

AQUATek LVA User Manual

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AQUATek LVA User Manual

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Preface

P.1 Warranty

Refer to www.teledynetekmar.com for the Terms and Conditions of Sale and the Product Warranty. For questions regarding this policy and its application contact Teledyne Tekmar Customer Support using the contact information in Section P.2 "Teledyne Tekmar Customer Support Center".

P.2 Teledyne Tekmar Customer Support Center

U.S. Phone: (800) 874-2004

U.S. Email: tekmarsupport@teledyne.com

International Phone (Outside the U.S.): Country Code + 1 (513) 229-7000

International Email: Tekmar_Intltech@teledyne.com



NOTE

When contacting Teledyne Tekmar Customer Support for troubleshooting, information from the TekLink software "About Dialog" may be requested by a Teledyne Tekmar Customer Support Representative. Select Tools Screen>About Button in the software.

P.3 Essential Instructions



NOTE

It is important that you read this page before proceeding!

Teledyne Tekmar designs, manufactures and tests its products to meet many national and international standards. The AQUATek LVA is a sophisticated technical product and must be properly installed, used and maintained to ensure that it operates within normal specifications. You must adhere to and integrate the following instructions into your safety program when installing, using and maintaining the AQUATek LVA. Failure to follow the proper instructions may invalidate the warranty.

- Read all instructions prior to installing, operating and servicing the product. Follow all warnings, cautions and instructions marked on, and supplied with, the product and this manual. If you do not understand any of the instructions, contact your Teledyne Tekmar Representative for clarification.
- Educate personnel in the proper installation, operation and maintenance of the product. Only qualified personnel should install, operate, update, program and maintain the product.
- Install your equipment as specified in Chapter 2: "Installation and Setup" of this manual and according to applicable local and national codes. Connect all products to the required electrical and pressure sources.

- Only trained service personnel should replace blown fuses, and only after identifying and correcting the problem which caused the fuse(s) to blow. For continued protection, replace only with same type and rating of fuse.
- When replacement parts are required, ensure that qualified individuals use replacement parts specified by Teledyne Tekmar. Unauthorized parts and products can affect the product's performance and jeopardize safety. Using look-alike substitutions may result in fire, electrical hazards or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place (except when maintenance is being performed by qualified personnel) to prevent electrical shock and personal injury.



WARNING

DO NOT OPERATE IN AN EXPLOSIVE ENVIRONMENT OR WET ENVIRONMENTS. NEVER USE HYDROGEN OR OTHER FLAMMABLE GAS. VENTING OF THIS GAS CREATES AN EXPLOSIVE HAZARD.

P.4 Notations and Hazard Severity Levels

This manual uses **Notations** and **Hazard Severity Levels** to emphasize information that is important for instrument functionality and user and instrument safety. The four levels consist of:



NOTE

Note is used for information and descriptions to ensure correct usage to prevent damage of the instrument.



Caution

Cautions identify a potential hazard, which if not avoided, may result in minor or moderate injury. This category can also warn you of unsafe practices or conditions that may cause property damage.



WARNING

Warnings identify a potentially hazardous condition, which if not avoided, could result in death or serious injury.



DANGER

DANGER is limited to the most extreme situations to identify an imminent hazard, which if not avoided, will result in death or serious injury.

P.5 AQUATek LVA Safety Symbols Defined

The AQUATek LVA instrument is labeled in compliance with the marking and nomenclature specified in the UL61010-1Ed. 3 (2012) safety standard. The following symbols and their associated signal words are used in the manual and on instrument labels.

L'instrument AQUATek LVA est étiqueté en conformité avec le marquage et la nomenclature spécifiés dans le standard de sécurité UL61010-1Ed. 3 (2012). Les étiquettes ci-dessous et leurs marquages associés sont utilisés dans le manuel et sur l'étiquetage de l'instrument.

Electrical Hazard!



Risque électrique!

Warning/Caution! A hazardous or potentially hazardous situation that, if not avoided, will result in product and/or property damage and possible injury and/or death.



Danger/Attention! Un risque ou une situation potentielle à risque, qui n'est pas respectée, résultera dans le dommage du produit et/ou des biens et la possibilité de blessures et/ou de mort.

Burn hazard! Hot surface inside. Allow this area to cool before servicing.



Risque de brûlure! Surface chaude à l'intérieur. Attendre le refroidissement de cette zone avant entretien.

Read the Appropriate Documentation!



Lire la documentation appropriée.

Skin Contact Hazard! Use protective gloves and other appropriate PPE.



Risque au contact de la peau. Utiliser des gants de protection ou autres équipements de protection personnel appropriés.

High Pressure Hazard!



