LeadScape Microflow workstation
(LS1/ Zirconium/Optiflow/6500)

Zirconium™
www.prolab.ch/uhplc

Planning/Current State:

LeadScape will bind to Zirconium method editor panel to set up LC gradient
.zrm method will then be treated as a ‘starter method’

Zirconium software will be used directly to create ‘settings’ file (.zrs file)
.zrs file will be imported into LeadScape method

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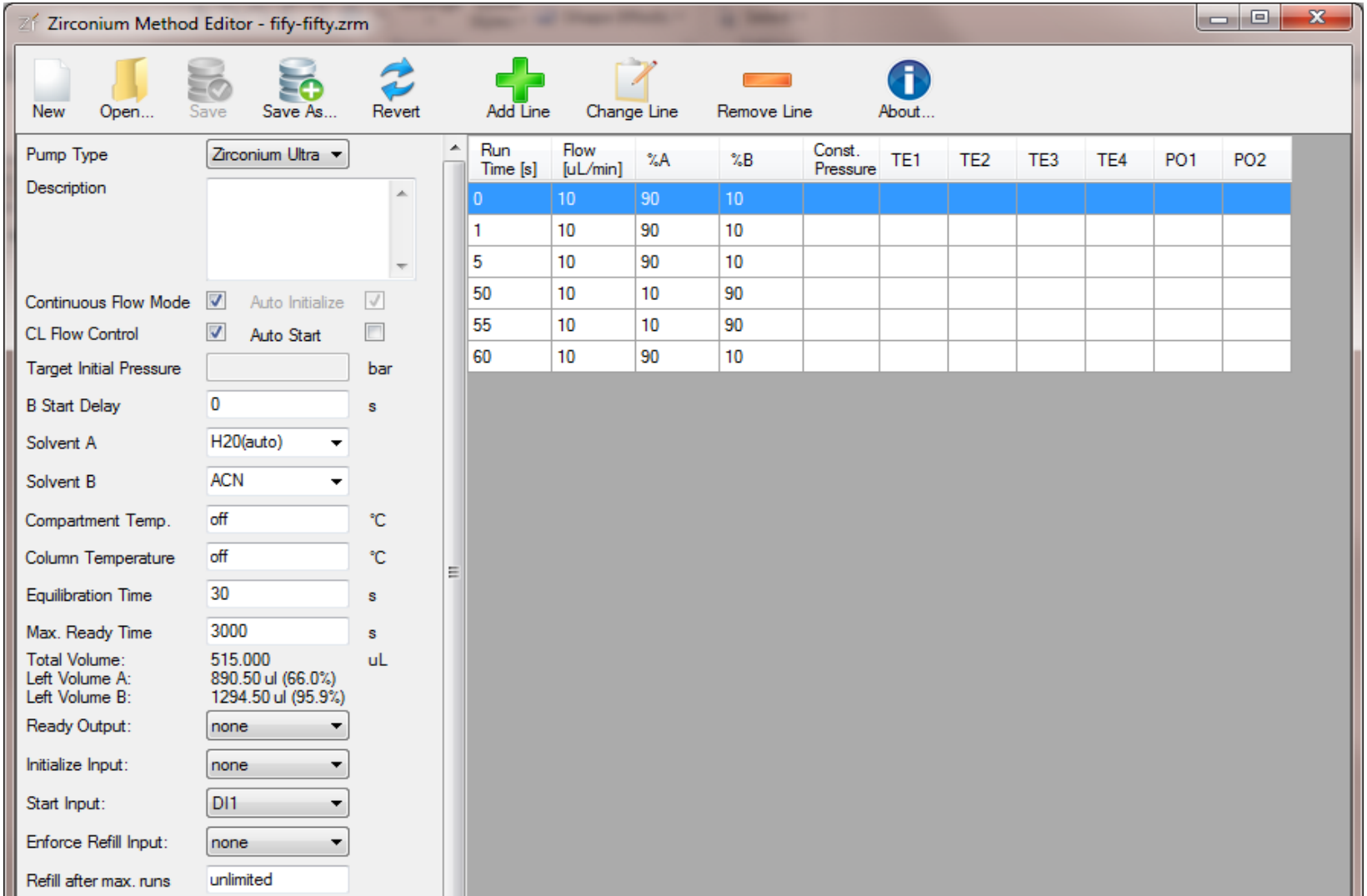
Zirconium Method Editor



