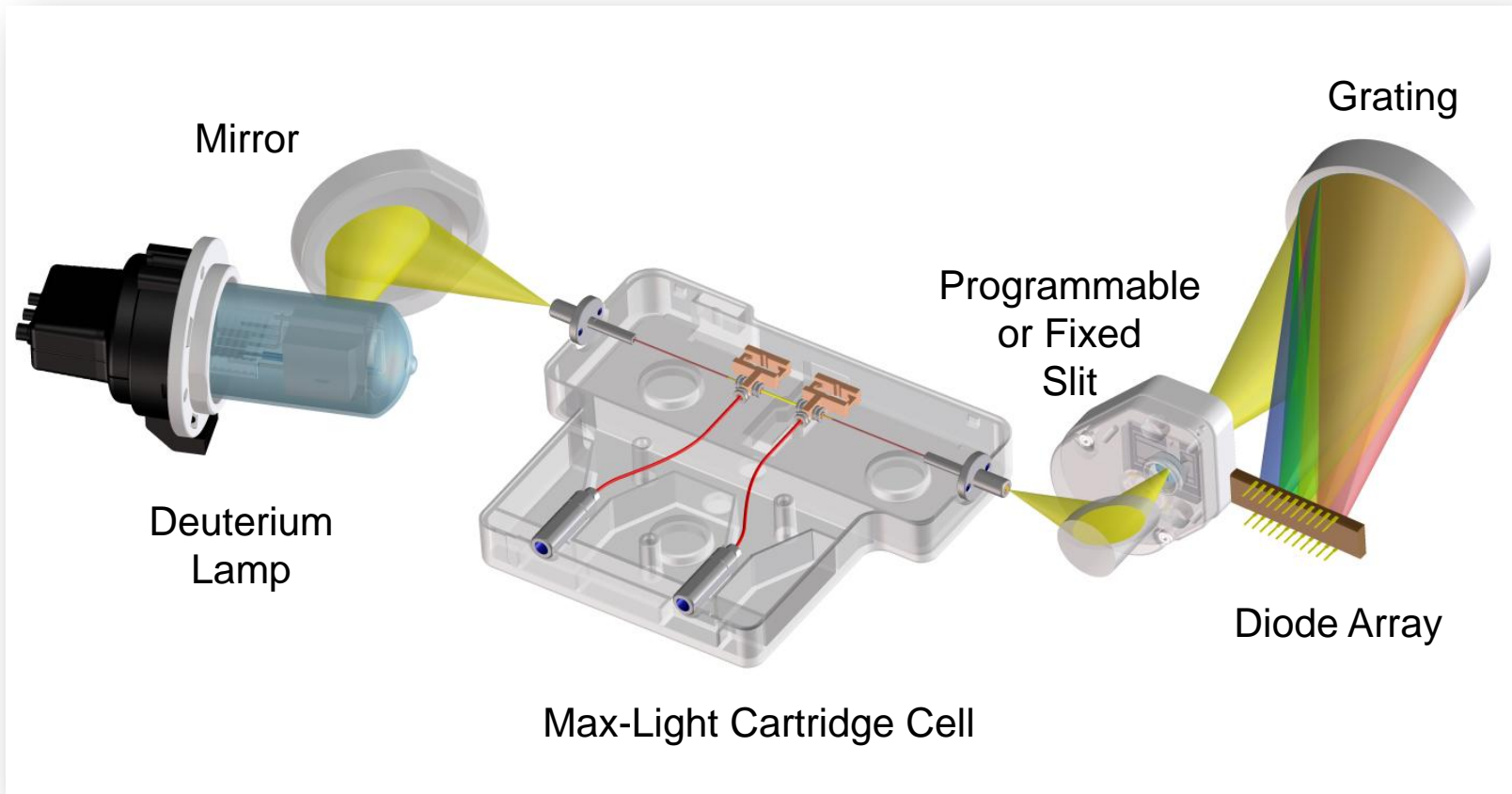
Temperature [°C]	Time [min]	LeftTemperature	RightTemperature
25.5	0.0	25.5	25.5
25.5	0.2	25.5	25.5
25.0	0.4	25.0	25.0
24.0	0.6	24.0	24.0
23.0	0.8	23.0	23.0
22.0	1.0	22.0	22.0
21.0	1.2	21.0	21.0
20.5	1.4	20.5	20.5
20.0	1.6	20.0	20.0
20.0	1.8	20.0	20.0
20.0	2.0	20.0	20.0
20.0	2.15	20.0	20.0

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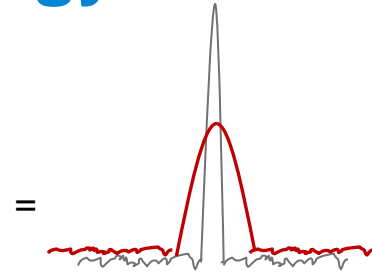
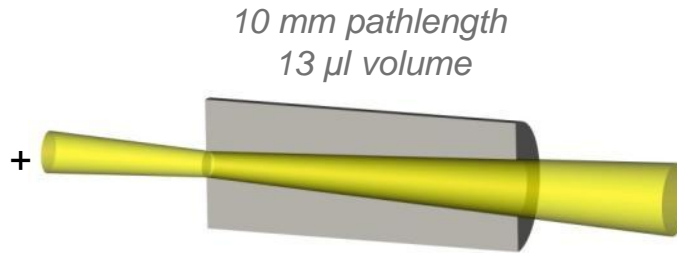
Optical design of Agilent 1260 and 1290 Diode Array Detector



10mm and a 60mm path length cells are available

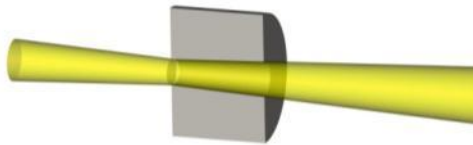
Why Do We Need New Cell Technology?

Short 2.1 mm ID column

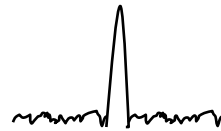


How to achieve smaller cell volume?

short path-length (3 mm, 2 μ l)

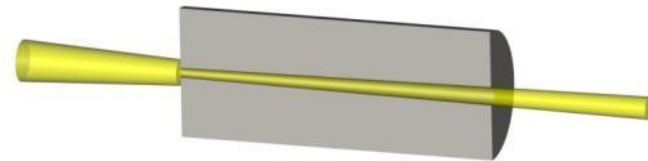


High light transmission
=> low noise

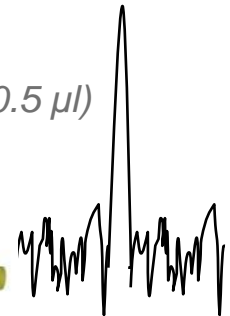


Low S/N

long path-length (10 mm, 0.5 μ l)



