

CONTACT PHENOMENEX FOR:

- HPLC/UHPLC Columns (capillary to preparative)
- SEC Columns: Aqueous (GFC) and non-Aqueous (GPC)
- Amino Acid Analysis
- SFC Columns
- HPLC Specialty Columns for Analysis of:
 - Basic, acidic and amphoteric drugs
 - High/Low pH separations (pH 1-12)
 - Proteins/Peptides by reversed phase
 - Biopolymers Proteins and Nucleic Acids by GFC/SEC
 - Synthetic polymers
 - Foods and Beverages
 - Environmental Samples
 - Drugs in biological fluids
- HPLC Bulk Media
- HPLC Accessories such as:
 - Sample and Solvent Filters
 - SecurityGuard™ Column Protection
 - Syringe Filters
 - Syringes and Vials
 - Column Heater
 - HPLC Injection Valves
 - Tubings and Fittings
- GC Columns
- GC Accessories
- Sample Preparation Products (SPE, SLE, Protien Precipitation, Filters)
- Application Development and Validation Support
- Outstanding Technical Service

TABLE OF CONTENTS

I.	Introduction	4
11.	Abnormal Pressure	5
111.	Leaks	7
IV.	Problems with the Chromatogram	9
V.	Problems with the Injector	. 17
VI.	Problems Detected by Smell, Sight, or Sound	. 18
VII.	Key Problem Areas and Preventive Maintenance	20
Protect	Your HPLC/UHPLC Column	. 22
Simple	Filtration Prior to Chromatography	. 23

© 2016 Phenomenex, Inc. All rights reserved.

No part of this booklet may be copied without prior written permission from Phenomenex, Inc. USA.

While every attempt has been made to ensure the accuracy of the information contained in this guide, Phenomenex assumes no responsibility for its use. We welcome any additions or corrections for incorporation into future editions.

I. INTRODUCTION

LOCATING AND CORRECTING THE PROBLEM

A systematic approach to identifying the problem is the best approach to troubleshooting your HPLC system. This guide is organized by five major categories of symptoms to help you quickly identify the source of the problem(s) you are encountering:

- pressure abnormalities
- leaks
- problems with the chromatogram
- injector problems
- other problems detected by the senses of smell, sight, and sound

When you have corrected the problem, record the incident in the system recordbook to help with future problems.

PREVENTION

Many LC problems can be prevented with routine preventive maintenance. For example, replacing pump seals at regular intervals should eliminate pump-seal failure and its associated problems. Section VII lists the most common problem areas for each LC module, and preventive maintenance practices that will reduce their frequency. These suggestions should be modified to fit your particular model of LC, and then made a regular part of your laboratory routine.

WHERE TO GET ADDITIONAL HELP

- Phenomenex has experienced technical consultants who can assist you with almost any problem. We welcome your phone calls, faxes or emails.
- The operator's and service manuals for the instrument should be consulted.
 These contain exploded diagrams, troubleshooting procedures for specific models, and part numbers to help you order replacement parts.
- Other people in the lab may have had experience solving a problem which is giving you trouble; they can be a helpful resource.
- The manufacturer of your instrument can help you. Most LC manufacturers offer free technical support to their customers.
- Phenomenex offers seminars on HPLC/UHPLC.
- There are a number of reference sources that can give you guidance in problem solving:
 - J.W. Dolan and L.R. Snyder, *Troubleshooting LC Systems*, Humana Press, NJ (1989).
 - L.R. Snyder and J.J. Kirkland, *Introduction to Modern Liquid Chromatography*, 2nd ed., Wiley, NY (1979).
 - D.J. Runser, *Maintaining and Troubleshooting HPLC Systems A User's Guide*, Wiley, NY (1981).
 - J.W. Dolan, "LC Troubleshooting", LC/GC Magazine. This is a monthly column.

II. ABNORMAL PRESSURE

A change in the operating pressure is a sign that there may be a problem. Choose the category below that best fits the symptoms that you observe, and follow the suggestions to correct the problem.

