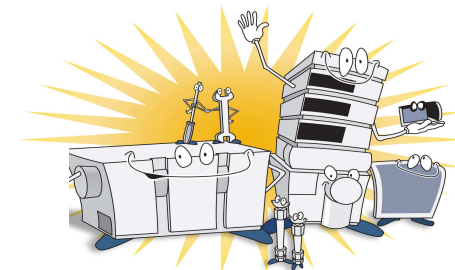


G4218A ELSD 工程师安装指南



Introduction to the ELSD installation

Evaporative Light Scattering Detector

ELSD G4218A

Engineer manual

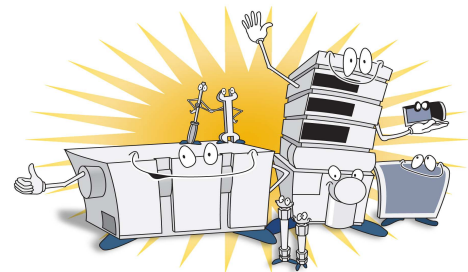
胡常亮



G4218A – 介绍

The ELSD – A perfect fit to the Agilent Detector Portfolio

- 作为**UV-Vis**的补充, 可以对不含发色团的不挥发物和半挥发物进行检测。
- 比**RID**更好用, 可以跑梯度, 并且灵敏度好。
- **US List price including I&F:21.400 USD**
- **Agilent 1200 Series OEM is based on Sedex 85.**
- 可以与**RRLC**联用, 速度够快!
- 与岛津是同一家**OEM**供应商



Factory menu Code 2210
只有工程师才能进入, 不要给用户

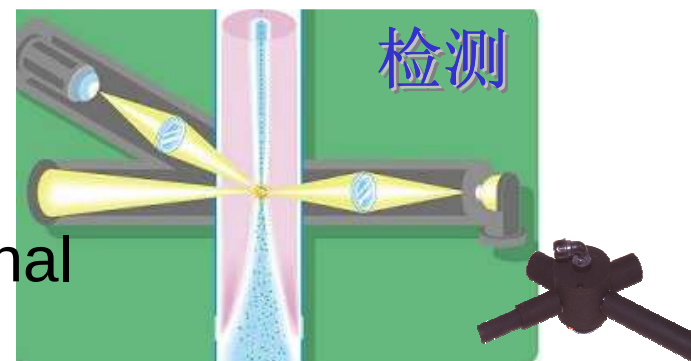


Sedex 85 Agilent ELSD

G4218A – 原理简介

溶质（待测物）半挥发、不挥发

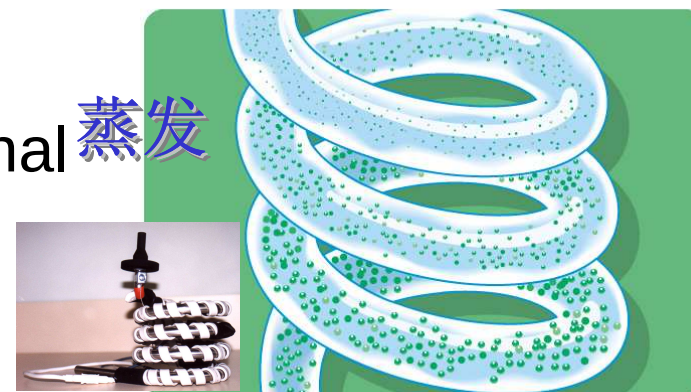
Signal



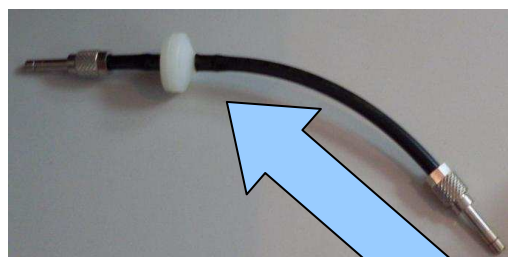
在漂移管处可控温加热，使得流动相等可挥发物挥发。加热的温度从室温+5℃到100℃

No Signal

蒸发



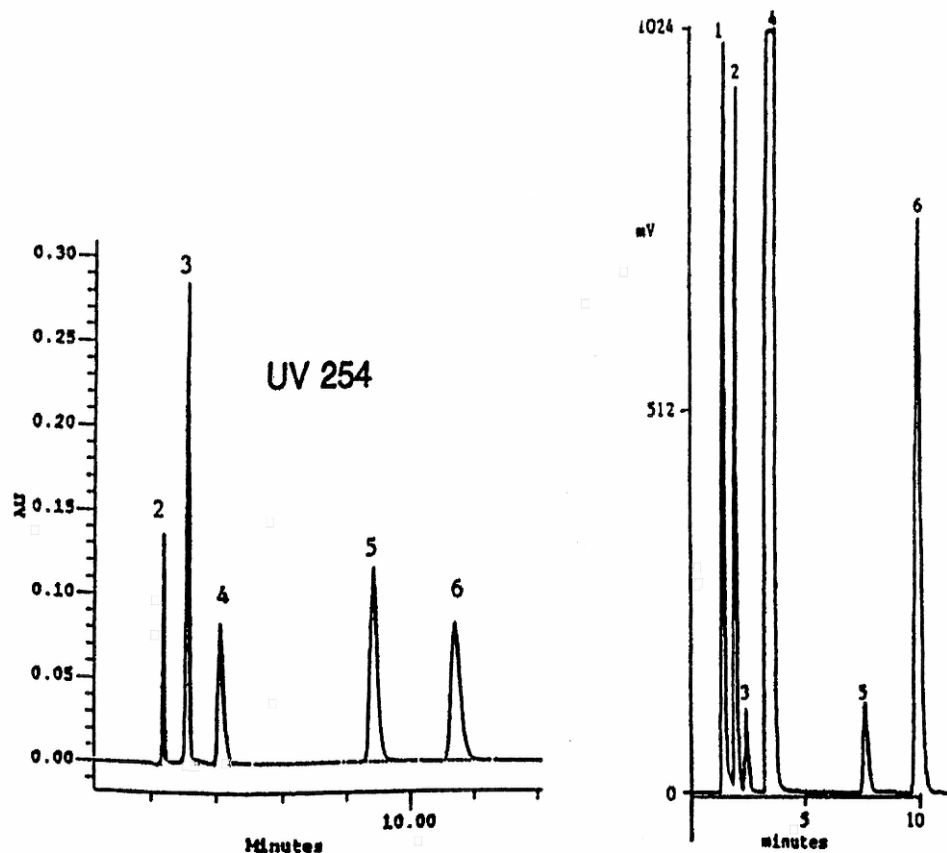
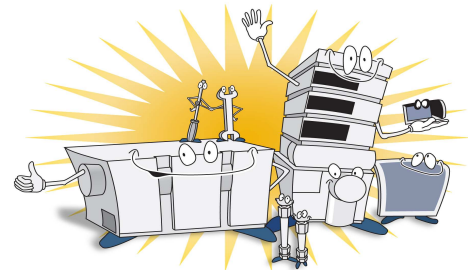
在雾化管中由氮气将流动相和样品吹成均匀的小液滴。