Risque de haute pression!

Risk of Eye Injury. Wear safety glasses and other appropriate PPE.



Risque de blessures aux yeux. Porter des lunettes de sécurité et autres équipements de protection personnel appropriés.



Pinch Point Hazard! Keep hands and other appendages away.

Danger d'écrasement! Garder les mains et autres membres éloignés.



Lift Point!

Point de Levage!

P.6 AQUATek LVA Safety Labels



Electrical Ground

Prise de terre

WARNING: Electrical shock hazard. Do not operate without cover.



DANGER: Risque d'électrocution. Ne pas utiliser sans capot.

WARNING: To avoid electrical shock, disconnect supply before changing fuses.



DANGER: Pour éviter le risque d'électrocution, débrancher l'alimentation avant de remplacer les fusibles.

WARNING: For continued fire protection, replace with same type and rating of fuses.



DANGER: Pour prévenir le risque d'incendie, remplacer avec des fusibles de même type et de même caractéristique.

WARNING: Remove the power cable before performing maintenance and/or servicing the instrument.



DANGER: Débrancher le câble d'alimentation avant toutes interventions de maintenance et/ou d'entretien sur l'instrument.

CAUTION: Maximum pressure for pressurization gas is 100 PSI (6.9 bar).



ATTENTION: La pression maximale pour le gaz porteur est de 200 PSI (13.8 bar).

CAUTION: Inlet pressure recommended for pressurization gas is a minimum of 65 PSI to maximum of 100 PSI (4.5 to 6.9 bar).



ATTENTION: La pression d'entrée recommandée pour le gaz échantillonné doit être comprise entre 65 PSI et 100 PSI (4.5 to 6.9 bar).



Power entry module requires:
La puissance de module d'entrée nécessite:
2 IEC 5 x 20 mm fuses
100V - 240V operation
T 2.5A - 250v

P.7 Working Safely



DANGER

If the equipment is used in a manner not specified herein, the protection provided by the equipment may be impaired!

The AQUATek LVA weighs 31.75 kg (70 lbs). If this weight exceeds your lifting ability, lift and position the AQUATek LVA with two people. Lift and position the AQUATek LVA using the designated lift points.

Route tubing drain lines to slope downward only. Do not extend tubing into the waste bottle more than 7 - 13 cm (3" - 5"). Failure to follow these directions may result in improper drainage of the AQUATek LVA.



Please be aware that if the AQUATek LVA, its components, and/or accessories are used in a manner not specified by Teledyne Tekmar, protection by the equipment may be impaired.

Only use replacement parts supplied or approved by Teledyne Tekmar when performing maintenance on the AQUATek LVA. Use of unapproved parts could result in damage to the instrument, as well as personal injury.

Running an improper method may damage the AQUATek LVA. Setting up a new method should be performed by personnel who are properly trained, knowledgeable and well acquainted with the AQUATek LVA.

Ensure that the installation location allows the AQUATek LVA to be easily turned off and the power cord disconnected, in the event of an emergency.

The circuit used to power the AQUATek LVA should be protected by a Certified/Listed 15/20 Circuit Breaker for short circuit protection.

Do not plug the AQUATek LVA into an extension cord. An extension cord may overheat and cause a fire.



Only replace the AQUATek LVA mains supply AC power cable with a UL listed cable of the same current and voltage rating.

Ensure the power cable is routed away from, and is not capable of contacting, any hot surface.

Only replace fuses with those of the same type and rating. Refer to Section 6.8 "AQUATek LVA Power Entry Module Fuse Replacement".

To avoid the risk of fire and maintain optimum instrument performance, install the AQUATek LVA on a non-flammable surface and maintain a minimum 15.24 cm (6") perimeter around the unit that is unobstructed by flammable material or other equipment.



NEVER use hydrogen or other flammable gas with the AQUATek LVA. Venting of this gas creates an explosion hazard. Follow the manufacturer's directions for safe handling of gas and chemicals. Also refer to the Safety Data Sheets (SDSs) for information on specific chemicals.



To avoid injury to yourself or damage to the AQUATek LVA, do not exceed the recommended pressure settings. Observe safety regulations when handling pressurized gas. For more information see Matheson™ Gases Data Book (available from the Matheson Company, East Rutherford, New Jersey).



Sample and associated waste may contain hazardous and toxic substances. Follow the proper safety and health practices, as well as anticipating all regulatory limitations before using or disposing of chemicals.