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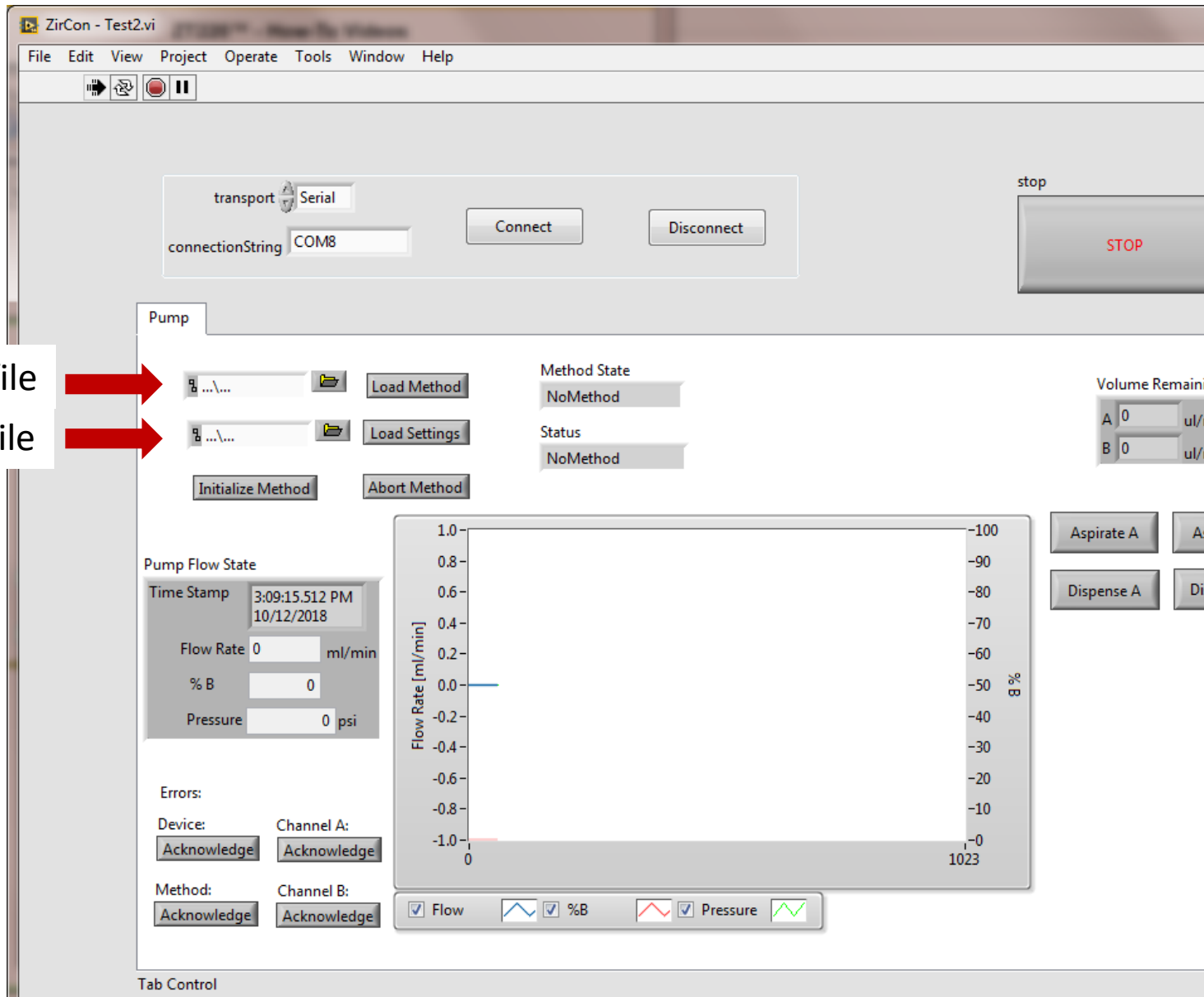
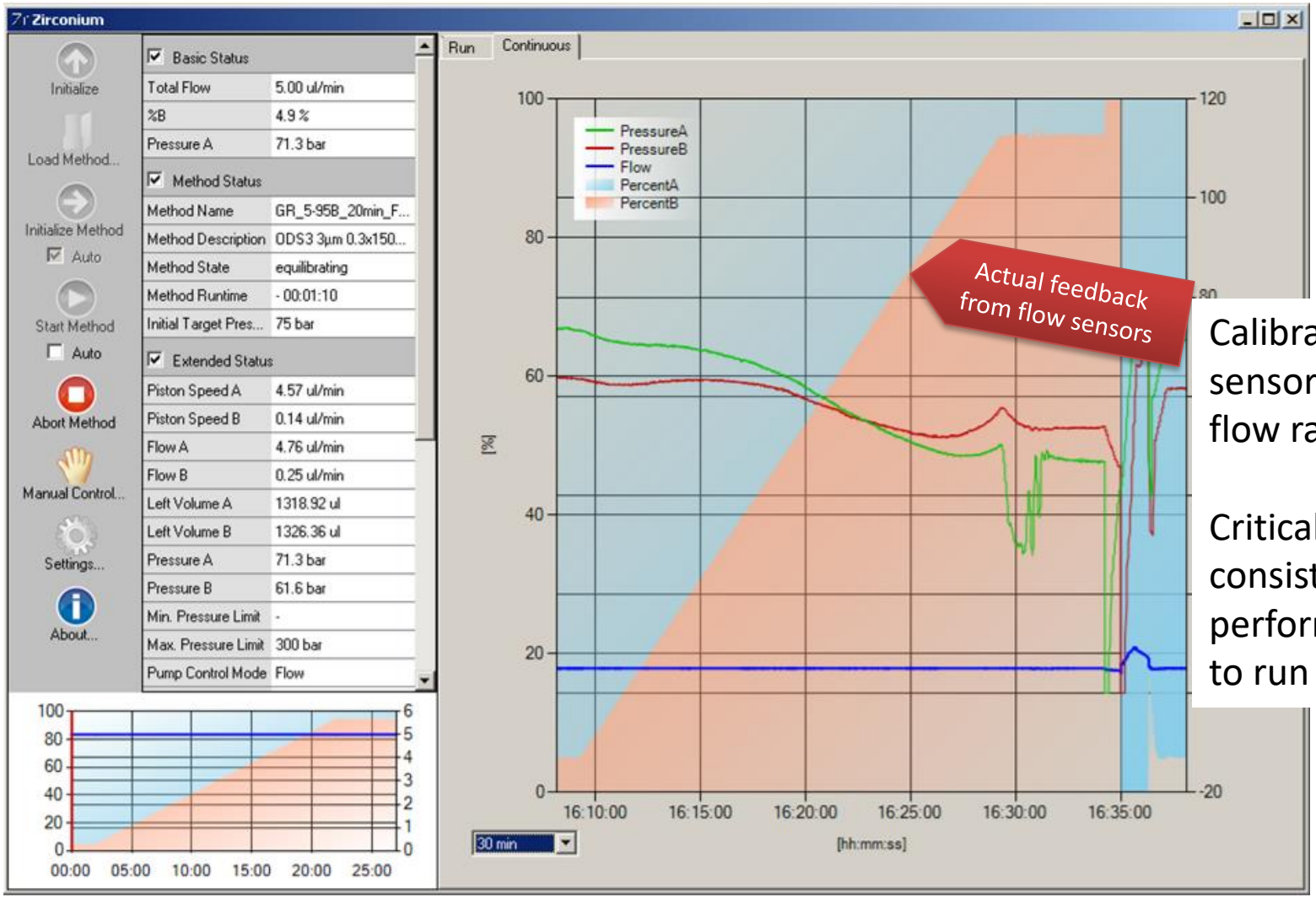
Current Control/testing panel in LeadScape