A. No pressure reading, no flow			
POSSIBLE CAUSE SOLUTION			
Power off	1. Turn on power		
2. Fuse blown	2. Replace fuse		
3. Controller setting or failure	a. Verify proper settings b. Repair or replace controller		
4. Broken piston	4. Replace piston		
5. Air trapped in pump head	Degas solvents; bleed air from pump, prime pump		
6. Insufficient mobile phase	a. Replenish reservoir b. Replace inlet frit if blocked		
7. Faulty check valve(s)	7. Replace check valve(s)		
8. Major leak	8. Tighten or replace fittings		

B. No pressure reading, flow is normal

POSSIBLE CAUSE		SOLUTION	
1.	Faulty meter	1.	Replace meter
2.	Faulty pressure transducer	2.	Replace transducer

C. Steady, high pressure

	o. Otcady, mgm pressure		
РО	SSIBLE CAUSE	so	LUTION
1.	Flow rate set too high	1.	Adjust setting
2.	Blocked column frit	2.	a. Backflush column (if permitted)b. Replace frit*c. Replace column
3.	Improper mobile phase; precipitated buffer	3.	a. Use correct mobile phaseb. Wash column
4.	Improper column	4.	Use proper column
5.	Injector blockage	5.	Clear blockage or replace injector
6.	Column temperature too low	6.	Raise temperature
7.	Controller malfunction	7.	Repair or replace controller
8.	Blocked guard column	8.	Remove/replace guard column
9.	Blocked in-line filter	9.	Remove/replace in-line filter

^{*} Check manufacturer's column warranty first. Removal of end-fittings may void column warranty.

II. ABNORMAL PRESSURE (continued)

D.	Stead	v.	low	pressure
	CtGGG	,,	, 0 , ,	pi occai c

D. Cloudy, low procedure	
POSSIBLE CAUSE	SOLUTION
1. Flow set too low	Adjust flow rate
2. Leak in system	Locate and correct
3. Improper column	Use proper column
4. Column temperature too high	4. Lower temperature
5. Controller malfunction	5. Repair or replace controller

E. Pressure climbing

POSSIBLE CAUSE		SOLUTION
1.	See section C	See section C

F. Pressure dropping to zero

The state of the spirit of the state of the		
POSSIBLE CAUSE	SOLUTION	
1. See sections A and B	See sections A and B	

G. Pressure dropping, but not to zero

	1 1 0	
POSSIBLE CAUSE		SOLUTION
1. See section D		1. See section D

H. Pressure cycling				
POSSIBLE CAUSE	SOLUTION			
1. Air in pump	 a. Degas solvent b. Bleed air from pump 			
2. Faulty check valve(s)	2. Replace check valve(s)			
3. Pump seal failure	3. Replace pump seal			
4. Insufficient degassing	4 a. Degas solventb. Change degassing methods (use Degassex on-line degasser)			
5. Leak in system	5. Locate and correct			
6. Using gradient elution	Pressure cycling is normal due to viscosity changes			

III. LEAKS

Leaks are usually stopped by tightening or replacing a fitting. Be aware, however, that overtightened metal compression fittings can leak and plastic fingertights can wear out. If a fitting leak does not stop when the fitting is tightened a little, take the fitting apart and inspect for damage (e.g. distorted ferrule, or particles on the sealing surface); damaged fittings should be discarded.