To avoid electrical shock:

- The interior of the instrument is an electrical shock hazard. Do not operate without the panels, covers and guards installed. To avoid electrical shock, turn OFF and unplug before servicing.
- Plug the power cord into a properly grounded outlet.
- Be alert for environmental, shock or other hazards in the event that tubing or any other liquid bearing object in the instrument bursts on the inside of the instrument. Before cleaning up, unplug the instrument and determine the nature of the liquid that was spilled. Use extreme caution and apply the appropriate clean-up procedures.

Pinch Point Hazard! The horizontal path of the autosampler arms and the vertical path of the sample needle are pinch point hazard areas. While the instrument is powered on and operating, keep hands and appendages away from these areas.





Risk of Eye Injury. Wear safety glasses and other appropriate PPE. It is recommended that safety glasses be worn at all times in the presence of pressurized gases.

This instrument contains heated components. Touching any heated zone during the operation of the instrument can cause a burn. The water heater will be activate when its setpoint is above actual temperatures. Keep all instrument panels fastened when operating the AQUATek LVA. To prevent injury, allow areas with this label to cool before servicing.



P.8 Electromagnetic Compatibility (EMC)

This product has been tested for Electromagnetic Compatibility (EMC). The instrument does not emit levels of EM energy that cause electromagnetic interference (EMI) in other devices in the vicinity.

P.8.1 South Korea EMC Declaration

Class A EMC Declaration

Warning: This equipment has been evaluated for its suitability for use in commercial environment. When used in a domestic environment, there is a risk of radio interference.

사용자안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다 .
※ 사용자 안내문은 “ 업무용 방송통신기자재 ” 에만 적용한다 .

P.9 Explanation of Regulatory Marks

P.9.1 Unit Disposal

The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste, in compliance with the European Waste Electrical and Electronic Equipment Directive (WEEE, 2002/96/EC).



Please contact Teledyne Tekmar or your local distributor for instructions on returning the system for proper disassembly and disposal. Contact Teledyne Tekmar Customer Support.

P.9.2 CE Mark



The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.

AQUATEk LVA User Manual

Chapter 1: Introduction

The AQUATEk LVA is a microprocessor-controlled purge and trap autosampler that automates the sample preparation steps for Purge and Trap (P&T) analysis of liquid samples. The system is capable of preparing samples such as drinking water and wastewater and transfers liquid sample aliquots from the vial to the sparger of the Lumin or Stratum Purge and Trap (P&T) concentrator. The AQUATEk LVA interfaces directly to the P&T concentrator and allows for complete automation of sample preparation for liquid samples including: vial handling, sample volume measurement, internal standard injections, sample transfer to the concentrator and rinse/clean-up between samples.

The AQUATEk LVA offers all the capabilities required for compliance with US EPA methods for the analysis of volatile organic samples, including a true closed-system technique for sample handling and vial cooling. This ensures sample integrity during the sample preparation process and greatly minimizes the loss of volatile organic compounds (VOCs).

Figure 1-1 AQUATEk LVA with Lumin P&T Concentrator on Top



1.1 AQUATek LVA Specifications

For additional information on installation requirements refer to Chapter 2: "Installation and Setup".

Table 1-1 General Specifications	
Part Number - 15-3800-000	AQUATek LVA (100-240 VAC) Universal Voltage with Vial Chilling
Dimensions	Height: 64.3 cm (25.3") Width: 54.9 cm (21.6") Depth: 66.8 cm (26.3")
Weight	31.75 kg (70 lbs)
Environmental Specifications	Operating Temperature: The system is capable of operating in lab temperatures between 10 °C and 30 °C (50 °F and 86 °F). Relative Humidity: 10% to 90%
Corrosion	The front cover and autosampler vial rack are corrosion resistant to waters within a pH range of 1-10.

Table 1-2 Performance Specifications	
Sample Types	Liquid samples, including drinking water and wastewater; liquid samples containing up to 15 mm of sediment when measured from the bottom of an upright 40 mL vial.
Sample Capacity	84 Positions for 40 mL VOA vials.
Vial Size	Nominal 40 mL capacity, single hole cap with PTFE-faced silicone septum, per US EPA specifications; 3-3/4" (9.5 cm) high without cap and septum; 1-1/16" (2.7 cm) OD; 24 mm ID cap for water sampling.
Vial Sampling Device	XYZ Robotics with septum piercing needle.
Maximum Concentrator Sample Concentration	1 ppm. High level samples should be pre-screened with HT3 or Versa Headspace Sampler.
Vial Cooling	Chilling plate cools sample vials to 4 °C (39.2 °F) as defined by most US EPA Methodologies (requires and external recirculating bath).