Flow Controller Performance

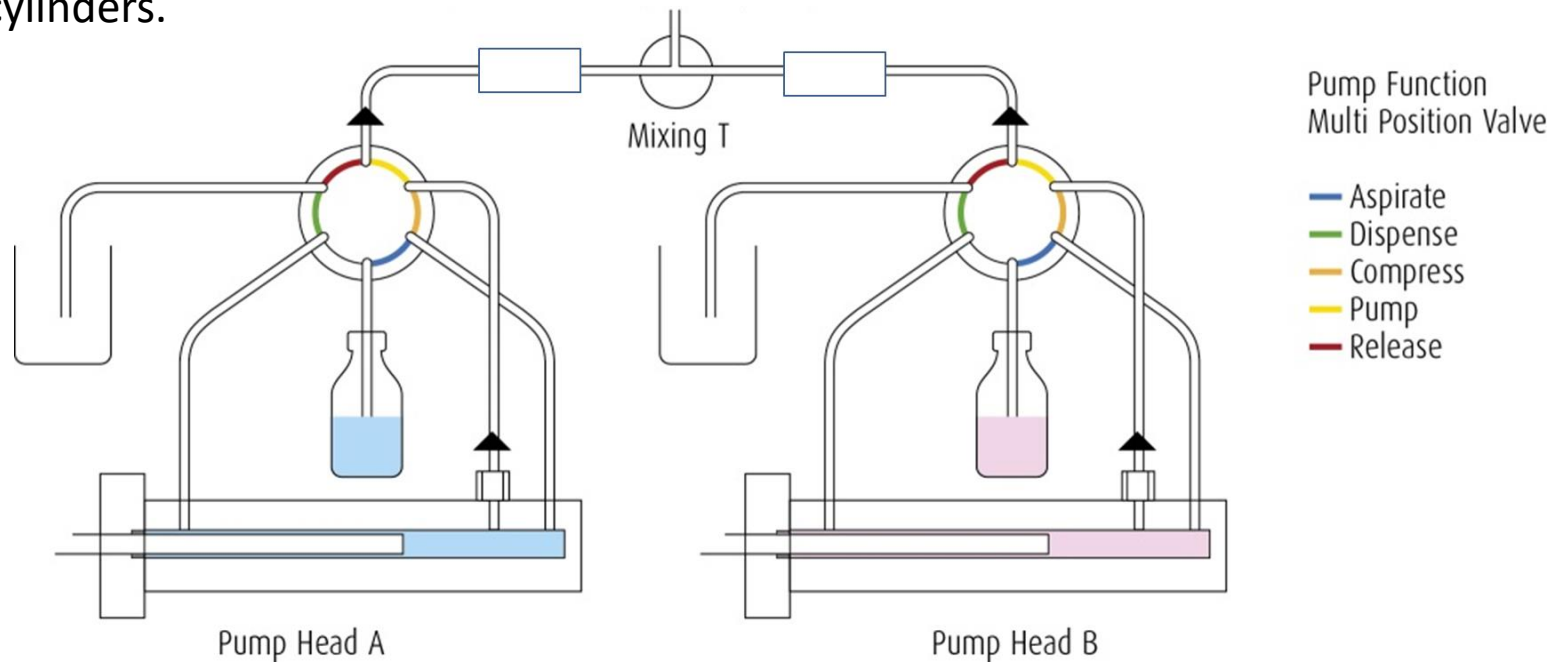


Calibrating the flow sensor is important at flow rate <20 µL/min

Critical for obtaining consistent LC performance from run to run

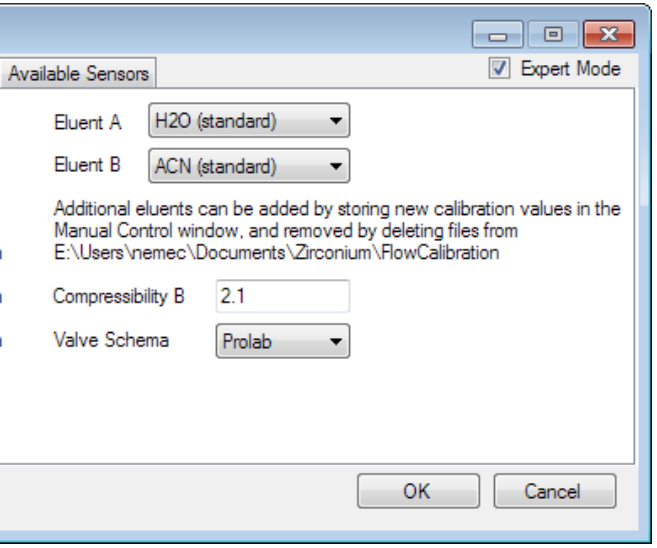
Creating .zrs file (calibrating the flow sensor)

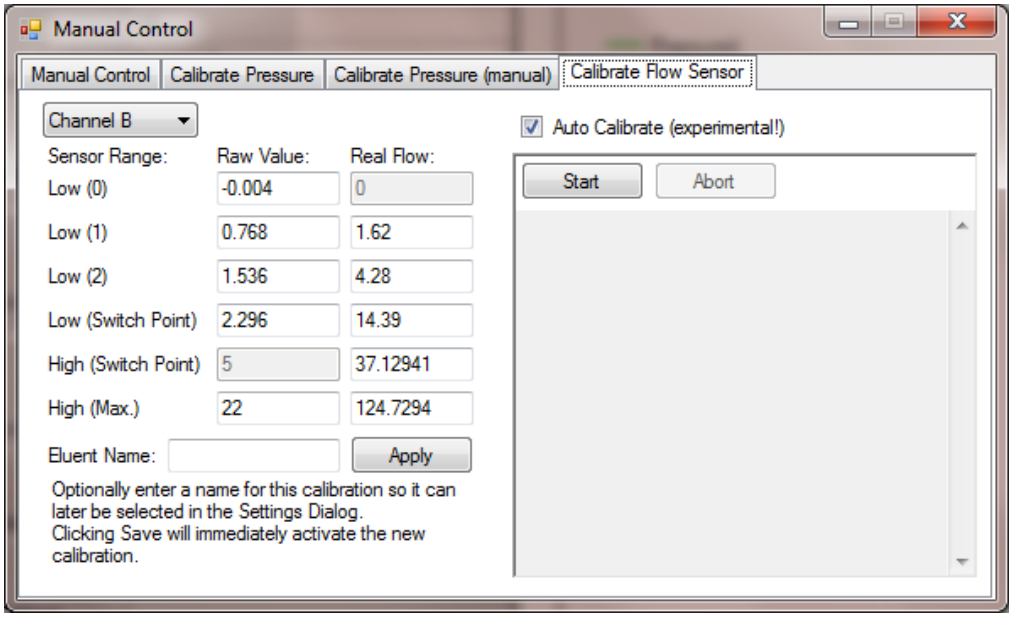
The closed-loop flow control algorithm uses feedback rom two flow sensors placed right before the mixing tee in order to set the target pressures for both pump cylinders.