Low light transmission
=> high noise

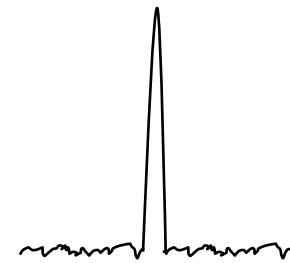


Low S/N

Optofluidic Waveguides

- Long path length
- Small cell volume
- High light transmission

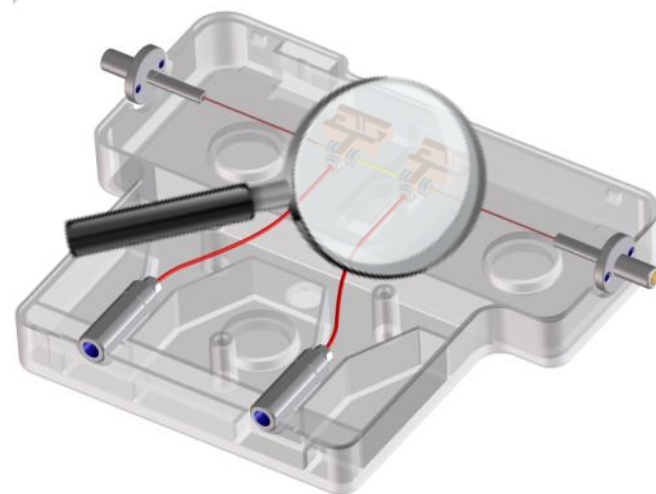
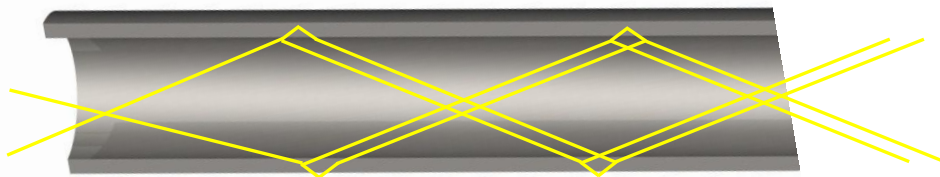
Solution:



Highest S/N

Max-Light Cartridge Cell

Non-coated fiber (fused silica)

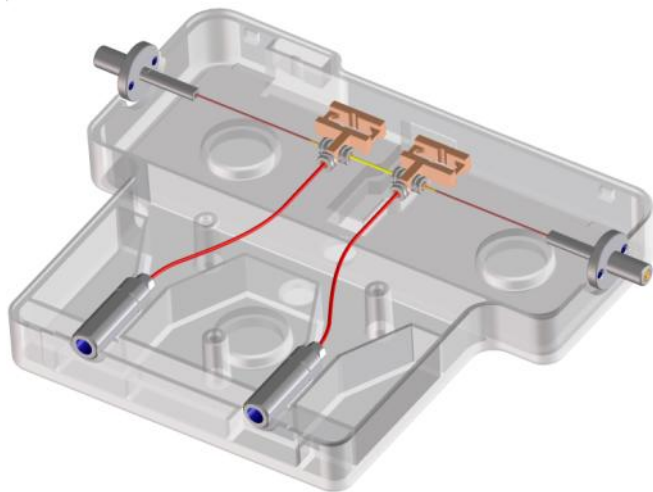


High Light Transmission due to Total-Internal Reflection (TIR) principle
(~ 100 % Light efficiency)

Benefits

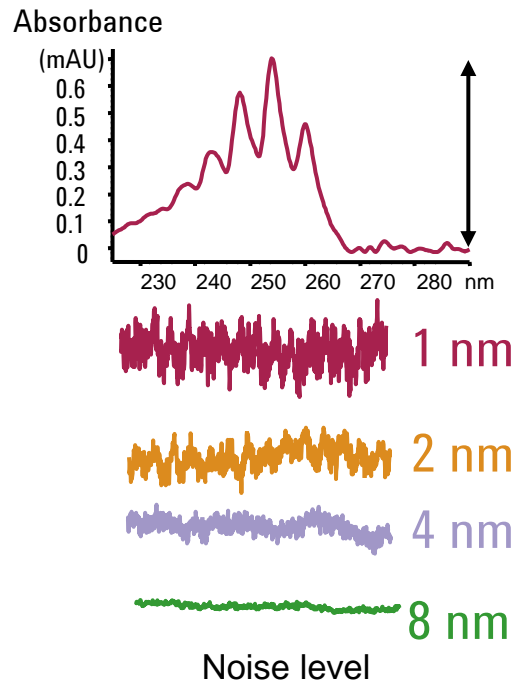
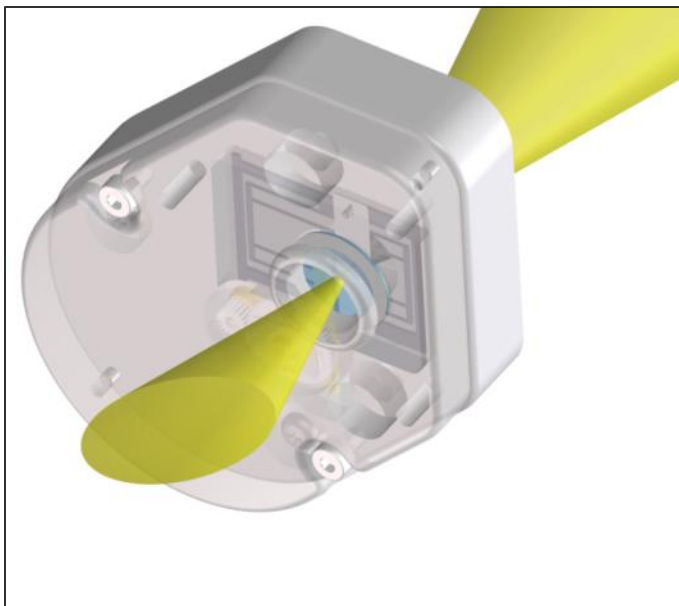
- Highest sensitivity (S/N) with small cell volumes (dispersion effects).
- More reliable and robust peak integration (automated) due to nearly no Refractive Index and thermal effects (solvent temperature).
- Coating free fused silica (no special care instructions or smiling baseline effects).
- Easy cell selection (one cell for all major applications).
- Cartridge design for ease of use.

Agilent 1290 DAD Max-Light Cartridges



Flow Cell Type	Cell Volume	Part Number	Path Length (nominal)
Standard Max-Light Cartridge	1.0 μ l	G4213-60008	10 mm
High Sensitivity Max-Light Cartridge	4.0 μ l	G4213-60007	60 mm
Max-Light Cartridge Test Cell		G4212-60011	

Programmable Slit



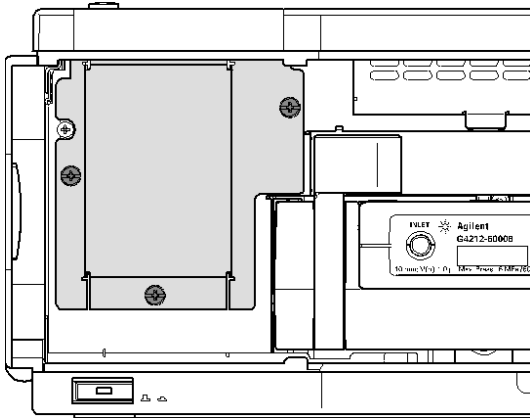
Programmable slit for easy optimization of sensitivity, linearity and spectral resolution.