Table 1-3 Methods, Applications and Certifications	
Official Methods	US EPA 502.1, 502.2, 524.2, 524.3, 524.4, 503.1
	US EPA 601, 602, 603, 624
	US EPA 8010, 8015, 8020, 8021, 8030, 8240, 8260
	ASTM and Standard Methods
	Massachusetts VPH and GRO Methods
Applications	Environmental, Food and Beverage, Pharmaceutical, Flavor/Fragrance and Petrochemical
Certifications	Certifications are listed on the Declaration of Conformity (DOC). The DOC is included with the instrument, in the shipping box.

Table 1-4 Liquid Samples	
Blanks	Automatic blanks can be pulled from the DI water reservoir and spiked with standard/surrogate allowing all autosampler positions to be used for samples.
Vial Cooling (Standard Chiller Tray)	Cools samples to 4 °C (39.2 °F) as defined by most US EPA methodologies (requires an external recirculating cooling bath available from Teledyne Tekmar).
Cooling Bath Connection	Inlet and outlet hose connections require 1/4" (0.64 cm) ID rubber tubing and hose clamps.

Table 1-5 Internal Standard Injection	
Internal Standard Injection Systems	Two standard injection systems utilizing 2-way dosing valves mounted on an internal valve manifold.
Capacity	Up to 20 µL in 1 µL, 2 µL, 5 µL, 10 µL and 20 µL increments.
Precision and Accuracy	< 10% RSD measured by GC/MS for Fluorobenzene and Bromofluorobenzene, (n=7) based on 5 µL injection volume.
Consumption	1 µL per 1 µL injection.
Standard Vessels	Two 15 mL standard vessels, UV-protected for added standard stability. Standard vessels are sealed under pressure for standard concentration integrity.

Table 1-6 Liquid Handling	
Sample Liquid Handling	Sample loop dispenses fixed volumes of water determined by the installed sample loop. Sample loops are available in 5, 10, 20 and 25 mL volumes.
Sample Precision	< 1% RSD (n=7 @ 5 mL delivery volume measured by weight).
Sample Liquid Path	Glass, PEEK, PTFE, EPDM and Ultem® for solenoid valve manifold. 1/16" (0.16 cm) OD PEEK tubing for liquid transfer.
Water Supply	Requires use of a pressurized blank DI water reservoir (included).
Cleaning	The entire liquid sample pathway can be rinsed using a high-temperature DI water rinse (US Patent 6,280,688) cleaning technique. User defined rinse volume for the needle and glassware.

Table 1-7 Pressurization Gas Handling and Requirements	
Pressurization Gas Requirements	Ultra-high purity (99.999%) nitrogen or helium.
Incoming Pressurization Gas Pressure	65 - 100 psi (4.48 bar - 6.89 bar).
System Pressurization Gas Pressure	7 psi (0.06 bar).
Pressurization Gas Pathway	1/16" (0.1 cm) and 1/8" (0.32 cm) OD PEEK tubing; 1/8" (0.32 cm) OD PTFE tubing.
Internal Pressure Regulator	Regulates pressure to the internal standard vessels as well as the pressure sweep modes (i.e. Presweep A and B), sample transfer, bake rinse transfer and the DI water reservoir.

Table 1-8 Electrical Requirements	
Voltage Requirements	100-240 VAC +/- 10%, 50/60Hz, 2.5A, 300W
External Circuits	The circuit used to power the AQUATek LVA should be protected by a Certified/Listed 15/20 Circuit Breaker for short circuit protection. The AC Power Cable supplied with the AQUATek LVA is compliant with applicable safety standards. Supplied RS-232 communication cable is of proper type jacketing.

Table 1-9 Computer Requirements and System Control Specifications

Operating System	TekLink software in a Windows® 7 or greater environment via USB. Windows® 10 is recommended.
Instrument Control	TekLink software via USB cable to the concentrator and RS-232 communication cable to the AQUATek LVA.
Language	TekLink can easily be translated into any language via single file modification.
Method Storage	Infinite method storage including pre-programmed default methods.
Method Scheduling	Water samples can be run from any position in the sample sequence. Up to two internal standards can be added to any user-specified position. Multiple runs can be made from the same vial (not recommended).
System History	The system records a complete history of all sample, schedule, method, instrument and error information.
Revision Control	The system records and saves changes to methods, schedules and configurations. The revision number is shown on the printed method or schedule.

Table 1-10 Valving

Solenoid Valves	Six 24 VDC rocker style valves, mounted on an Ultem Manifold.
Standard Addition Valves	Two 24 VDC dosing valves mounted on the Ultem Manifold.