The temperature-based flow sensors are actually mass flow sensors, and have different calibration curves for different media (they come factory-calibrated for H2O).

Creating .zrs file (calibrating the flow sensor)

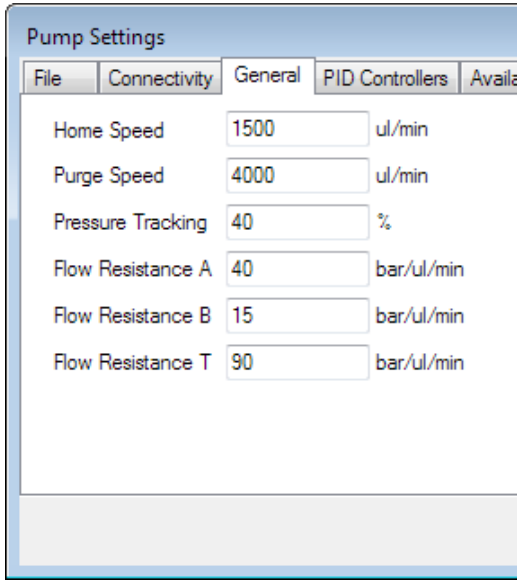




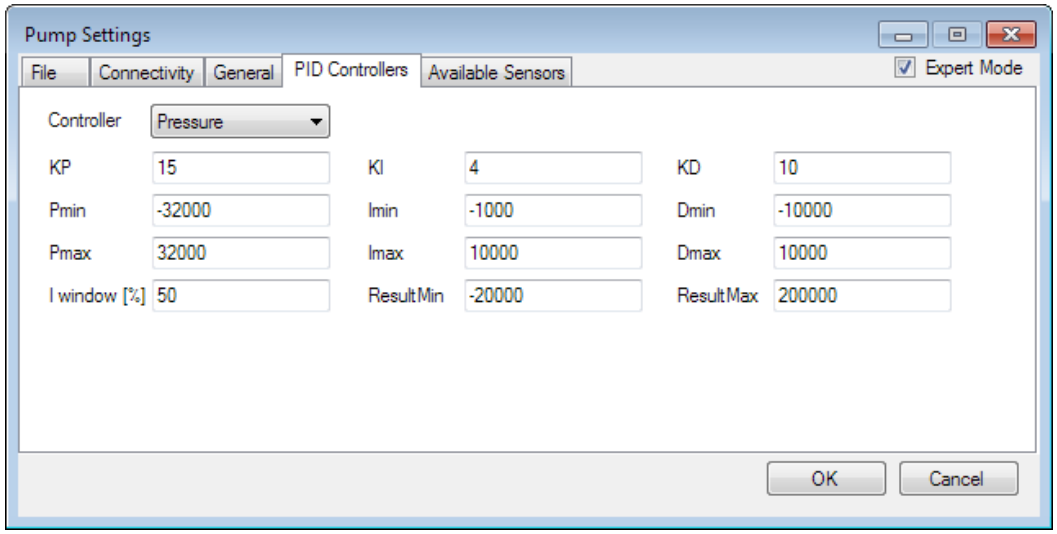
The calibration of each sensor can be selected from a list of default curves for commonly used eluents, or individually set by comparing offset piston volume to measured value of the sensors at different calibration points.