为防止氮气中的不挥发物带来干扰，白色的是0.01um过滤器，可更换。



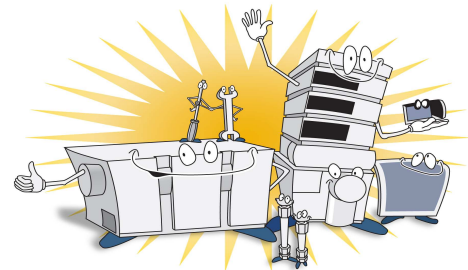
G4218A – ELSD vs. UV 灵敏度



1. UV 和ELSD 的灵敏度不能进行比较.
2. ELSD 与UV不同, 它是个质量型检测器.
3. 如果两个样品的分子量相同, 那么它们的ELSD响应就相同.
4. UV response depends on sample Absorption



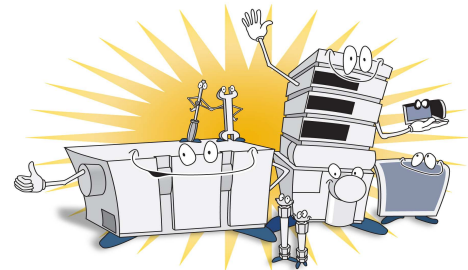
G4218A – Installing the ELSD



Shipment content

- Detector based on regional voltage 100 V/115 V/230 V
- Standard nebulizer
- Drain bottle and exhaust tube
- Optional pressure regulator with filter 0.01 μm
- Capillary 60 cm, 0.17 mm for connection to LC
- Caffeine standards, 250 $\mu\text{g/ml}$ in water
- Cables (power, RS 232 straight, APG, autozero)

G4218A – 仪器安装



仪器连接方式一般由两种：

1. RS232+remote cable 与CTC一样
2. 通过35900来与工作站通讯

- 装箱方式与LC的其它模块不同

ELSD的Firmware

版本是**A.01.02**

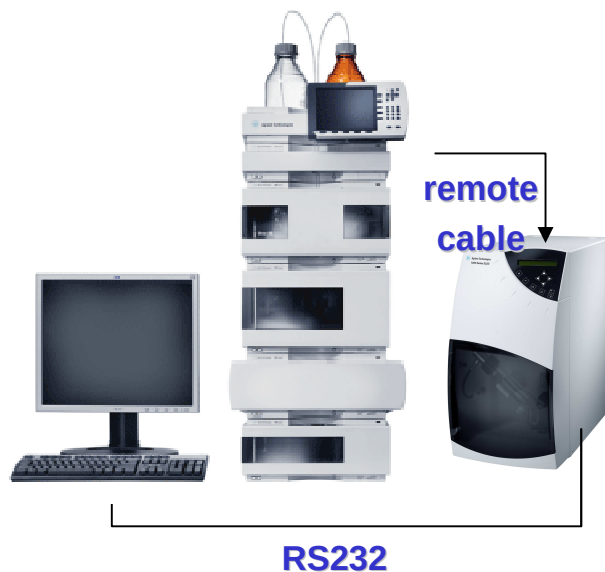
与**LC的FW**版本无关

只要是**B.03.02**的

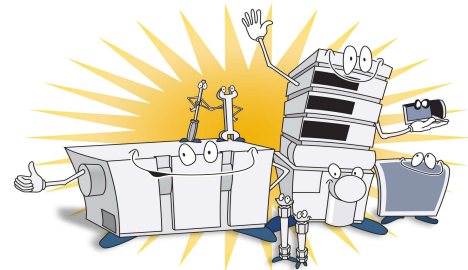
工作站就行。

目前有个已知的**bug**

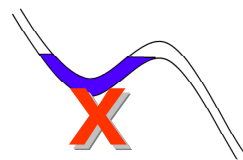
如果是手动进样器的话，要先在工作站上点开始后再掰阀进样



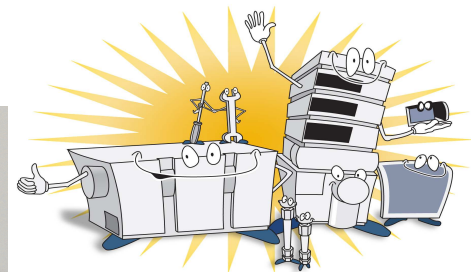
G4218A –仪器安装



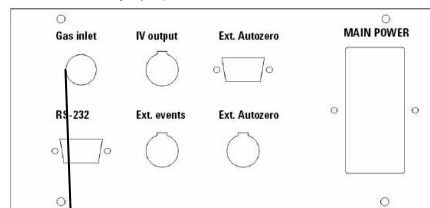
- 废液瓶不能盖盖子
- 废液管不能伸到液面下
- 废液管不能打弯
- 否着会影响检测结果和低灵敏度



G4218A –仪器安装



ELSD背面



to LC

氮气

氮气（快速连接）
如果用户用钢瓶氮
气的话，记得带上
1/4-1/8英寸的变径
接头

废液



to evaporator

WARNING

CAUTION

Avoid overpressure!

当气源压力超过**4.5bar (67psi)** 时会使ELSD的压力传感器损坏，大多数情况下会用**3.5bar(51psi)**来完成分析。

要求气源能够最大提供**4L/min**的氮气(纯度要求不高，但是要干净无油)，Agilent不支持用户使用空气，因为有危险！

Avoid leaks!