Table 1-11 Heaters and Temperatures

Hot Water Heater	Variable heat control from 35 °C to 90 °C (95 °F to 194 °F).
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Table 1-12 Built-in System Tests and Diagnostics

Electronic Leak Check	Ability to leak check the sample pathway of the system via an automated system leak check process.
Benchmark Test	The system has a mode that will allow for full electromechanical testing including: valving, heater, vial handling system, liquid delivery system, inputs and outputs.
Diagnostics	The system offers independent control of all valves and vial handling systems for troubleshooting.
Unit Status Light	The unit status light indicator changes color to indicate standby, schedule running and error states.


NOTE

For pH probe specifications refer to 5.1 "pH Probe Specifications".

1.2 AQUATek LVA Component Overview

Table 1-13 AQUATek LVA Components

Component	Function
XYZ Robotic Arm	Positions the sample needle over the vials for sampling.
Rinse Station	Used for rinsing of the sample pathway and sample needle. The rinse station is attached to a gravity fed drain line.
Unit Status Light	Indicates standby, schedule running and error states.
Sample Pathway	An inert sample pathway with treated fittings.
Sample Needle	A 2-stage sample needle that displaces sample from the vial to the sample loop (versus aspirating per US EPA methodologies).
Vial Chiller Plate	Allows sample vials to be held at temperatures down to 4° C (39.2 °F) until they are sampled.
Solenoid Valves	Valves mounted on the valve manifold and actuated according to the mode.
24VDC Power Supply	Supplies 24V Direct Current (DC) to the AQUATek LVA valves and motors.
5VDC Power Supply	Supplies 5V Direct Current (DC) to the AQUATek LVA Printed Circuit Boards (PCBs).
CPU Communication Board (Master Board)	Communicates to the concentrator and controlling PC via the RS-232 data communication cable. Also responsible for control of the optional pH probe, if installed.
Multi-Channel Temperature Control Board	Responsible for control of the water heater.
DC Valve Control Board	Actuates the AQUATek LVA solenoid valves.
Banner Display Board	Controls the status indicator LED.
Internal Standard Valve Control Board	Controls the two standard injection system 2-way dosing valves mounted on a valve manifold.
XYZ Interface Board (Sidekick)	Responsible for communications between the XYZ Control Board (Incrediboard) and the autosampler arm.
XYZ Control Board (Incrediboard)	Controls all autosampler movements.
RS-232 Data Communication Cable	Conveys TekLink commands on the controlling PC to the AQUATek LVA via the concentrator.

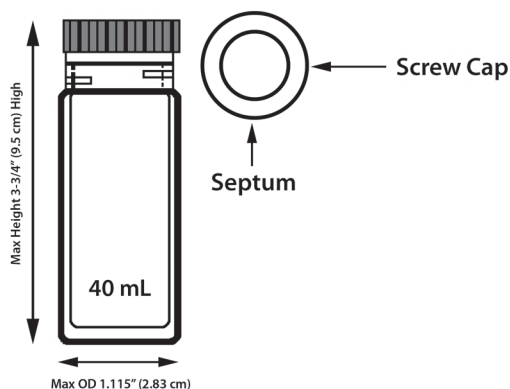
1.2.1 Vials

The standard US EPA-approved 40 mL glass vial is commonly used for environmental samples. Vials should have a nominal 40 mL capacity, single hole cap with PTFE-faced silicone septum (per US EPA specifications), measure 3-3/4" (9.5 cm) high without cap and septum and have an Outside Diameter (OD) of 1-1/16" (2.7 cm).



Vials cannot exceed 1.115" (2.83 cm) OD including labels.

Figure 1-2 Maximum Vial Dimensions



1.2.2 System Pressure Regulator

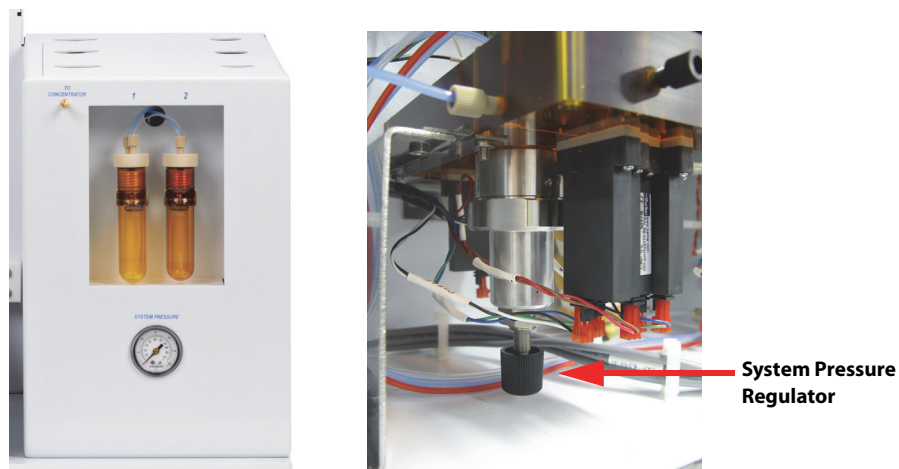
The AQUATek LVA has a standard pressure regulator located on the solenoid valve manifold. The standard pressure regulator regulates the pressure sweep modes (i.e. Presweep A and B), Sample Transfer, Bake Rinse Transfer, DI water reservoir and internal standard vessel pressure. The regulator pressure setting is displayed on the gauge mounted on the front panel of instrument.