Overview Maintenance Agilent 1290 DADs

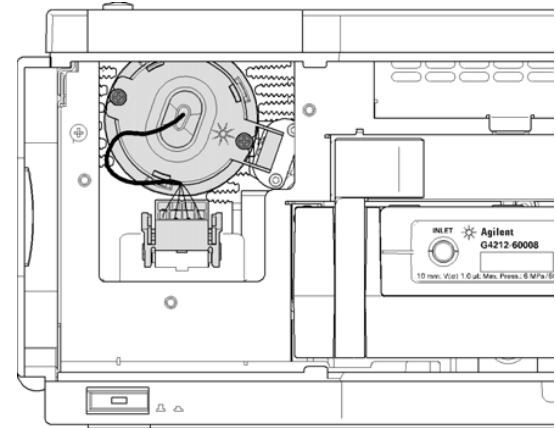
Procedure	Typical Frequency	Notes
Cleaning of module	If required	
Deuterium lamp exchange	If noise and/or drift exceeds your application limits or lamp does not ignite.	A wavelength calibration test and an intensity test should be performed after replacement.
Flow cell exchange	If leaking or if intensity drops due to contaminated flow cell.	A wavelength calibration test should be performed after replacement.
Leak sensor drying	If leak has occurred.	Check for leaks.
Leak handling System replacement	If broken or corroded.	Check for leaks.



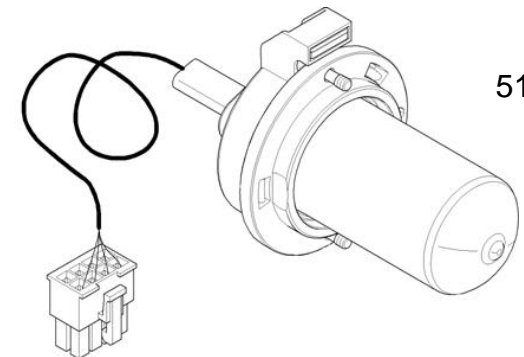
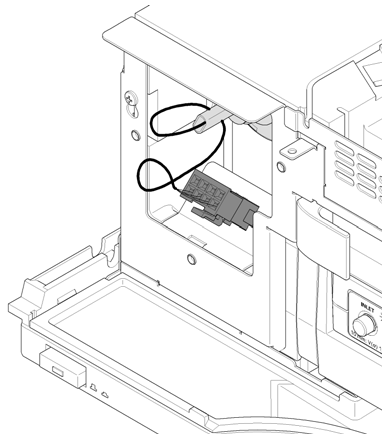
Replacing the Deuterium Lamp 1290 DAD



Unscrew the three screws to remove the cover.



Disconnect the lamp, remove and replace. Do not touch the Glass bulb with your fingers.



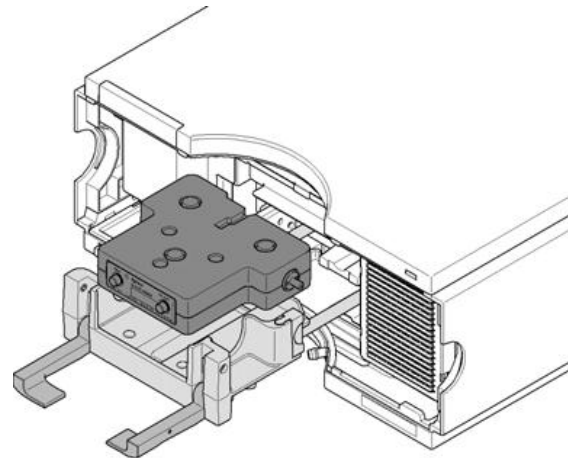
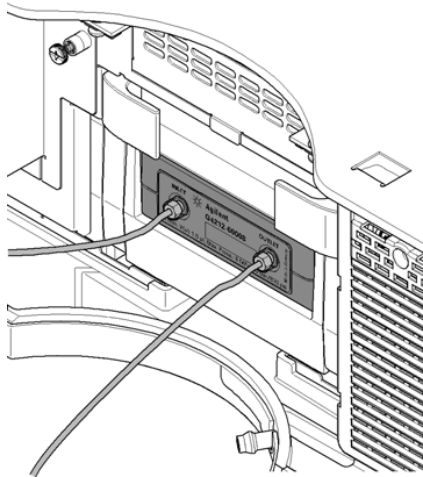
5190-0917

Cleaning the Max-Light Cartridge

If there are low counts on the Intensity Test or the Cell Test

1. Flush the flow cell with isopropanol or ethanol for some time.
2. Remove the cell from the cartridge holder.
3. Carefully clean the light inlet and outlet using lens tissue or Q-tips dipped in alcohol.

If alcohol cleaning fails, you can try the cell cleaning fluid (5062-8529) or replace the cartridge.



Wavelength Calibration

Calibrations

Calibration: Wavelength Calibration

Name: Wavelength Calibration

Approx. Time: 3 min

Description:

VWD Wavelength Calibration

Wavelength Verification/Calibration

Wavelength calibration of the detector is done using the zero-order position of the deuterium lamp at 486 nm emission-line positions of the deuterium lamp. The grating is calibrated on the zero-order position. The stepper-motor position at which the maximum occurs is stored in the detector. Next, the grating is calibrated against the deuterium emission-line at 486 nm, and the motor position at which the

Uses the zero-order position, the 656 nm (alpha-emission line) and the 486 nm (beta-emission line) to calibrate the detector.

General

Test Name	Wavelength Calibration	Description	This procedure performs a Wavelength Verification and Recalibration.
Module	G1314C:DE60555110		
Status	Passed		
Start Time	8/12/2010 12:59:27 PM		
Stop Time	8/12/2010 1:06:27 PM		

Test Procedure

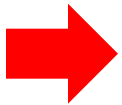
- ✓ 1. Check Prerequisites...
- ✓ 2. Wavelength Verification...
- ✓ 3. Calibrate Detector...