A. Leaky fittings			
POSSIBLE CAUSE	SOLUTION		
Loose fitting	1. Tighten		
2. Stripped fitting	2. Replace		
3. Overtightened* fitting	a. Loosen and retighten b. Replace		
4. Dirty fitting	a. Disassemble and clean b. Replace		
5. Mismatched parts	5. Use all parts from same brand		

B. Leaks at pump	
POSSIBLE CAUSE	SOLUTION
Loose check valves	a. Tighten check valve (do not overtighten) b. Replace check valve
2. Loose fittings	2. Tighten fittings (do not overtighten)
3. Mixer seal failure	a. Replace mixer seal b. Replace mixer
4. Pump seal failure	4. Repair or replace
5. Pressure transducer failure	5. Repair or replace
6. Pulse damper failure	Replace pulse damper
7. Proportioning valve failure	 a. Check diaphragms, replace if leaky b. Check for fitting damage, replace
8. Purge valve	8. a. Tighten valve b. Replace purge valve

^{*} Use fingertight end-fittings to avoid sealing problems and the need for wrenches

III. LEAKS (continued)

	C. Injector leaks				
POSSIBLE CAUSE		SOLUTION			
1.	Rotor seal failure	Rebuild or replace injector			
2.	Blocked loop	2. Replace loop			
3.	Loose injection-port seal	3. Adjust			
4.	Improper syringe-needle diameter	4. Use correct syringe			
5.	Waste-line siphoning	Keep waste line above surface waste			
6.	Waste-line blockage	6. Replace waste line			

D. Column leaks			
POSSIBLE CAUSE	SOLUTION		
Loose endfitting	Tighten endfitting		
2. Column packing in ferrule	Disassemble, rinse ferrule, reassemble		
3. Improper frit thickness	3. Use proper frit (see chart below)		

E. Detector leaks				
POSSIBLE CAUSE	SOLUTION			
Cell gasket failure	a. Prevent excessive backpressure b. Replace gasket			
2. Cracked cell window(s)	2. Replace window(s)			
3. Leaky fittings	3. Tighten or replace			
4. Blocked waste line	Replace waste line			
5. Blocked flow cell	5. Rebuild or replace			

FRIT PORE SIZE SELECTION GUIDE

When Particle Size of material is:	Frit Pore Size should be:
2 - 4 μm	0.5 μm
5 - 20 μm	2 μm

IV. PROBLEMS WITH THE CHROMATOGRAM

Many problems in the LC system show up as changes in the chromatogram. Some of these can be solved by changes in the equipment; however, others require modification of the assay procedure. Selecting the proper column type and mobile phase are keys to "good chromatography."

A. Peak tailing			
POSSIBLE CAUSE	SOLUTION		
Blocked frit	a. Reverse flush column (if allowed) b. Replace inlet frit* c. Replace column		
2. Column void	2. Fill void*		
3. Interfering peak	a. Use longer column b. Change mobile phase and/or column/selectivity		
4. Wrong mobile phase pH	Adjust pH. For basic compounds, lower pH usually provides more symmetric peaks		
5. Sample reacting with active sites Normal Problem	5. a. Add ion pair reagent or volatile basic modifier b. Change column		

B. Peak fronting			
POSSIBLE CAUSE	SOLUTION		
Low temperature	Increase column temperature		
2. Wrong sample solvent	Use mobile phase for injection solvent		
3. Sample overload	Decrease sample concentration		
4. Bad column	4. See A.1. and A.2.		

C. Split peaks				
POSSIBLE CAUSE	SOLUTION			
Contamination on guard or analytical column inlet	Remove guard column and attempt analysis. Replace guard if necessary			
	continued on next page			

^{*} Check manufacturer's column warranty first. Removal of end-fittings may void column warranty.

PEAK TAILING

C. Split peaks (continued)

POSSIBLE CAUSE



Normal Problem

SPLIT PEAKS

If analytical column
is obstructed, reverse and flush. If
problem persists, column may
be fouled with strongly retained
contaminants. Use appropriate
restoration procedure. If problem
persists, inlet is probably plugged.
Change frit or replace column

- Sample solvent incompatible with mobile phase
- 2. Change solvent. Whenever possible, inject samples in mobile phase

D. Distortion of larger peaks

POSSIBLE CAUSE

SOLUTION

1. Sample overload

1. Reduce sample size

E. Distortion of early peaks

POSSIBLE CAUSE

SOLUTION

- Wrong injection solvent
- 1. a. Reduce injection volume
 - b. Use weaker injection solvent