1.2.3 Internal Standard Vessels

The AQUATek LVA is equipped with two 15 mL amber internal standard vessels. The amber color prevents transmission of UV radiation, preserving standard integrity. The vessels are sealed with a PEEK cap to prevent adsorption and contamination of the standard solution. From left to right the standard vessels are referred to as STD1 and STD2.

Each standard vessel is pressurized to 7 psi (system pressure) and can deliver spikes of 2 µL, 5 µL, 10 µL or 20 µL to each sample. Each standard vessel has a maximum spike volume of 20 µL, but 40 µL can be added to each sample, if both standards are used.

Figure 1-3 IS Vessels, System Pressure Regulator and Pressure Gauge



1.2.4 Sample Loop

The AQUATek LVA is equipped with a fixed volume PEEK sample loop. Sample loops are available in 5, 10, 20 and 25 mL volumes. The sample loop is filled with liquid sample from the sample vial using positive pressure displacement.

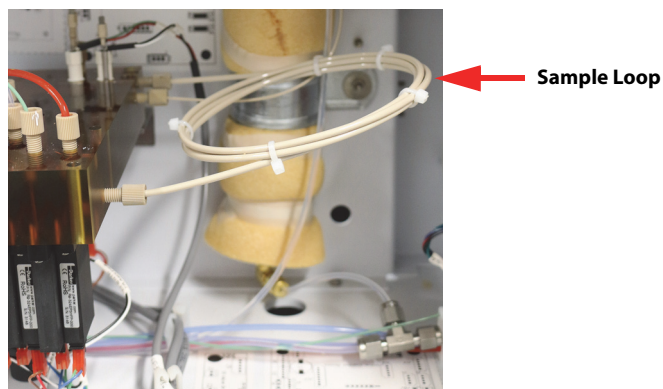


NOTE

Sample Loop Time (Pressurization Time) on the AQUATek LVA Tab must be long enough to fully fill the sample loop. If the time is too short, the volume will be inaccurate.

The loop is connected to the solenoid valve manifold to allow for the sample volume to be swept to the concentrator for analysis and to allow for cleanup of the loop between samples via hot water rinsing and an inert gas sweep.

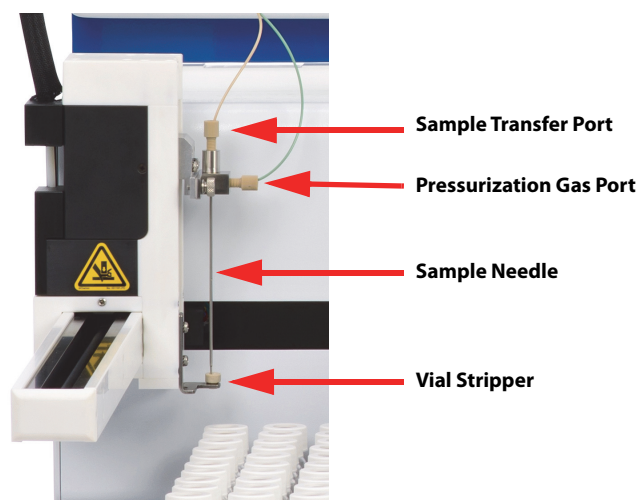
Figure 1-4 Sample Loop



1.2.5 Sample Needle and Vial Stripper

The AQUATek LVA uses a 2-stage sample needle to displace sample from the vial to the sample loop. The 2-stage needle displaces liquid samples from the vial versus aspirating per US EPA methodologies. The vial stripper forces the sample vial off of the 2-stage sample needle when the needle is moved back to the up position.

Figure 1-5 Sample Needle



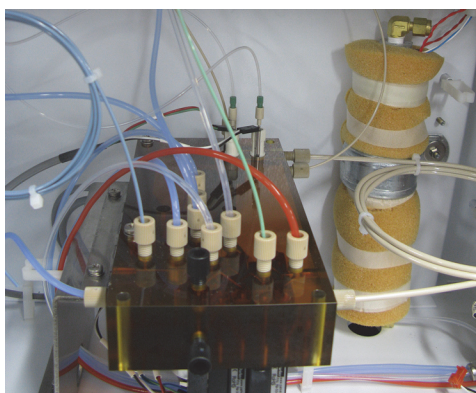
1.2.6 Valving

The AQUATek LVA contains the valves shown in Table 1-14 "Valve Overview". The internal standard pressure regulator is also located on the valve manifold.