Result

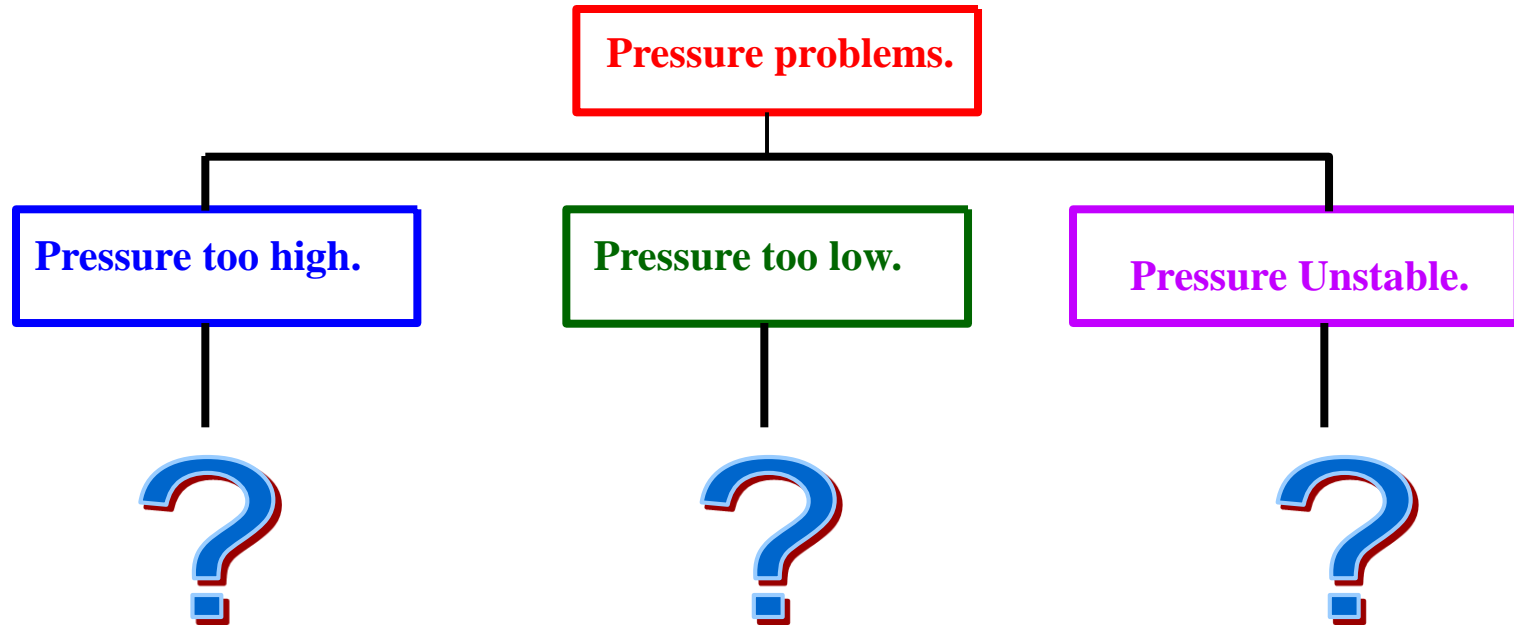
Name	Value
Accumulated UV Lamp Burn Time	3.66 h
UV Lamp On-Time	1.01 h
Time to Wait Before Wavelength Calibration	0.00 min
Wavelength Gap of previous 0-order Calibra	0.300 nm
Maximum Wavelength Gap of previous Calib	0.100 nm
Wavelength Gap of 0-order Calibration	0.500 nm
Maximum Wavelength Gap of Calibration	-0.100 nm
Calibrate Detector with Wavelength Verificati	Yes

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Problems with the System Pressure

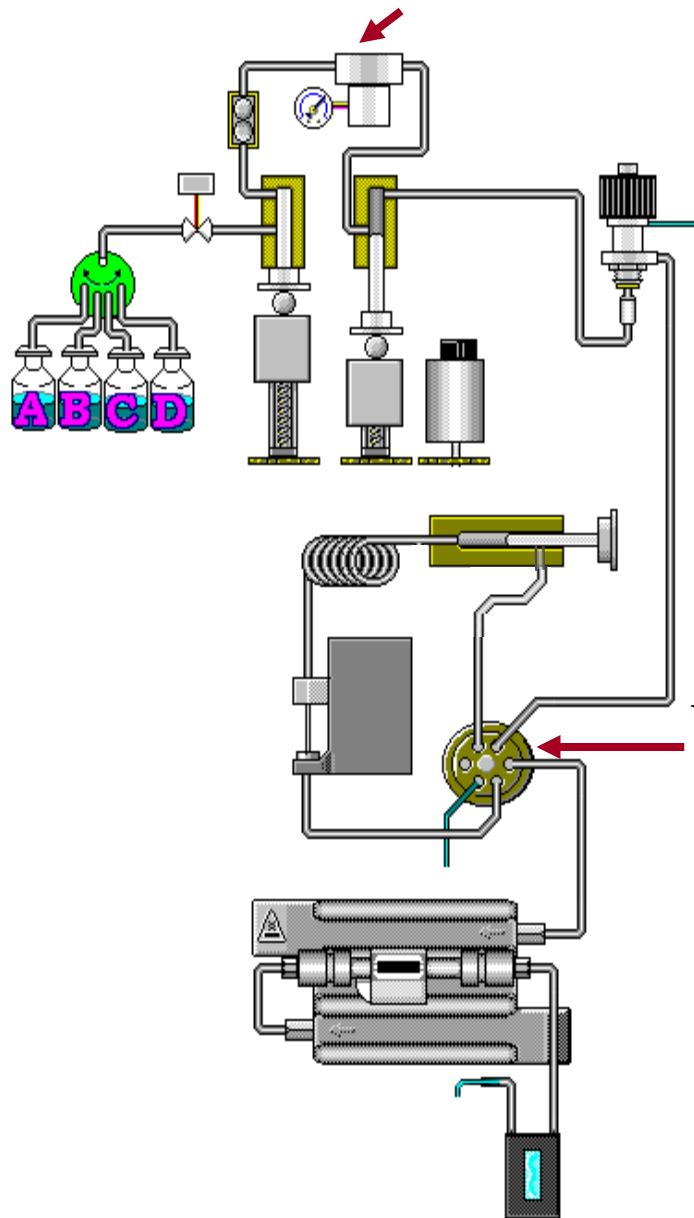


Pressure Problem One

Pressure Too High.

- Column inlet frit contaminated.
- Frit in purge valve contaminated.
- Column contaminated.
- Blockage in a capillary, particularly needle seat capillary.
- Rotor in injection valve plugged.
- Injection needle or needle seat plugged.

Pressure Measurement.