F. Tailing, early peaks more than later ones

POSSIBLE CAUSE

SOLUTION

- 1. Extra-column effects
- a. Replumb system (shorter, narrower tubing)
 - b. Use smaller volume detector cell

G. Increased tailing as k' increases

POSSIBLE CAUSE

SOLUTION

- 1. Secondary retention effects, reversed-phase mode
- 1. a. Add triethylamine (basic samples)
 - b. Add acetate (acidic samples)
 - c. Add salt or buffer (ionic samples)
 - d. Try a different column
- 2. Secondary retention effects, normal-phase mode
- a. Add triethylamine
 (basic compounds)
 - b. Add acetic acid (acidic compounds)

G. Increased tailing as k' increases (continued)				
POSSIBLE CAUSE	SOLUTION			
Secondary retention effects, normal-phase mode	c. Add water (poly-functional compounds). Only for normal-phase methods which use water-miscible solvents. d. Try a different LC method			
3. Secondary retention effects, ion-pair				
H. Acidic or basic peaks tail				
POSSIBLE CAUSE	SOLUTION			
1. Inadequate buffering	a. Use 50-100 mM buffer concentration b. Use buffer with pKa equal to pH of mobile phase			
I. Extra peaks				
POSSIBLE CAUSE	SOLUTION			
Other components in sample	1. Normal			
Late-eluting peak from previous injection	a. Increase run time or gradient slope b. Increase flow rate			
3. Vacancy or ghost peaks	 3. a. Check purity of mobile phase b. Use mobile phase as injection solvent c. Reduce injection volume 			
4. Contamination	4. Filter sample			
J. Retention time drifts				
POSSIBLE CAUSE	SOLUTION			
Poor temperature control	Thermostat column			
2. Mobile phase changing	Prevent change (evaporation, reaction, etc.)			
3. Poor column equilibration	Allow more time for column equilibration between runs			
K. Abrupt retention time cha	anges			
POSSIBLE CAUSE	SOLUTION			
1. Flow rate change	Reset flowrate			
2. Air bubble in pump	2. Bleed air from pump			
3. Improper mobile phase	3. a. Replace with proper mobile phaseb. Set proper mobile phase mixture on controller			

L. Baseline drift					
POSSIBLE CAUSE			SOLUTION		
1.	Column temperature fluctuation. (Even small changes cause cyclic baseline rise and fall. Most often affects refractive index and conductivity detectors, or UV detectors at high sensitivity or in direct photometric mode.)	1.	Control column and mobile phase temperature, use heat exchanger before detector NORMAL PROBLEM BASELINE DRIFT		
2.	Nonhomogenous mobile phase. (Drift usually to higher absorbance, rather than cyclic pattern from temperature fluctuation.)	2.	Use HPLC grade solvents, high purity salts, and additives. Degas mobile phase before use, sparge with helium during use		
3.	Contaminant or air buildup in detector cell	3.	Flush cell with methanol or other strong solvent. If necessary, clean cell with 1N HNO ₃ (never with HCI.)		
4.	Plugged outlet line after detector. (High pressure cracks cell window, producing noisy baseline.)	4.	Unplug or replace line. Refer to detector manual to replace window		
5.	Mobile phase mixing problem or change in flow rate	5.	Correct composition / flow rate. To avoid, routinely monitor composition and flow rate		
6.	Slow column equililbration, especially when changing mobile phase	6.	Flush with intermediate strength solvent, run 10-20 column volumes of new mobile phase before analysis		
7.	Mobile phase contaminated, deteriorated, or prepared from low quality materials	7.	Check make-up of mobile phase. Use highest grade chemicals and HPLC solvents		
8.	Strongly retained materials in sample (high k') can elute as very broad peaks and appear to be a rising baseline. (Gradient analyses can aggravate problem.)	8.	Use guard column. If necessary, flush column with strong solvent between injections or periodically during analysis		
9.	Mobile phase recycled but detector not adjusted	9.	Reset baseline. Use new mobile phase when dynamic range of detector is exceeded		
10	Detector (UV) not set at absorbance maximum but at slope of curve	10.	Change wavelength to UV absorbance maximum		