Table 1-14 Valve Overview	
Solenoid Valves	Six 24 VDC rocker style valves
Standard Addition Valves	Two 24 VDC dosing valves

Solenoid Valves

Figure 1-6 AQUATek LVA Valve Manifold



The manifold contains the following valves:

- Sample Valve (A)
- Drain Valve (B)
- Transfer Valve (C)
- Pressurize Valve (D)
- Water Valve (E)
- Pressure Select Valve (F)

1.2.7 XYZ Robotic Arm

The AQUATek LVA uses a three-axis robotic arm assembly to position the 2-stage sample needle over the sample vials and rinse station. The needle then moves up and down to puncture the vials and lower into the rinse station drain.

Figure 1-7 XYZ Robotic Arm



1.2.8 Status Light

The AQUATek LVA rhomboid status light changes color to indicate the instrument's state. The status related to each color is shown in Table 1-15 "Status Light Indications". The Teledyne rhomboid logo is lit using an LED board behind the panel.

Figure 1-8 Status Light

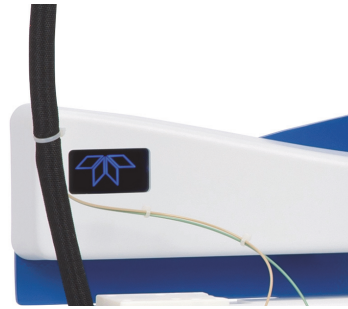


Table 1-15 Status Light Indications	
Color	Indication
Blue	Standby
Green	Schedule Running
Red	Error

1.2.9 Rinse Station

The rinse station allows the needle to be rinsed completely before each sample and is connected to a gravity fed drain line. The needle is positioned in the rinse station in all modes other than sample fill, standby and purge ready modes. Its function is especially important during the loop and needle rinses, draining rinse water and extra sample from the needle.

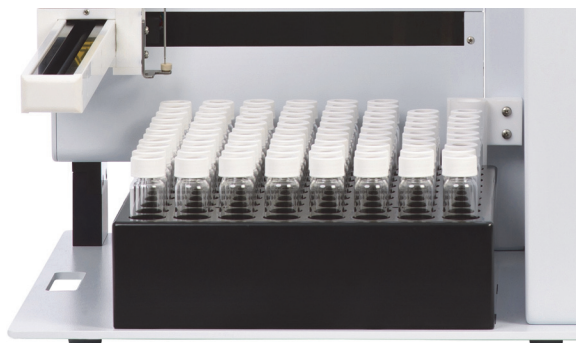
Figure 1-9 Rinse Station



1.2.10 Autosampler Vial Rack

The 84-position vial tray is removable and sits over the vial chiller plate.

Figure 1-10 Autosampler Vial Rack



1.2.11 Vial Chiller Plate

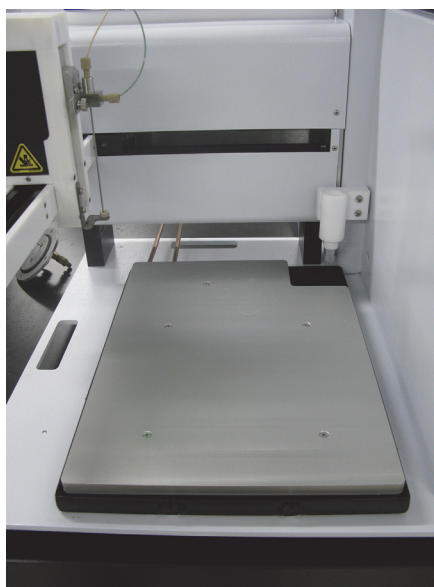
The AQUATek LVA is equipped with a chilling plate (installed beneath the autosampler vial rack) that allows sample vials to be held at temperatures down to 4 °C (39.2 °F) until they are sampled. The vial chiller requires connection to a recirculating cooling bath (available through Teledyne Tekmar). The vial chiller drain should be routed to a suitable waste container.



NOTE

A hydrophobic vial label rated for sub-ambient applications is recommended when the chiller is in use.

Figure 1-11 Vial Chiller Plate



1.3 Optional Accessories

1.3.1 pH Probe (AQUATEk LVA)

The AQUATEk LVA can be configured with an optional pH probe capable of measuring the pH of samples during desorb mode. In the TekLink software the sample schedule pH COLUMN is updated with the sample pH value. Recording the pH value confirms that samples have been preserved at the proper pH, according to US EPA method protocol.