Creating .zrs file (tuning the flow controller)

The flow controller is an algorithm which is based on both channels' current flow values and the known properties of the restriction between the sensors and the mixing tee. In order to determine given pressure changes in each iteration, it needs as configuration values the specific flow resistances on each side of the mixing tee. These depend on the installed capillary dimensions as well as on the eluent.



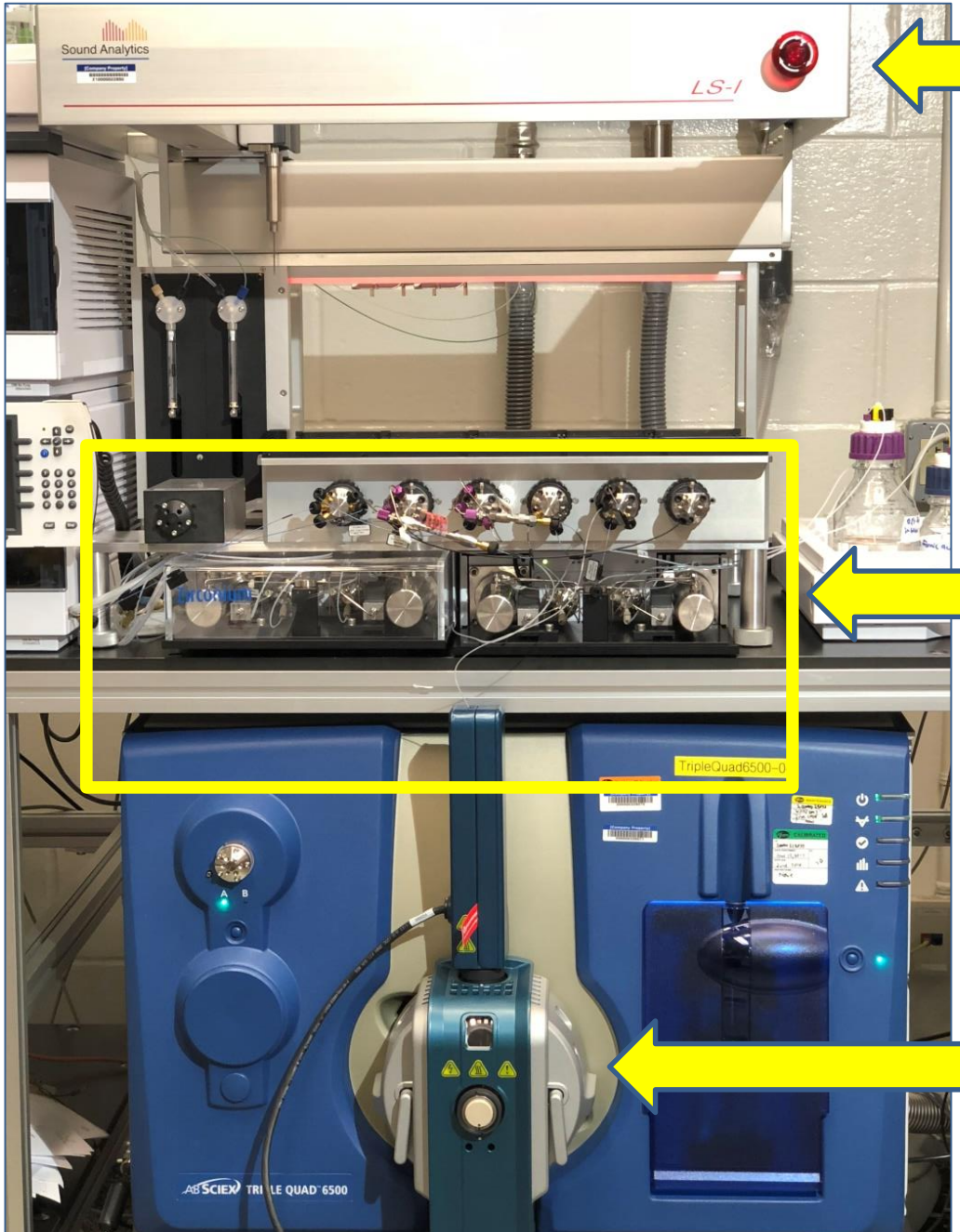
Creating .zrs file (tuning the pressure controller)



The flow of each channel is the result of the exact pressure differences between each pump head and the mixing tee. In order to control each channel‘s pressure, a separate pressure control algorithm is in control of the piston speed.