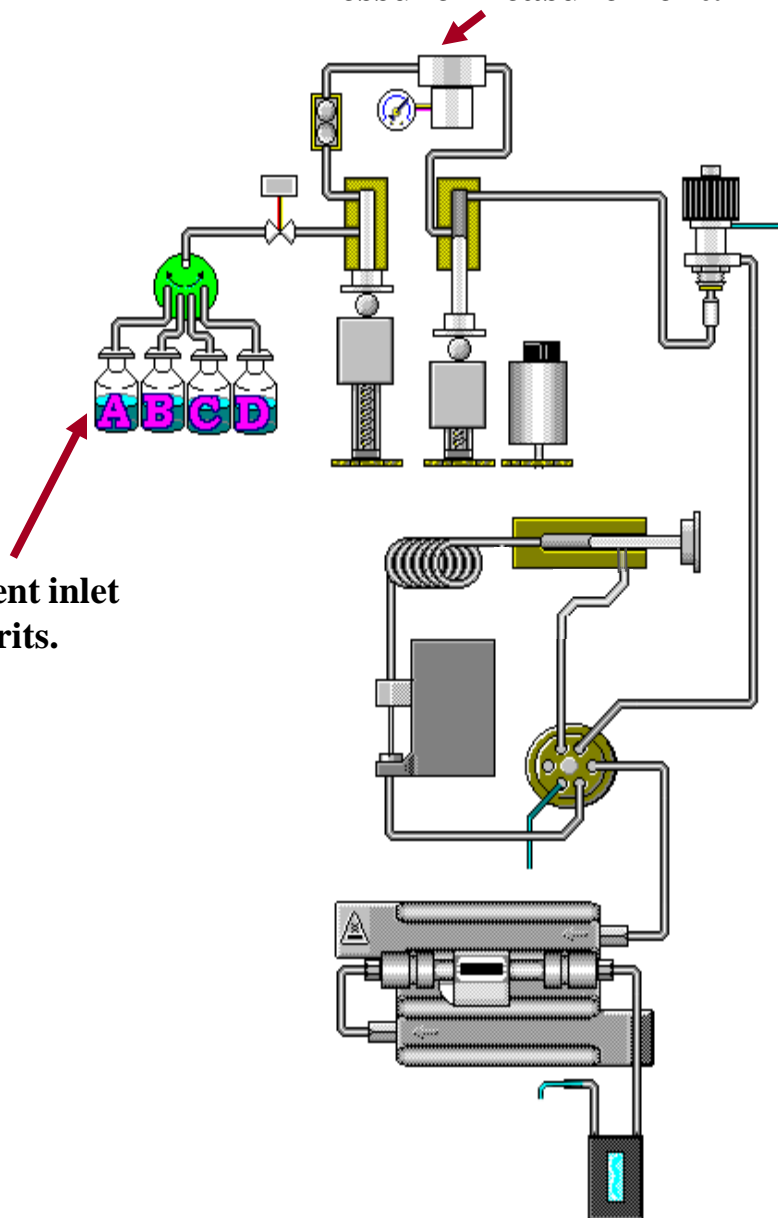
Pressure Problem Two

Pressure Too Low.

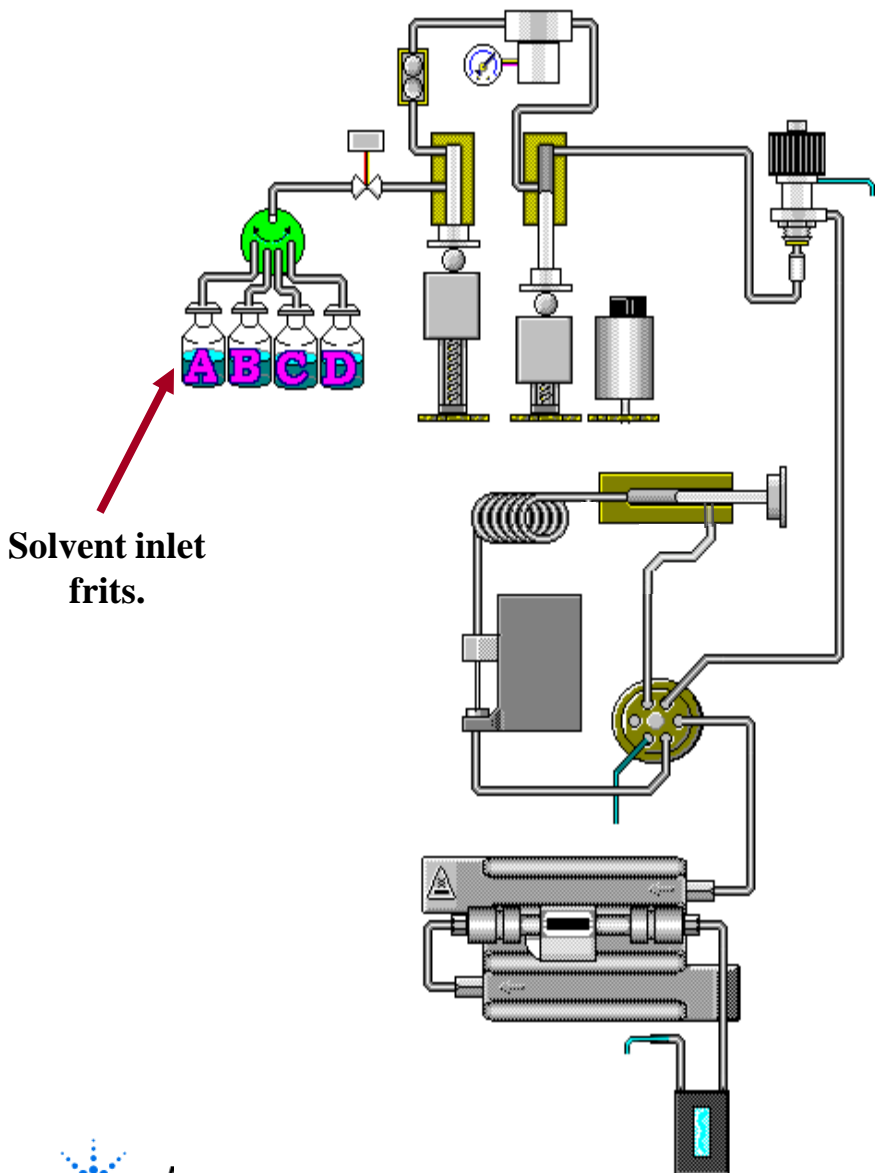
- Solvent inlet frit plugged.
- Leak in a capillary connection or other part (pump seals).
- Wrong solvent or flow rate.
- Inlet valve defective.
- Multichannel Gradient valve incorrectly proportioning.
- Outlet ball valve defective.
- Column defective (stationary phase).

Solvent inlet frits.

Pressure Measurement.



Pressure Problem Three



Pressure Fluctuation.

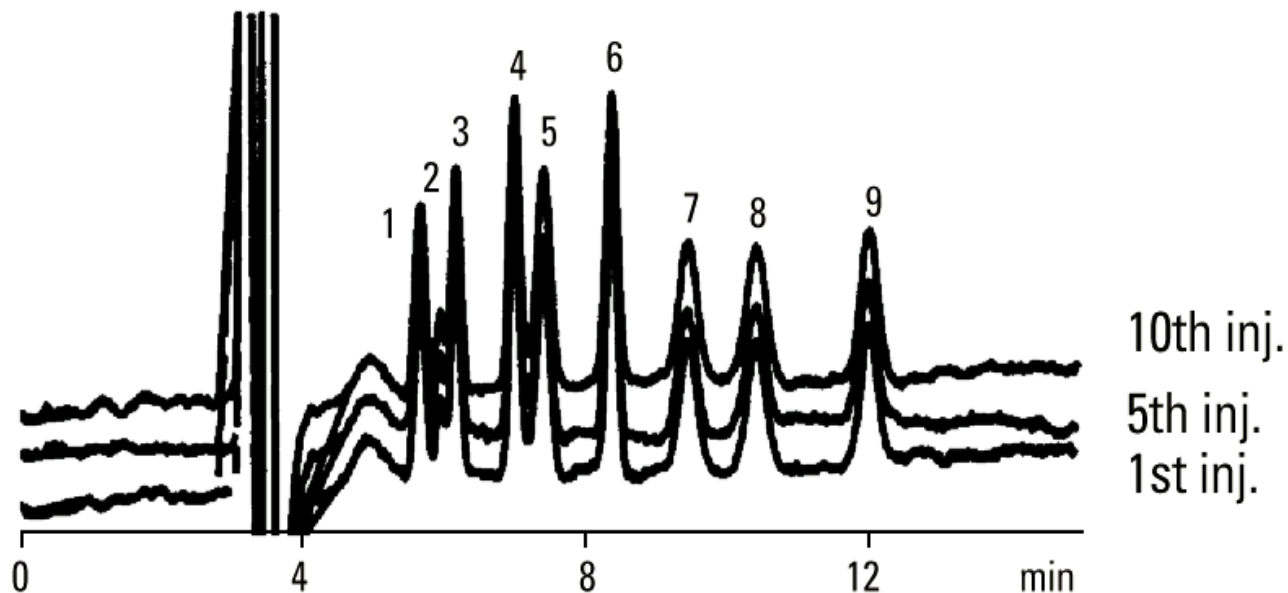
- Solvent inlet frits plugged.
- Solvent not degassed.
- Pump seals leaking.
- Outlet ball valve defective.
- Active inlet valve defective.