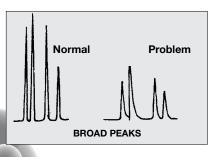
M. Baseline noise (regular)				
POSSIBLE CAUSE	SOLUTION			
Air in mobile phase, detector cell, or pump	Degas mobile phase. Flush system to remove air from detector cell or pump			
2. Leak Normal Problem BASELINE NOISE	See section III. Check system for loose fittings. Check pump for leaks, salt build-up, unusual noises. Change pump seals if necessary			
3. Incomplete mobile phase mixing	Mix mobile phase by hand or use less viscous solvent			
4. Temperature effect (column at high temperature, detector unheated)	Reduce differential or add heat exchanger			
Other electronic equipment on same line	Isolate LC, detector or recorder to determine if source of problem is external. Correct as neccessary			
6. Pump pulsations	Incorporate pulse dampener into system			

N. Baseline noise (irregular)

POSSIBLE CAUSE		SOLUTION	
1.	Leak Normal Problem BASELINE NOISE	1.	See section III. Check for loose fittings. Check pump for leaks, salt build-up, unusual noises. Change seals if neccessary. Check for detector cell leak
2.	Mobile phase contaminated, deteriorated, or prepared from low quality materials	2.	Check make-up of mobile phase.
3.	Mobile phase solvents immiscible	3.	Select and use only miscible solvents
4.	Detector/recorder electronics	4.	Isolate detector and recorder electronically. Refer to instruction manual to correct problem
5.	Air trapped in system	5.	Flush system with strong solvent
6.	Air bubbles in detector	6.	Purge detector. Install back-

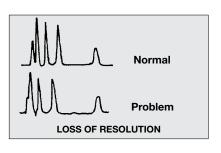
	N.	Baseline noise (irregular)	CC	ontinued
PO	SSIE	BLE CAUSE	SOI	LUTION
7.	sm	etector cell contaminated (even nall amounts of contaminants n cause noise)	7.	Clean cell by flushing with 1N HNO ₃ (never with HCl)
8.	We	eak detector lamp	8.	Replace lamp
9.		olumn leaking silica packing material	9.	Replace column
10		obile phase mixer inadequate malfunctioning	10.	Repair or replace the mixer or mix off-line if isocratic

	O. Broad peaks		
POSSIBLE CAUSE		SOLUTION	
1.	Mobile phase composition changed	1.	Prepare new mobile phase
2.	Mobile phase flow rate too low	2.	Adjust flow rate
3.	Leaks (especially between column and detector)	3.	See section III. Check for loose fittings. Check pump for leaks, salt build-up, and unusual noises. Change seals if necessary
4.	Detector settings incorrect	4.	Adjust settings
5.	Extra-column effects: a. Column overloaded	5.	 a. Inject smaller volume (e.g., 10 μL vs. 100 μL) or 1:10 and 1:100 dilutions of sample
	b. Detector response time or cell volume too large c. Tubing between column and		b. Reduce response time or use smaller cellc. Use as short a piece of 0.005-
	detector too long or ID too large d. Recorder response time too high		0.007 in. ID tubing as practicald. Reduce response time



O. Broad peaks (continued)		
POSSIBLE CAUSE	SOLUTION	
6. Buffer concentration too low	6. Increase concentration	
7. Guard column contaminated/worn out	7. Replace guard column	
Column contaminated / worn out. Low plate number	Replace column with new one of same type	
9. Void at column inlet	Open inlet end* and fill void or replace column	
Peak represents two or more poorly resolved compounds	10. Change column type to improve separation	
11. Column temperature too low	11. Increase temperature. Do not exceed 60 °C unless higher temperatures are acceptable to column manufacturer	
12. Detector time constant too large	12. Use smaller time constant	