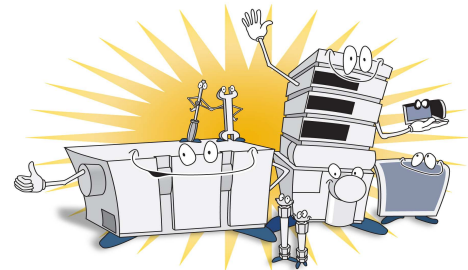
由于ELSD没有漏液传感器，
所以更要小心漏液，
否则会影响灵敏度和分析结果。



G4218A –仪器安装

Optional pressure regulator/filter

G4218-60100

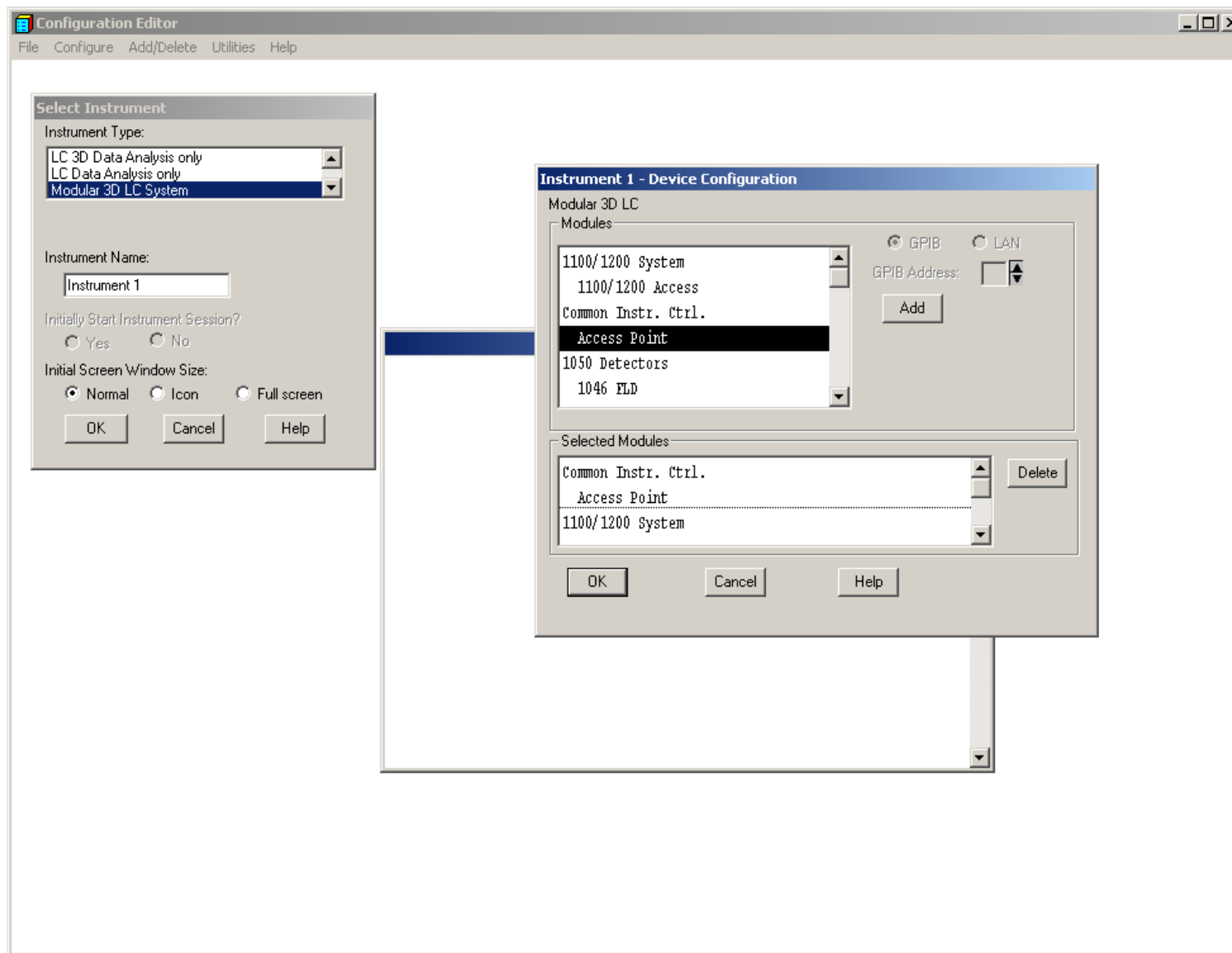


可以将它接到钢瓶减压阀后面，
气体由右侧进入，从左侧再连到
ELSD上。

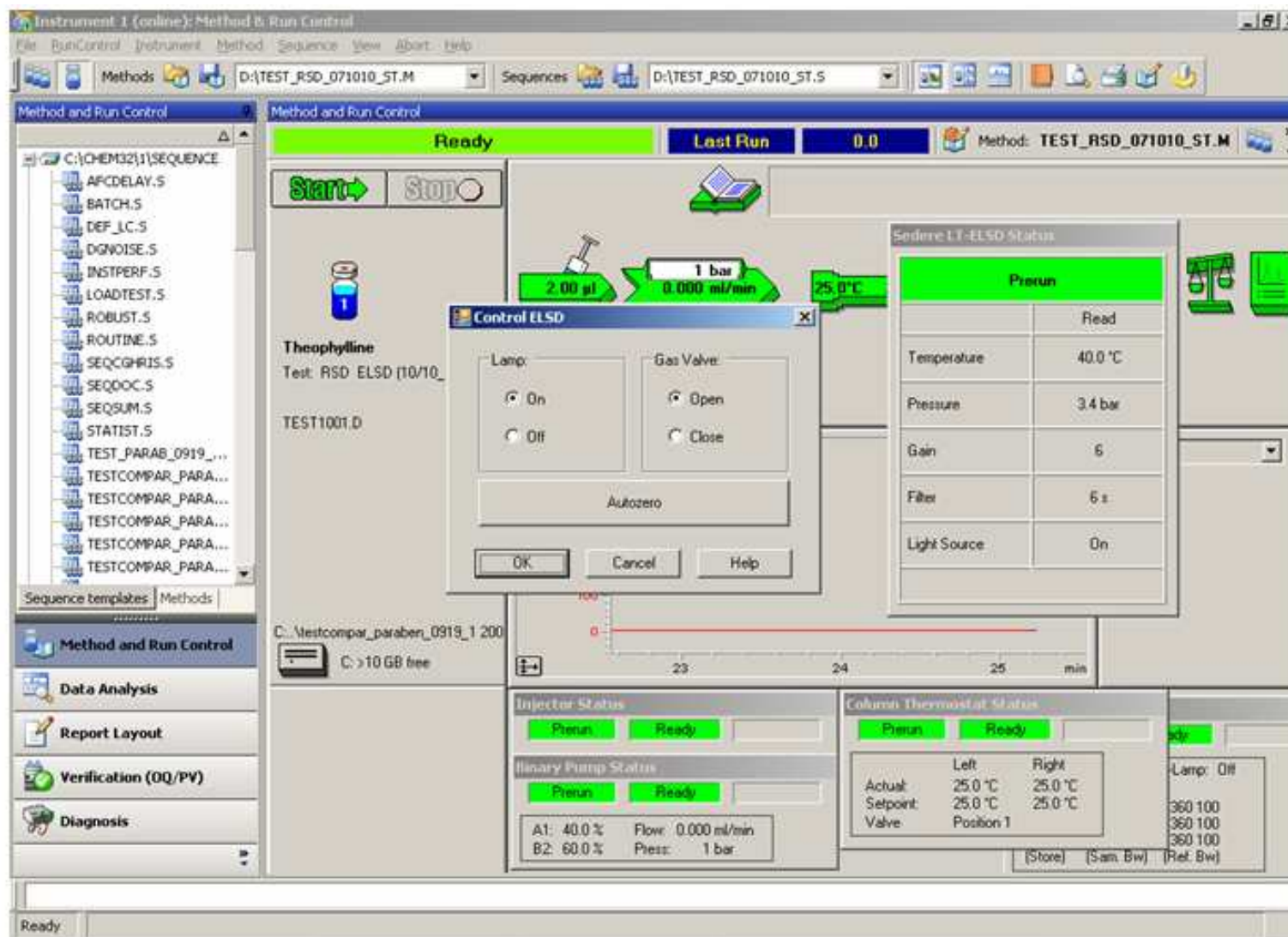
调节压力时先将黑帽拔起，调节后
再按下。

pre-filter 5 μm , filter 0.01 μm
每年可更换滤芯 G4218-40150

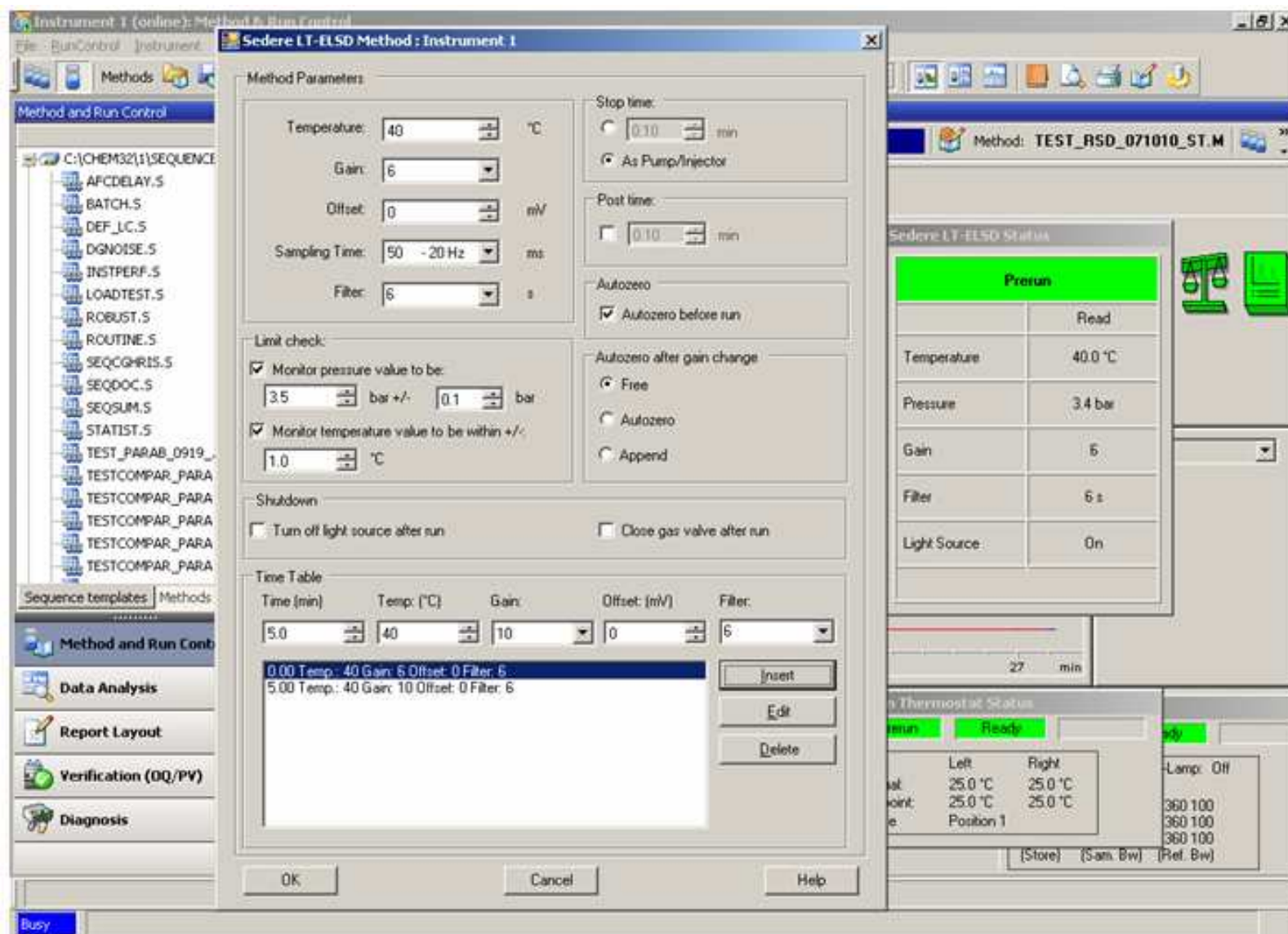
G4218A – 工作站