Usually an indication there is air in the pump.



Reproducibility

- Area and Peak Height problems together point to the autosampler system.
- Area and Retention Time problems together point to the pump.



Problems with Reproducibility – Peak Areas

Peak Areas not
Reproducible.

With peak height:

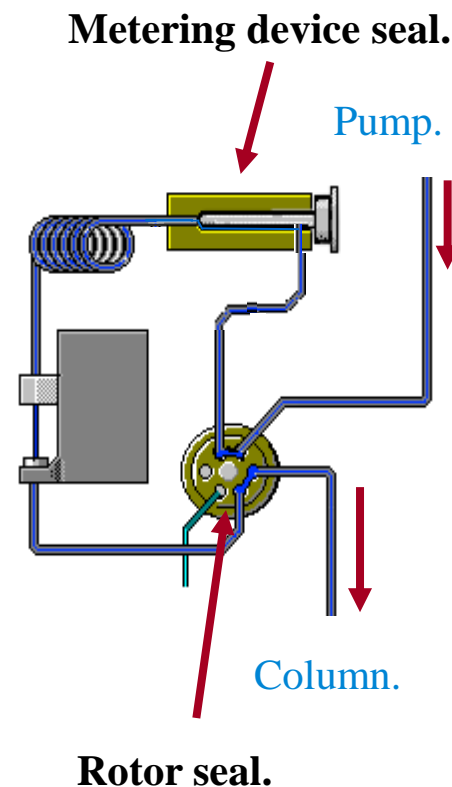
- Rotor seal cross-port leak or injection valve not tight.
- Metering device seal leaking.
- Needle partially blocked.

With retention time:

- Variable pump flow rate.

Other:

- Capillary from injector to detector not tight.
- Detector equilibration problems.



Problems with Reproducibility – Retention Time

Retention Times not Reproducible.

Pump Problems:

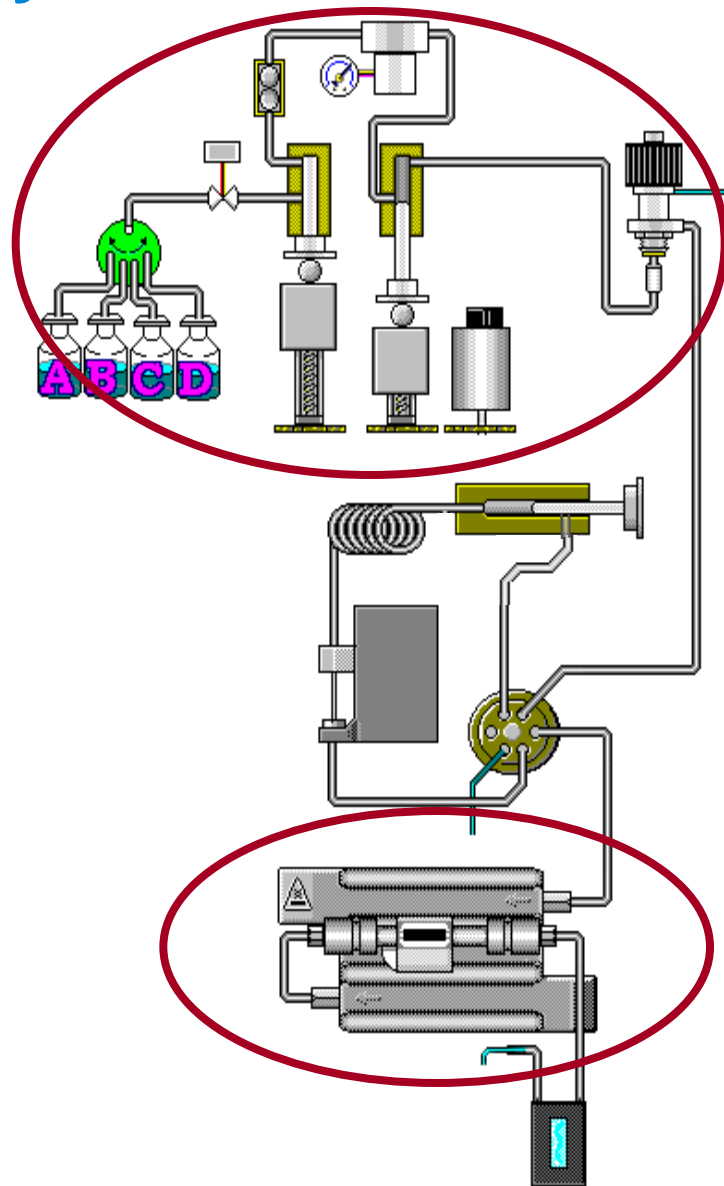
- Mobile phase composition problems.
- AIV, outlet ball valve defective.
- Flow rate problems.

Column Oven Problems:

- Temperature fluctuations.

Other:

- Column equilibration.
- Column deterioration.



Linearity Problems

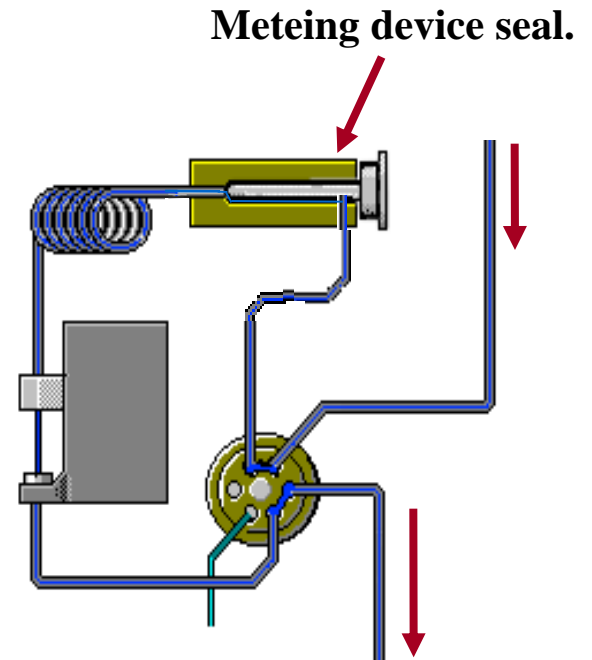
Peak Areas not Linear.

Autosampler:

- Rotor seal cross-port leak or injection valve not tight.
- Metering device seal leaking.
- Needle partially blocked.