P. Loss of resolution			
РО	SSIBLE CAUSE	SOLUTION	
1.	Mobile phase contaminated / deteriorated (causing retention time to change)	Prepare new mobile phase	
2.	Obstructed guard or	Remove guard column and	



analytical column

 Remove guard column and attempt analysis. Replace guard if necessary. If analytical column is obstructed, reverse and flush. If problem persists, column may be fouled with strongly retained contaminants. Use appropriate restoration procedure. If problem persists, inlet is probably plugged. Change frit or replace column

^{*} Check manufacturer's column warranty first. Removal of end-fittings may void column warranty.

Q. All peaks too small	
Q. All peaks too siriali	
POSSIBLE CAUSE	SOLUTION
Detector attenuation too high	Reduce attenuation
2. Detector time constant too large	2. Use smaller time constant
3. Injection size too small	a. Increase sample concentration b. Increase injection volume, if column size allows
4. Improper recorder connection	4. Use correct connection
R. All peaks too large	
POSSIBLE CAUSE	SOLUTION
Detector attenuation too low	Use larger attenuation
2. Injection size too large	a. Reduce sample concentration b. Decrease injection volume, use a smaller sample loop or use partial loop filling
3. Improper recorder connection	Use correct connection

V. PROBLEMS WITH THE INJECTOR

These problems are usually detected while you are using the injection valve. Leaky injection valves are discussed in Section III (Leaks).

A. Manual injector, hard to turn		
POSSIBLE CAUSE	SOLUTION	
Damaged rotor seal	Rebuild or replace valve	
2. Rotor too tight	Adjust rotor tension	

B. Manual injector, hard to load		
POSSIBLE CAUSE	SOLUTION	
Valve misaligned	Adjust alignment	
2. Blocked loop	2. Replace loop	
3. Dirty syringe	Clean or replace syringe	
4. Blocked lines	4. Clear or replace lines	

C. Autoinjector, won't turn			
POSSIBLE CAUSE	SOLUTION		
No air pressure (or power)	Supply proper pressure (power)		
2. Rotor too tight	2. Adjust		
3. Valve misaligned	3. Adjust alignment		

D. Autoinjector, other problems			
POSSIBLE CAUSE	SOLUTION		
1. Blockage	Clear or replace blocked portion		
2. Jammed mechanism	2. See service manual		
3. Faulty controller	3. Repair or replace controller		

VI. PROBLEMS DETECTED BY SMELL, SIGHT OR SOUND

You need to use all your senses to identify LC problems. You should get in the habit of taking a few minutes each day to expose all of your senses (except taste!) to the LC so that you can get a "feel" for how the LC performs normally. This will help you to quickly locate problems. For example, often you can smell a leak before you see it. The majority of problems are identified by sight; most of these are included in the preceeding section.

A. Solvent smell			
POSSIBLE CAUSE	SOLUTION		
1. Leak	See section III		
2. Spill	a. Check for overflowing waste container b. Locate spill and clean up		

B. "Hot" smell	
POSSIBLE CAUSE	SOLUTION
Overheating module	 a. Check for proper ventilation, adjust b. Check temperature setting, adjust c. Shut module off, see service manual

C. Abnormal meter readings			
POSSIBLE CAUSE SOLUTION		LUTION	
1. P	ressure abnormality	1.	See section II
2. C	olumn oven problem	2.	a. Check settings, adjustb. See service manual
3. D	etector lamp failing	3.	Replace lamp

D. Warning lamps			
POSSIBLE CAUSE	SOLUTION		
Pressure limit exceeded	a. Check for blockage b. Check limit setting, adjust		
2. Other warning lamps	See service manual		

VI. PROBLEMS DETECTED BY SMELL, SIGHT OR SOUND

(continued)

E. Warning buzzers		
POSSIBLE CAUSE	SOLUTION	
Solvent leak / spill	Locate and correct	
2. Other warning buzzers	See service manual	

F. Squeaks and squeals		
POSSIBLE CAUSE	SOLUTION	
Bearing failure	See service manual	
2. Poor lubrication	Lubricate as necessary	
3. Mechanical wear	3. See service manual	

VII. KEY PROBLEM AREAS AND PREVENTIVE MAINTENANCE

The chart below lists the most common problems that occur with each LC module. In the right-hand column are listed preventive maintenance practices that can reduce the failure rate. The numbers in parentheses are suggested intervals between maintenance. The operator's and service manuals for your LC may have additional suggestions for preventive maintenance of your model of LC.