G4218A – 工作站

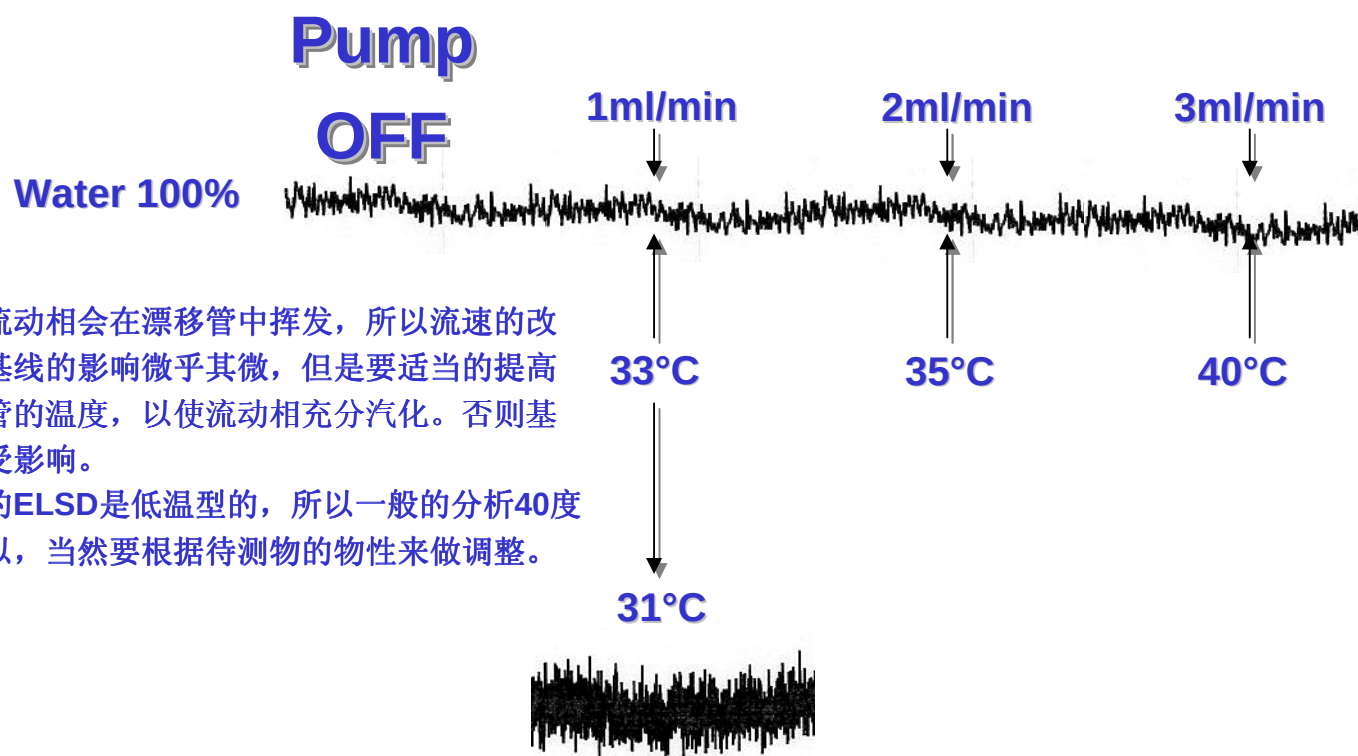


G4218A – 工作站

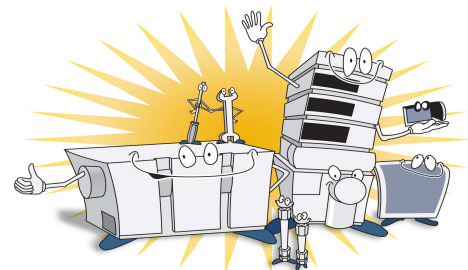


G4218A –工作站参数设置意义

Temperature effect on baseline



G4218A –工作站参数设置意义



What is gain ? Gain is the electronic scaling of the signal: higher gain, higher signal

Gain 值范围 : 1 to 12

Factor 2 between each gain

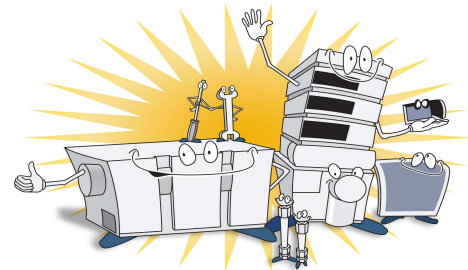