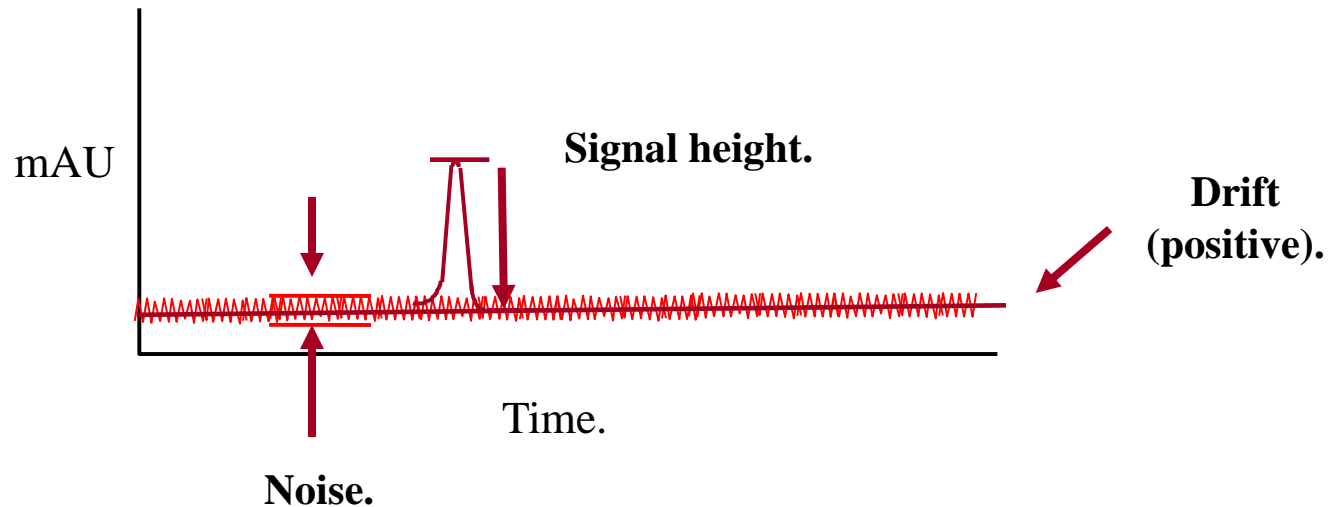
Detector:

- Saturation.



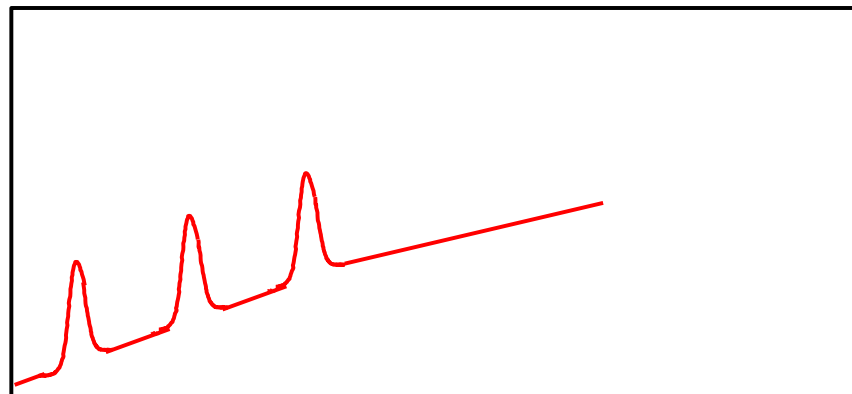
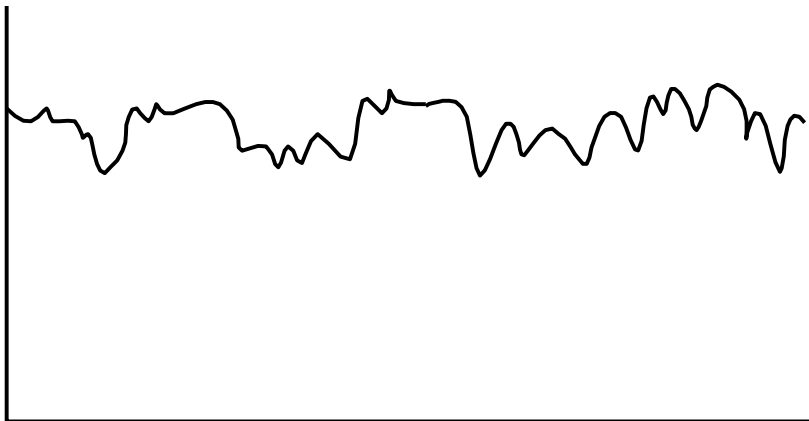
Baseline Noise Measurement

Use the Performance and Noise Report Style to automatically calculate the baseline noise.



Record width of baseline in mAU or RI units for later comparisons.

Baseline Fluctuations

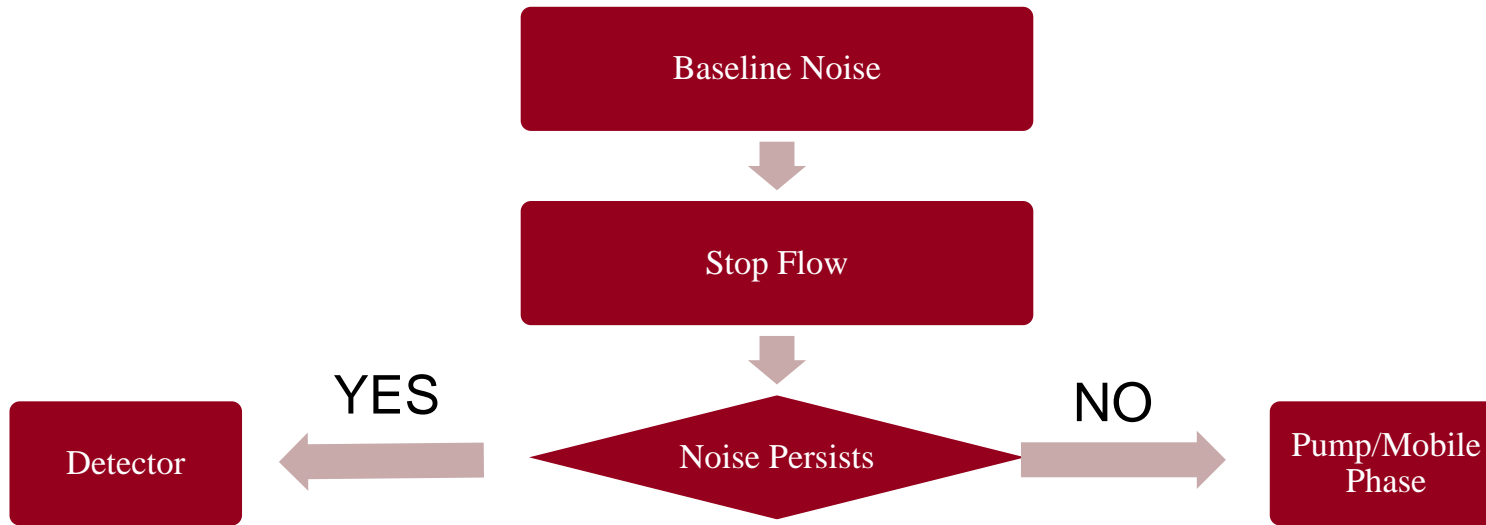


Possible Causes:

- Dirty Flow Cell.
- Dirty mobile phase.
- Detector Lamp Failing.
- Pulses from Pump (if Periodic).
- Temperature Effects on Detector (RI).
- Air Bubbles passing through Detector.
- Gradient elution.
- Immiscible Solvents.