Reservoir	
PROBLEM	PREVENTIVE MAINTENANCE
Blocked inlet frit	 a. Replace (3-6 mo.) b. Filter mobile phase, 0.5 μm filter
2. Gas bubbles	2. Degas mobile phase

Pump	
PROBLEM	PREVENTIVE MAINTENANCE
1. Air bubbles	Degas mobile phase
2. Pump seal failure	2. Replace (3 mo.)
3. Check valve failure	Filter mobile phase, use inlet-line frit. Keep spare

Injector	
PROBLEM	PREVENTIVE MAINTENANCE
Rotor seal wear	a. Don't overtighten b. Filter samples

Column	
PROBLEM	PREVENTIVE MAINTENANCE
1. Blocked frit	 a. Filter mobile phase b. Filter samples c. Use in-line filter and/or guard column
2. Void at head of column	 a. Avoid mobile phase pH > 8 (most silica-based columns) b. Use guard column c. Use precolumn (saturator column)

VII. KEY PROBLEM AREAS AND PREVENTIVE MAINTENANCE (continued)

	Detector		
PR	OBLEM	PR	EVENTIVE MAINTENANCE
1.	Lamp failure; decreased detector response; increased detector noise	1.	Replace (6 mo.) or keep spare lamp
2.	Bubbles in cell	2.	a. Keep cell cleanb. Use restrictor after cellc. Degas mobile phase

General	
PROBLEM	PREVENTIVE MAINTENANCE
Corrosive/abrasive damage	Flush buffer from LC and clean when not in use

WARNING: CONTAMINANTS CAN CAUSE



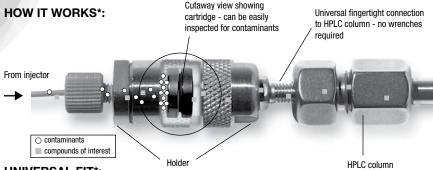
- High Backpressure
- Split Peaks
- Broad Peaks
- Baseline Noise
- Baseline Drift
- Loss of Resolution
- Irreversible Column Damage
- System Damage

PROTECT YOUR HPLC COLUMN AND RESULTS



Additional information can be found at www.phenomenex.com/securityquard

A universal HPLC guard cartridge system designed to effectively protect your valuable analytical columns and results from the damaging effect of contaminants. Trap contaminants without altering your chromatography.



UNIVERSAL FIT*:

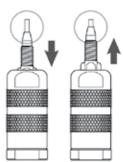
With the patented design, SecurityGuard can adjust to fit virtually any manufacturer's female/ inverted endfitting.



If the SecurityGuard Cartridge System does not provide at least an equivalent performance as compared to a competing guard cartridge system, return the product with the comparative data within 45 days for a FULL REFUND.

*SecurityGuard is patented by Phenomenex. U.S. Patent No. 6,162,362

CAUTION: this patent only aplies to the analytical-sized guard cartridge holder, and does not apply to SemiPrep, PREP or ULTRA holders, or to any cartridges.



Patented Design

SecurityGuard is a trademark of Phenomenex.