This is a standard so called PID controller, the parameters of which have to be empirically determined. Default values and example method settings help users quickly find the right values for their method.

LS-1 Microflow Workstation w/ Dual-Prolab Zirconium

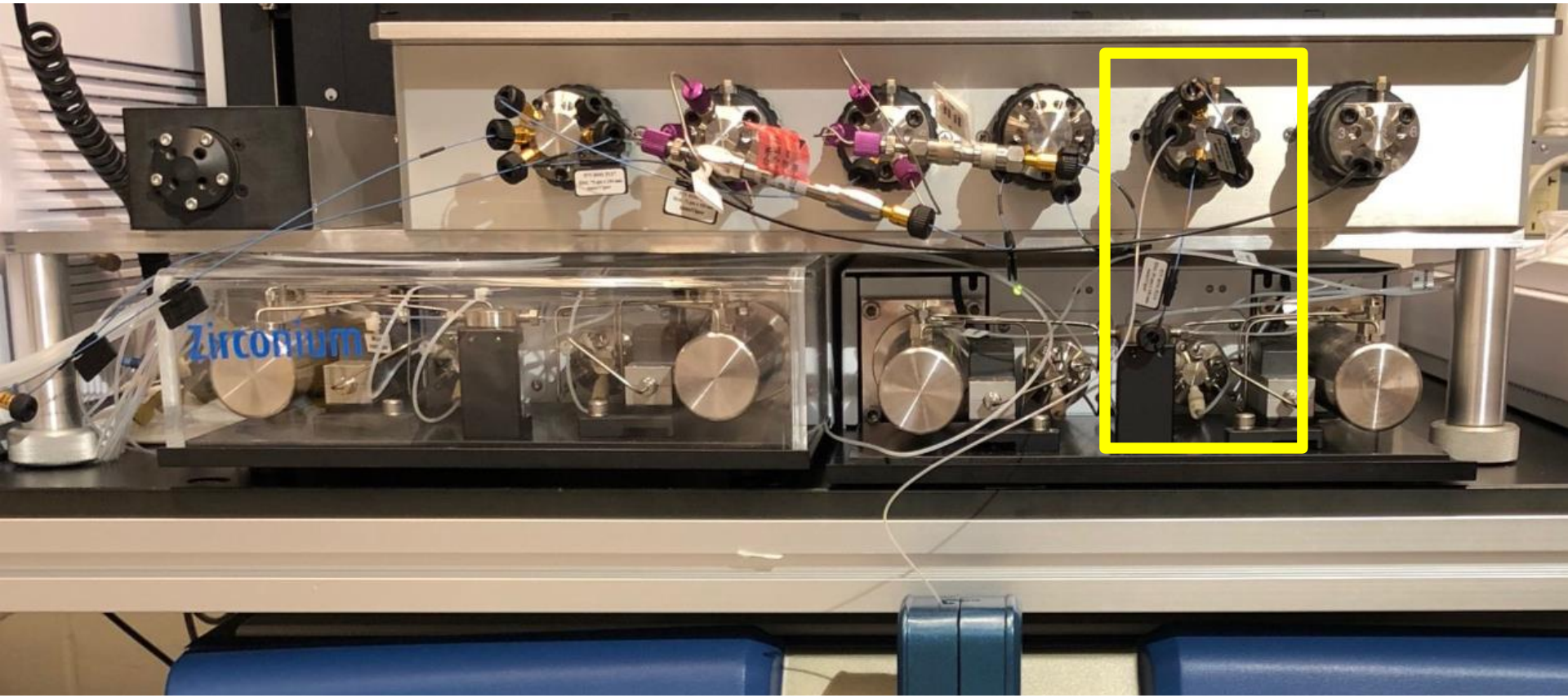


LS-1 (Sound Analytics)