...means that 2048 times less concentrated impurities at gain 12 gives same peak height as main peak at gain 1.

一般的分析建议使用Gain为6或7。

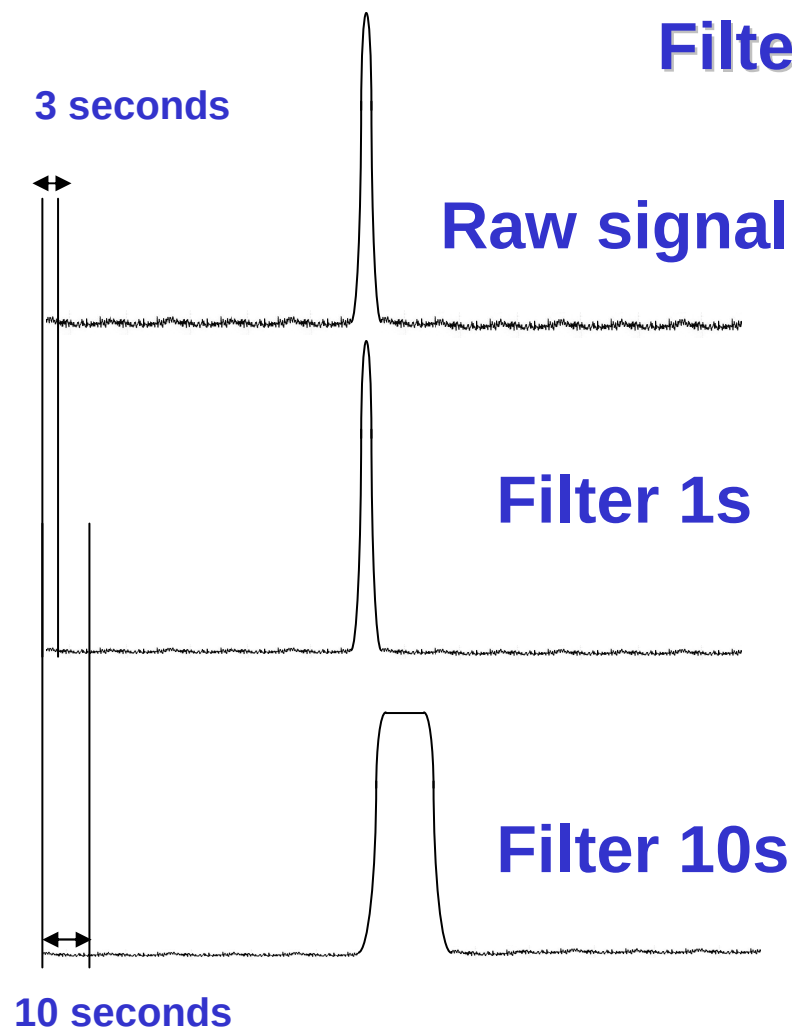
Gain	Signal (mV)	Noise (μV)	S/N
12	1000	1000	1000
11	500	500	1000
10	250	250	1000
9	125	125	1000
8	64	64	1000
7	32	32	1000
6	16	32	500
5	8	32	250
4	4	32	125
3	2	32	64
2	1	32	32
1	0.5	32	16



G4218A –工作站参数设置意义



Filter effect



What is Filter ?

Filter is a moving average.