Baseline Noise



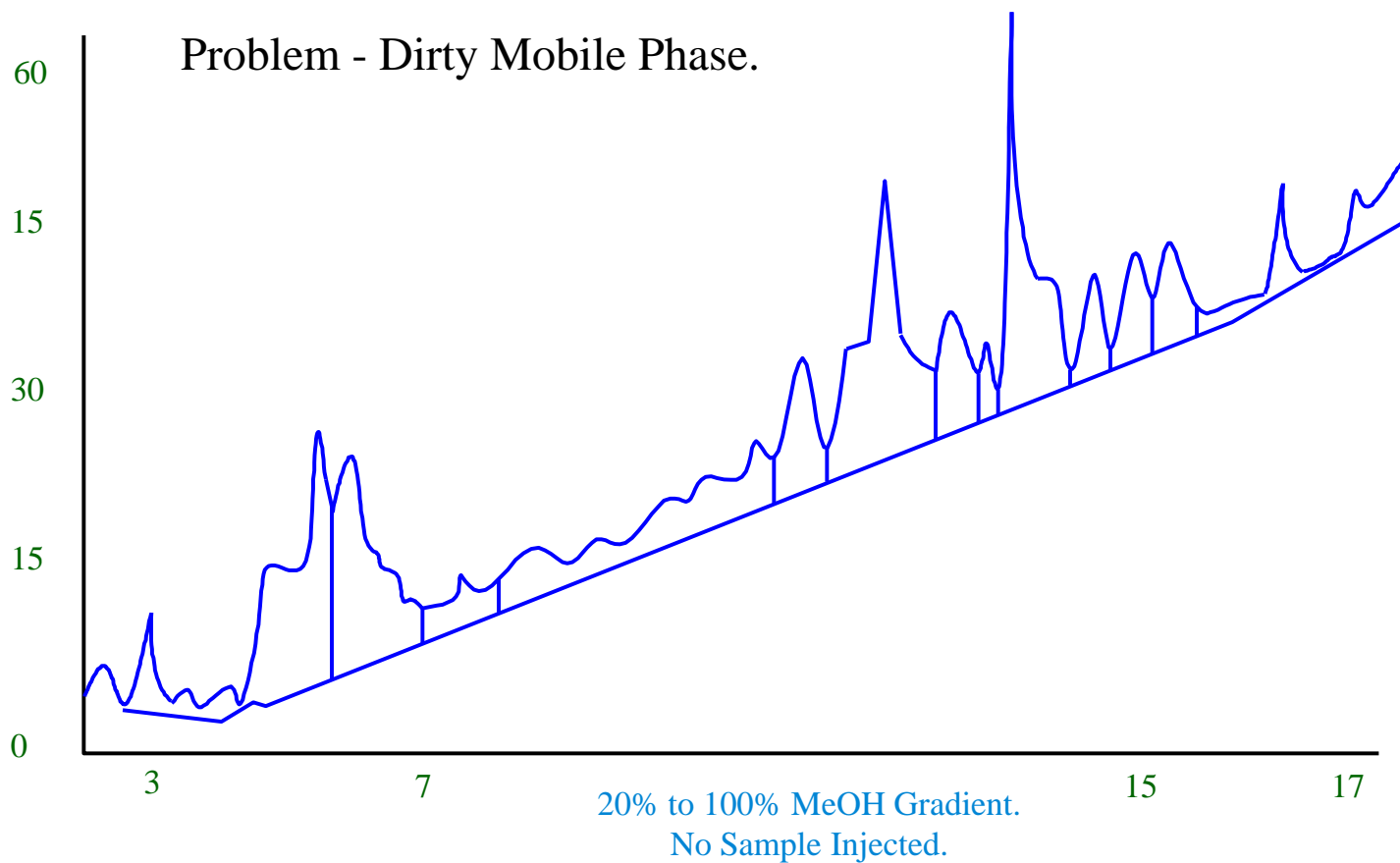
Other Questions to Ask

- Have you changed your mobile phase composition?
- Have you changed your acquisition wavelength?
- What mobile phase was last used in your instrument?
- Do you have a miscibility problem?
- Are your solvents dirty?

Example - Ghost Peaks

Ghost Peaks - Peaks which appear even on blank injections.

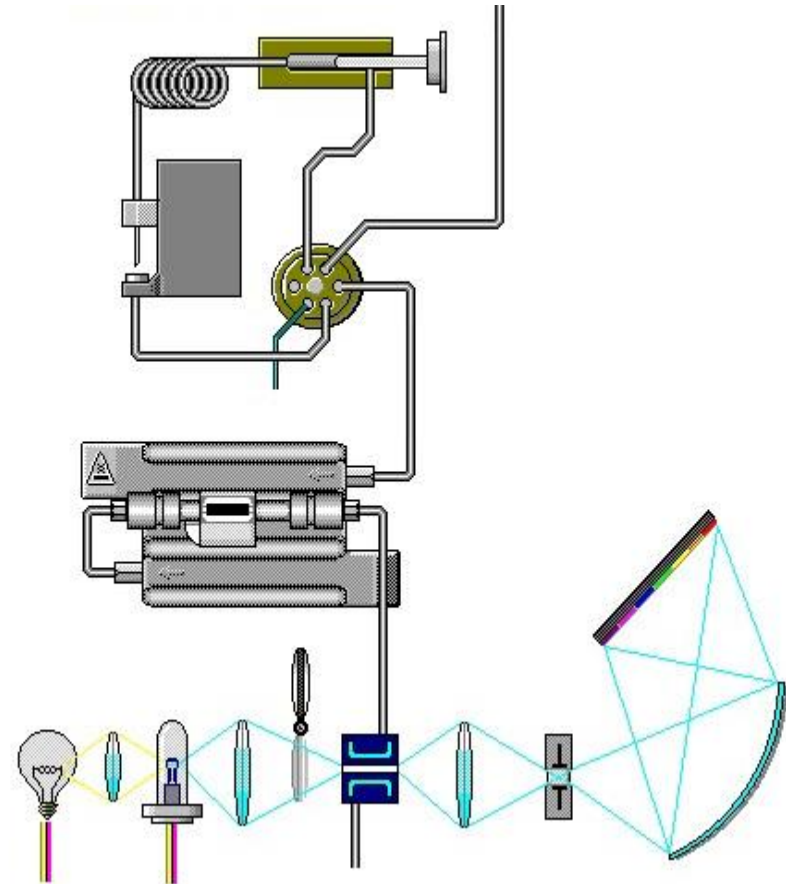
Problem - Dirty Mobile Phase.



Sensitivity Problems

Peak response too low.

- **Insufficient injection amount.**
- **Detector problems:**
 - **Lamp aging.**
 - **Detector cell contaminated.**
 - **Solvent absorption high.**



Introduction to Agilent 1290 Infinity Maintenance

**Thanks for
your attention**

Manuel Otero
AGILENT TECHNOLOGIES
manuel_otero@agilent.com