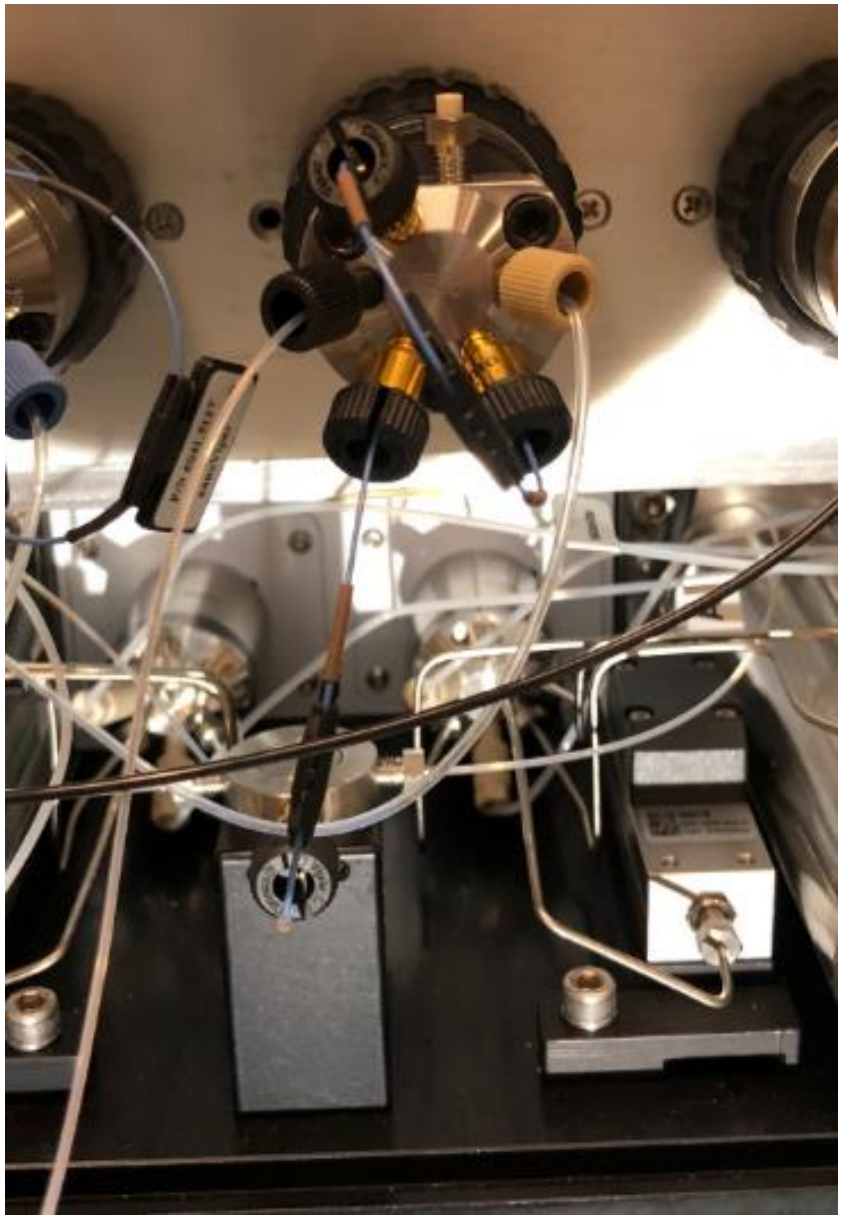
ZIRCONIUM™ UHPLC PUMPS (PROLAB)

OptiFlow source (Sciex)

LS-1/ Zirconium pump/ 6500 : Designed for reduced system volume, leading to exceptional performance and throughput in 1-20 µL/min flow range



LS-1/ Zirconium: Drive down system volume to increase throughput



System volume

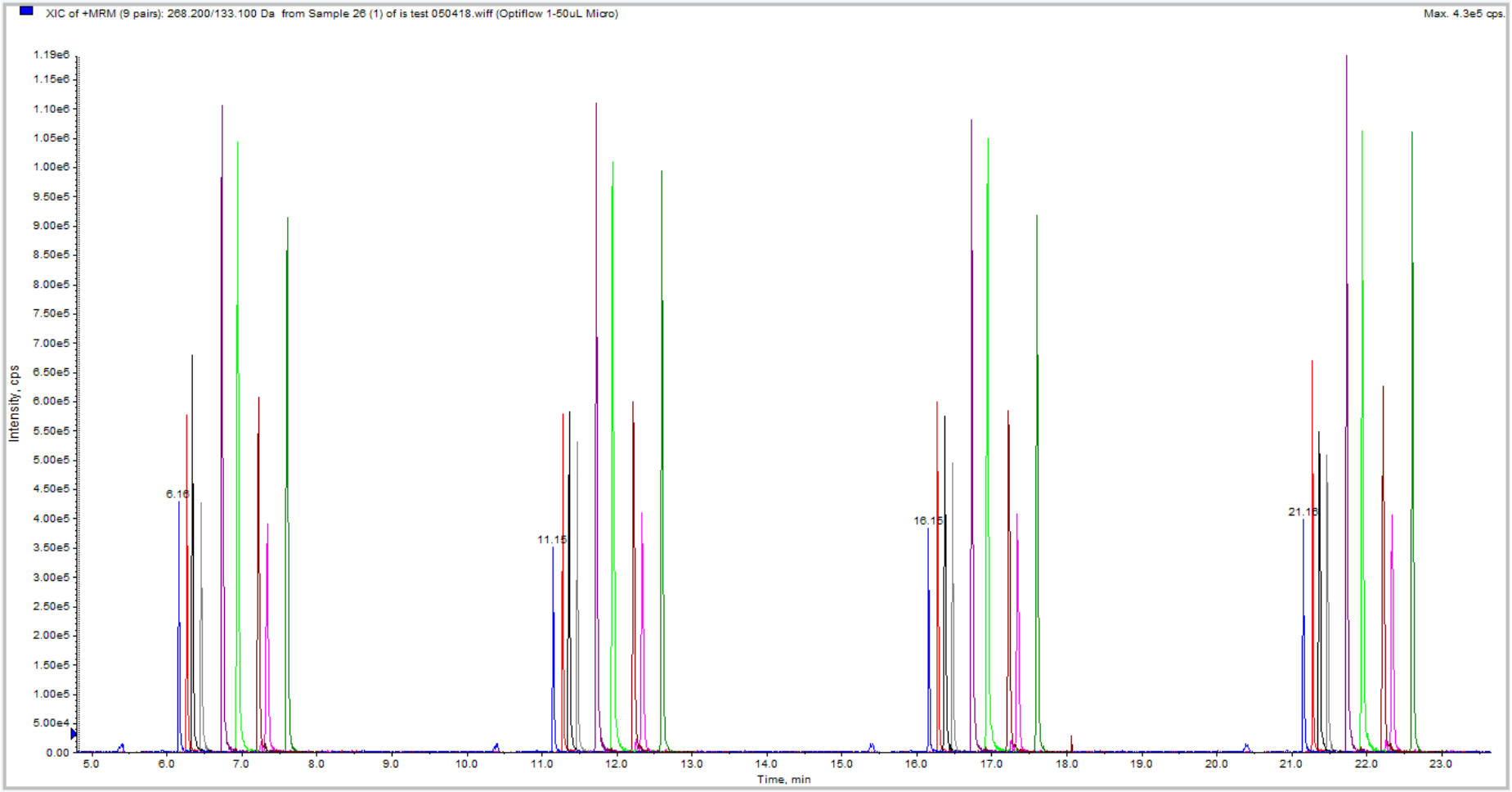
Pre-column
Pump to inj valve: 20µ x 150mm (0.047µL)
Sample loop: 50µ x 150mm (0.29µL)
Inj valve to column: 20µ x 550mm (0.173 µL)