User can choose its duration from 0, 0.5, 1, 2, 3,...10s

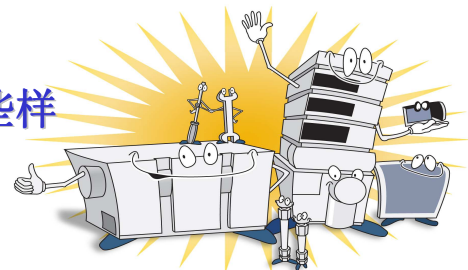
当Filter值越大时，基线越直，但是峰型会越失真。

G4218A – 验收方法

Checkout

WARNING

如果峰平头的话可以少进些样品（ELSD的信号超过1100mV时就会平头）



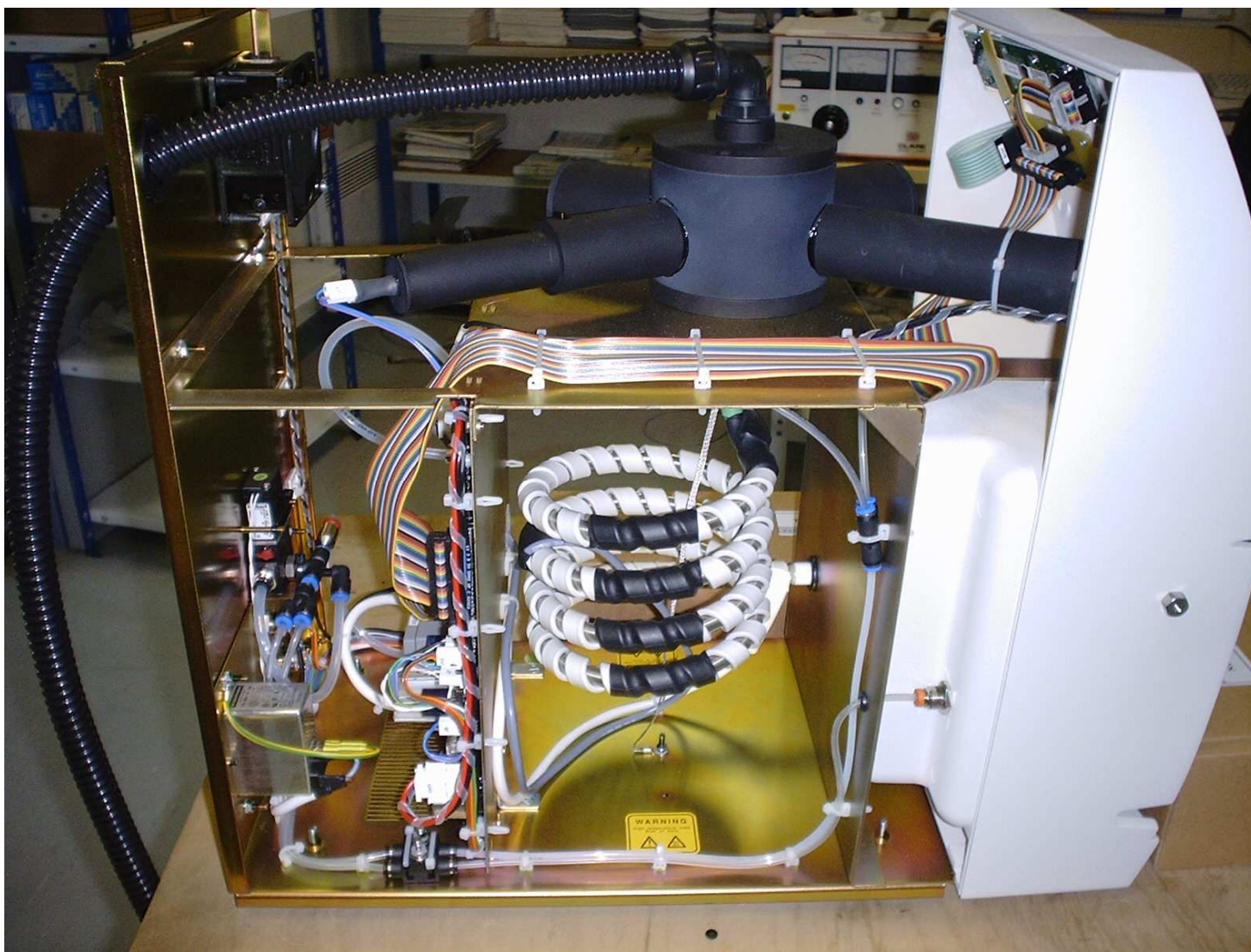
Sample	Caffeine standard 250 µg/ml in water (p/n G4218-85000)
Solvent	Isocratic, 80% water, 20% Acetonitrile
Flow	1 ml/minute
Injection volume	20 µl
Column	Eclipse XDB-C18 4.6x150 5u Analytical
TCC temperature	40 °C
ELSD temperature	40 °C
ELSD pressure	3.5 bar (51 psi)
ELSD gain	7
ELSD Filter	1 s

Wait for temperature/system equilibration, Check liquid level and stability in siphon!

每次做完样品要关闭ELSD时，在停泵后要继续通氮气30分钟，然后再关闭氮气并立刻降温。



G4218A – Detector Details



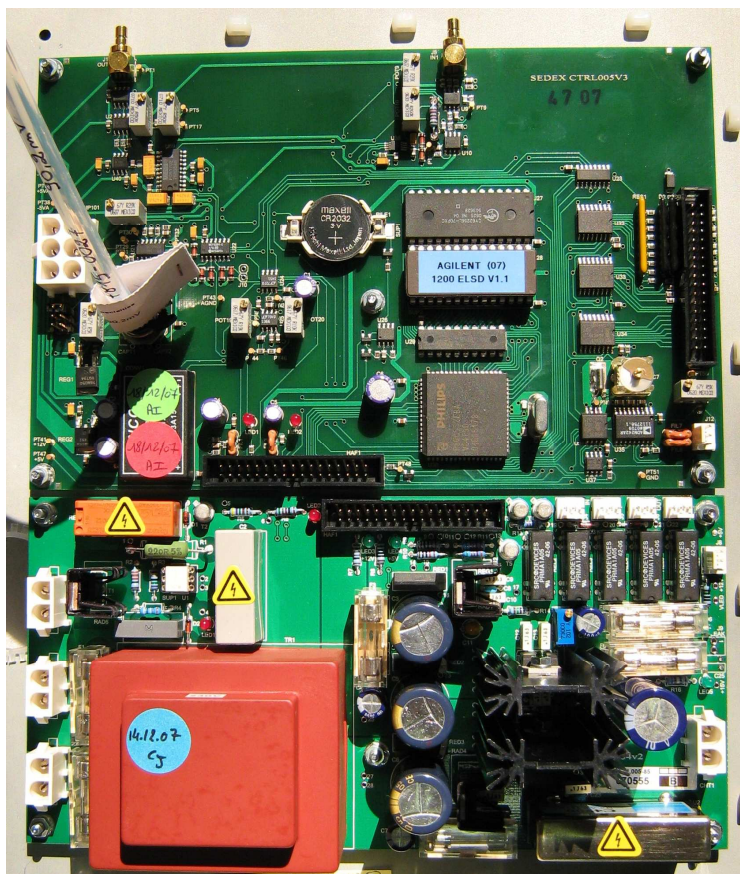
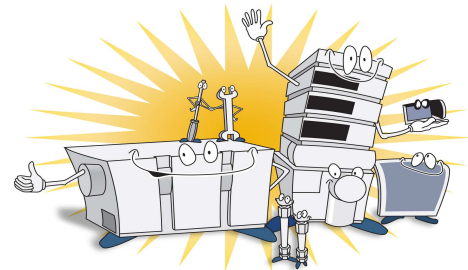
G4218A – 两块电路板和更换LED

主板 CTRL004:

压力传感器, 电池,

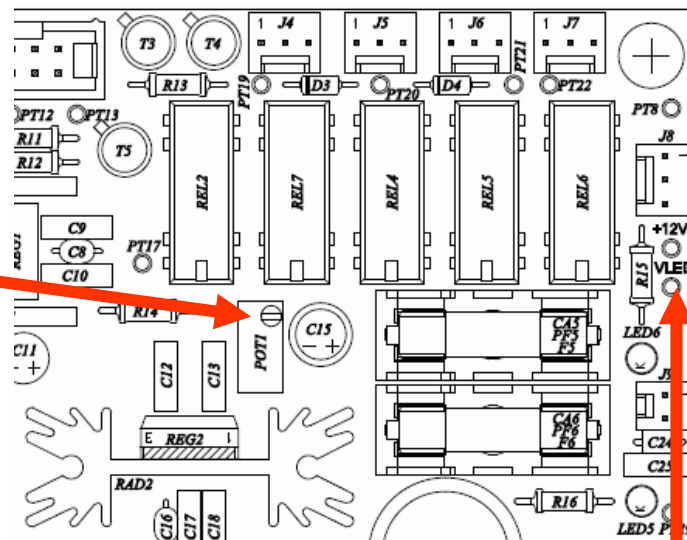
ELSD的Firmware是

更换chip的, 像6890A一样。



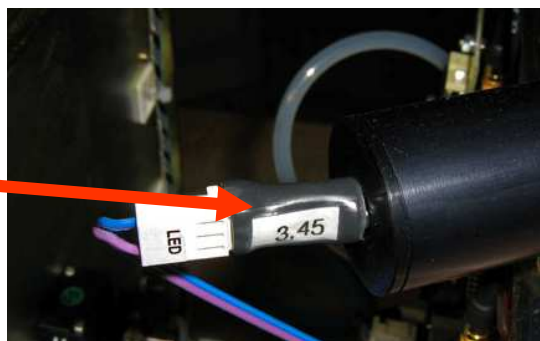
滑位电阻器
旋动可改变
LED的电压

电源板 ALIM005:
regional voltages

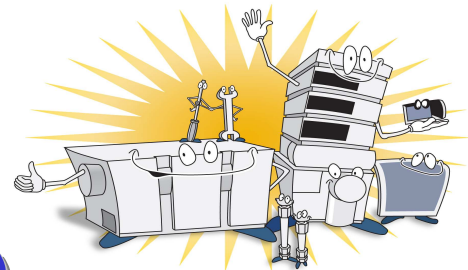


VLED: LED的电压测试点

ELSD使用的蓝光LED寿命为5000小时,
但是没有能量测试功能, 如果用户购买
PM的话, 我们会给用户更换一个, 每只
LED的最佳电压都不同, 更换时要调电压



G4218A –维修诊断



Prior to any service
(especially if « signal » trouble)

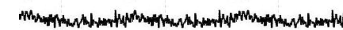
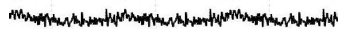
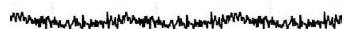
判断问题处是否出在流动相和柱子上

Instrument connected to HPLC. Column NOT inline, Gas : 3.5 bars., Gain : 12, LED on.

不接柱子也不走流动相

不接柱子，只走流动相

接上柱子后走流动相



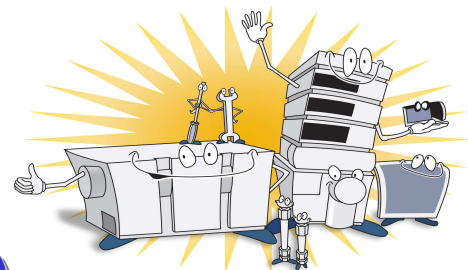
各做5分钟，并记录基线

氮气不干净或者漂移管温度低
也可能是流动相被污染了。

柱子的问题，有不挥发物流出。

G4218A –维修诊断

Prior to any service
(especially if « signal » trouble)



Electronic noise test

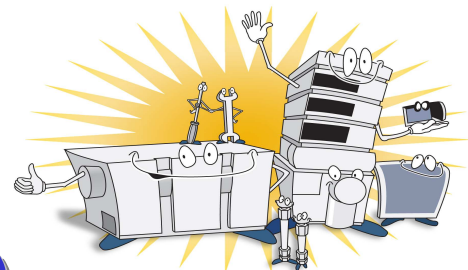
- Instrument not connected to HPLC.
- Nebulizer liquid inlet sealed with parafilm.
- Gas : 3.5 bar
- Gain : 12
- Filter : 1
- LED off

Signal variations must be less than +/-2mV so :

- Electronic noise is correct
- Gas is clean
- Instrument is clean

G4218A –维修诊断

Prior to any service
(especially if « signal » trouble)



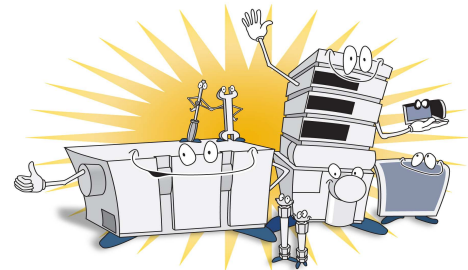
Stray light

- Instrument not connected to HPLC.
- Nebulizer liquid inlet sealed with parafilm.
- Gas : 3.5 bar
- Gain : 12
- LED on
- Set gain 1
- Check that "Offset after Autozero" menu is set to « 0mV ».
- Press autozero
- Set gain 12.
- Observe Stray light (normal range is 100 to 150mV. Typically 120-130mV,no spec). 目前我们的经验值要大于130mV。

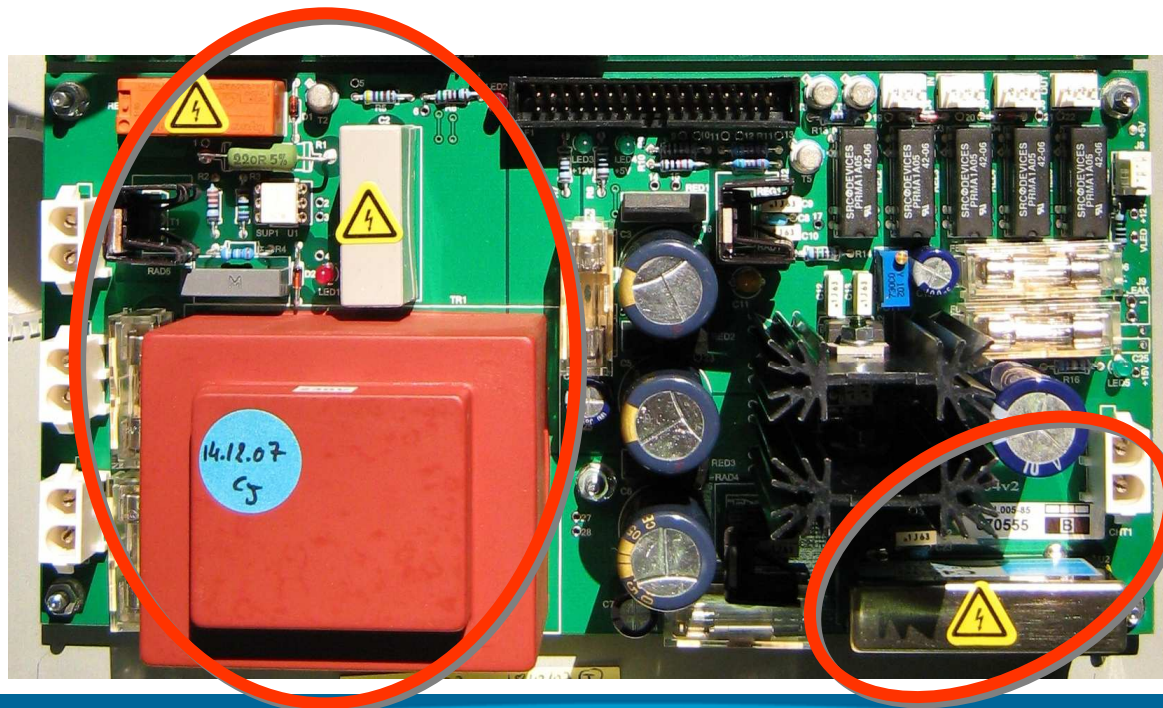
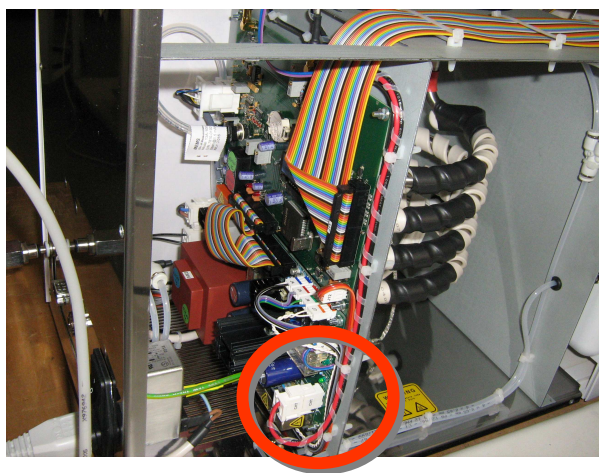
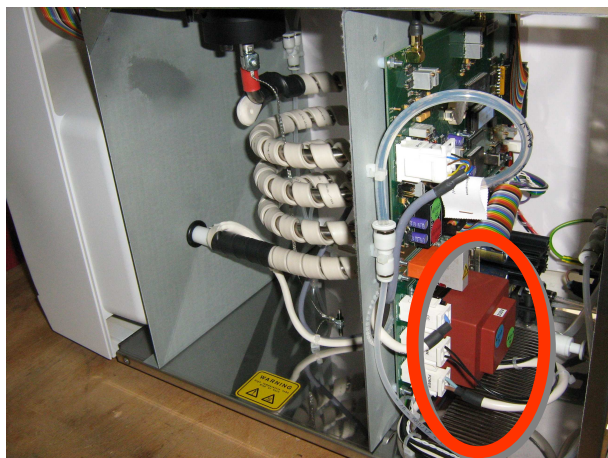
G4218A –维修诊断-安全