Phenex™ Syringe Filters

For Sample and Solvent Filtration Prior to Chromatography

- · Less system downtime
- More consistent, reproducible results
- Increased column lifetime

Phenex Offers:

- » Low protein adsorption
- » Broad chemical compatibility
- » Minimized extractables
- » Excellent flow rate
- » High total throughput

- » Low hold-up volume
- » Certified quality
- » 100 % integrity tested
- Bi-directional use



Syringe Filter Finder

3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix. www.phenomenex.com/SFfinder

Membrane Types		
RC (Regenerated Cellulose)	NY (Nylon)	
PTFE, Teflon® (Polytetrafluoroethylene)	CA (Cellulose Acetate)	
PES (Polyethersulfone)	GF (Glass Fiber)	
PVDF (Polyvinylidene Fluride)		



Above syringe filters are non-sterile. Housing is made of medical-grade polypropylene (PP).

Tip: Try a Sample Pack!

The best way to determine if a specific Phenex membrane is suitable for your application. Request yours today by phone or visit www.phenomenex.com/sample

Please contact your local Phenomenex technical consultant or distributor for availability or assistance.

Larger quantity purchases at significant savings are available.

Phenex is a trademark of Phenomenex. Teflon is a registered trademark of E.I. du Pont de Nemours and Co.



If Phenex Syringe Filters do not perform as well or better than your current syringe filter product of similar membrane, diameter and pore size, return the product with comparative data within 45 days for a FULL REFUND.

Australia

t: +61 (0)2-9428-6444

f: +61 (0)2-9428-6445 auinfo@phenomenex.com

Austria

t: +43 (0)1-319-1301 f: +43 (0)1-319-1300 anfrage@phenomenex.com

Belgium

t: +32 (0)2 503 4015 (French) t: +32 (0)2 511 8666 (Dutch)

f: +31 (0)30-2383749 beinfo@phenomenex.com

Canada

t: +1 (800) 543-3681

f: +1 (310) 328-7768 info@phenomenex.com

China

t: +86 (0)20 2282-6668

f: +86 (0)20 2809-8130 chinainfo@phenomenex.com

Denmark

t: +45 4824 8048

f: +45 4810 6265 nordicinfo@phenomenex.com

Finland

t: +358 (0)9 4789 0063

f: +45 4810 6265 nordicinfo@phenomenex.com

France

t: +33 (0)1 30 09 21 10

f: +33 (0)1 30 09 21 11 franceinfo@phenomenex.com

Germany

t: +49 (0)6021-58830-0

f: +49 (0)6021-58830-11 anfrage@phenomenex.com

India

t: +91 (0)40-3012 2400

f: +91 (0)40-3012 2411 indiainfo@phenomenex.com

Ireland

t: +353 (0)1 247 5405

f: +44 1625-501796

eireinfo@phenomenex.com

Italy

t: +39 051 6327511

f: +39 051 6327555 italiainfo@phenomenex.com

Luxembourg

t: +31 (0)30-2418700

f: +31 (0)30-2383749

nlinfo@phenomenex.com

Mexico

t: 01-800-844-5226

f: 001-310-328-7768

tecnicomx@phenomenex.com

The Netherlands

t: +31 (0)30-2418700

f: +31 (0)30-2383749

nlinfo@phenomenex.com

New Zealand

t: +64 (0)9-4780951

f: +64 (0)9-4780952

nzinfo@phenomenex.com

Norway

t: +47 810 02 005

f: +45 4810 6265

nordicinfo@phenomenex.com

Puerto Rico

t: +1 (800) 541-HPLC

f: +1 (310) 328-7768

info@phenomenex.com

Spain

t: +34 91-413-8613

f: +34 91-413-2290

espinfo@phenomenex.com

Sweden

t: +46 (0)8 611 6950

f: +45 4810 6265

nordicinfo@phenomenex.com

United Kingdom

t: +44 (0)1625-501367

f: +44 (0)1625-501796

ukinfo@phenomenex.com

USA

t: +1 (310) 212-0555

f: +1 (310) 328-7768

info@phenomenex.com

All other countries Corporate Office USA



t: +1 (310) 212-0555

f: +1 (310) 328-7768

info@phenomenex.com



www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country, contact Phenomenex USA, International Department at international@phenomenex.com