Total Pre-column Volume (including sample loop): 0.51 µL

Post-column
SCIEX SteadySpray electrode, 25µ x 200mm (0.1µL)

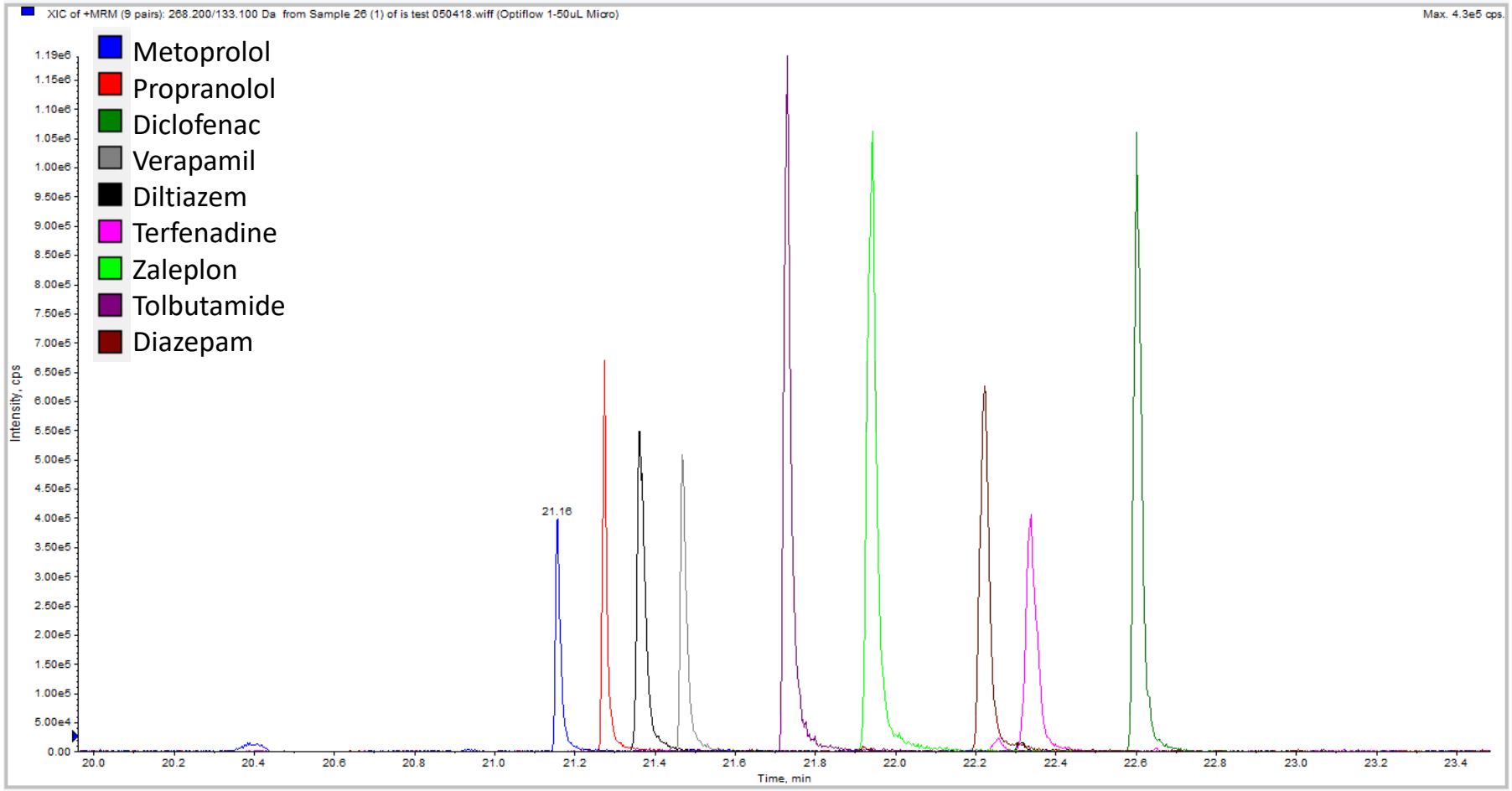
Total system volume: 0.61 µL

LS-1/ Zirconium/Optiflow: 8µL/min, 5min cycle time *



***Courtesy Brendon Kapinos, Pfizer Inc.**

LS-1/ Zirconium/Optiflow: 8µL/min, 5min cycle time*



***Courtesy Brendon Kapinos, Pfizer Inc.**

Luna Omega PS
C18, 3µ, 50X0.3mm
Phenomenex