SAFETY Dangerous areas

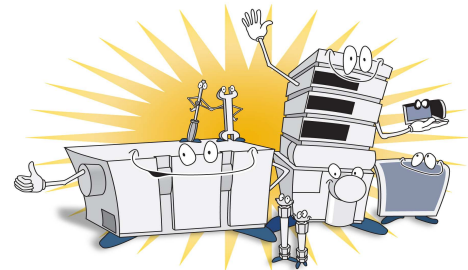


维修时一定要关闭电源，小心触电。



G4218A – 维修诊断

特别工具

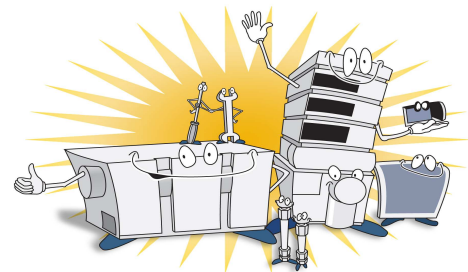
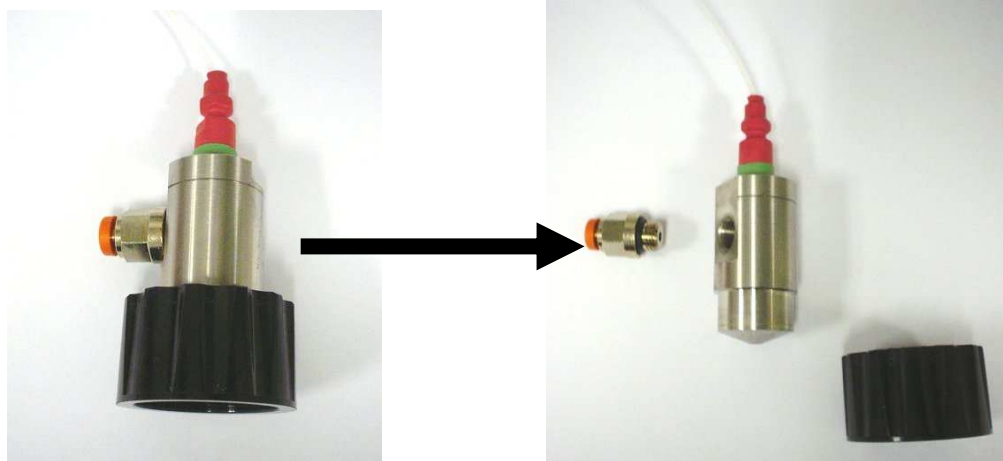


如果更换主板的话，一定要带这种螺丝刀，否则无法拆掉主板和电源板！



G4218A – 清洗

清洗雾化器



可以超声清洗，
但是不要让液面没过氮气入口，
并且保证不要划伤锥面！

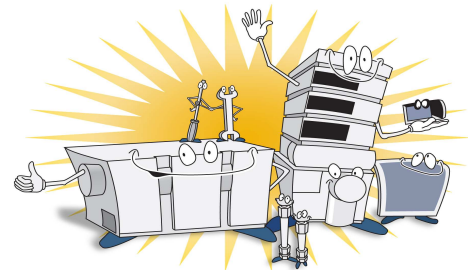


用户热清洗ELSD方法：

- 将流动相流量设置 **1 ml/min**，也可以用乙醇或丙酮。
- 按住键盘上的**+**键**5秒**，会自动升至**100° C**. 或在**Chemstation**里输入 **100 ° C**.
- 保持流速和温度至少**3个小时**。

G4218A –清洗

Cleaning the detector - factory



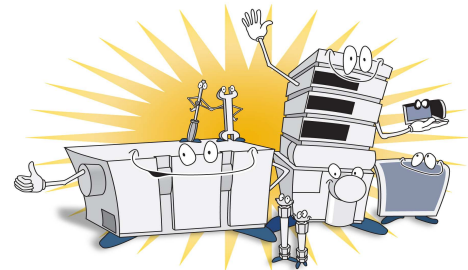
Have detector connected to LC system

The following procedure is used in production for thorough cleaning:

- at 0 minute : 0.1% TFA in water, 2 ml/min, 40°C, 3.5 bar nitrogen
- at 10 minutes : set temperature to 80°C
- at 80°C stabilized : wait 10 minutes
- Set temperature to 40°C and change eluent to water
- At 40°C stabilized : change eluent to ethanol and wait 10 minutes.
- change eluent to water and wait 10 minutes

Suggestion: increase all times to 30 minutes to 1 hour.

G4218A



在**khoo**的教材基础上我加入了自己的经验，完成了这个安装手册，希望能帮助没有参加过**ELSD**培训的工程师也能顺利完成**ELSD**的安装和维修。如有错误请告诉我，马上改正！

Thank you!