AQUATek LVA User Manual

Chapter 2: Installation and Setup

2.1 Pre-Installation

2.1.1 Overview

This section contains information on AQUATek LVA:

- Pre-installation requirements including electric, gas and software/computer.
- Unpacking and checking for shipping damage and/or missing items.
- Primary component overview.
- Installation procedures including gas, electrical, liquid and data connections.
- Installation procedures for connecting the Lumin or Stratum purge and trap concentrator to the AQUATek LVA.



NOTE

Concentrator specific installation and set-up procedures are contained in their respective Concentrator User Manual.

- TekLink software configuration (Lumin or Stratum).
- Preparation of DI water and internal standards.
- Preparation of the system for analysis.



NOTE

For liquid and gas connection procedures, refer to Section 6.2 "How to Make Gas and Liquid Connections".

2.1.2 Operating Environment

The AQUATek LVA operates at temperatures between 10 °C and 30 °C (50 °F and 86 °F) with humidity levels between 10% and 90%. These temperatures and humidity levels are consistent with a standard lab environment.



NOTE

To avoid material and/or component damage, keep the AQUATek LVA away from corrosive substances.

2.1.3 Work Surface Requirements

The AQUATek LVA is 64.3 cm (25.3”) high, 54.9 cm (21.6”) wide, 66.8 cm (26.3”) deep and weighs 31.75 kg (70 lbs).

Because the AQUATek LVA is designed to have the Lumin or Stratum Purge and Trap (P&T) concentrator placed on top of the unit to save bench space, consider the combined dimensions and weight of both units when selecting a location.

- The Lumin and AQUATek LVA have a combined weight of 44.0 kg (97 lb) and a combined height of 81.3 cm (32”).
- The Stratum and AQUATek LVA have a combined weight of 46.3 kg (102 lb) and a combined height of 87 cm (34.25”). The Stratum requires additional vertical clearance to raise the hinged top cover.

Ensure the work surface where the AQUATek LVA and concentrator is placed is capable of supporting the total combined weight, has a clear surface area with no shelves or overhanging obstruction and allows the unit to sit firmly and evenly on the surface.



NOTE

The concentrator can be placed next to the AQUATek LVA, but care should be taken when routing cables and the aqueous transfer line to avoid interference with the autosampler arm.



WARNING

To avoid the risk of fire and maintain optimum instrument performance, install the AQUATek LVA on a non-flammable surface and maintain a minimum 15.24 cm (6”) perimeter around the unit that is unobstructed by flammable material or other equipment.



WARNING

Ensure that the installation location allows the AQUATek LVA to be easily turned off and the power cord disconnected, in the event of an emergency.

2.1.4 Electrical Requirements

After selecting a location for the AQUATek LVA, check the availability of the required grounded outlets. The AQUATek LVA requires:

- 100- 240 VAC +/- 10%, 50/60Hz, 2.5A, 300W
- One grounded, three-pronged receptacle for the main power cord.



WARNING

The circuit used to power the AQUATek LVA should be protected by a Certified/Listed 15/20 Circuit Breaker for short circuit protection.

2.1.5 Gas Supply Requirements

Verify that the following requirements are met:

1. Nitrogen or helium purity must be 99.999% and less than 0.5 ppm hydrocarbon tested.
2. Gas pressure at the source must be high enough to:
 - Allow at least a 50 psi (4.48 bar) pressure drop at every flow or pressure regulator.
 - Travel the distance from the source to the AQUATek LVA.
 - Provide the required gas pressure at the unit. Operation of the AQUATek LVA requires helium or nitrogen at an incoming (supply) pressure of 65 - 100 psi (4.48 - 6.89 bar).
3. The diameter of gas supply tubing depends on the maximum pressure drop allowable for the configuration:
 - If the pressurization gas supply is close to the AQUATek LVA, use the pre-installed blue, 1/8" (0.32 cm) tubing.
 - If the gas supply is a significant distance from the AQUATek LVA, a single source supplies several instruments or a single source is subject to high demand for gas, it is recommended to reduce pressure by replacing the supply line from the gas source with 1/4" tubing.
4. Gas supply tubing lengths must be adequate. Be generous when cutting lengths of tubing for local supply lines. A relatively long coil of tubing between the supply and the AQUATek LVA allows the instrument to be moved without disconnecting the plumbing. The system is supplied with 6' (1.82 m) of blue, 1/8" (0.32 cm) tubing. Additional tubing can be added to increase the length as needed.
5. It is essential that gas line fittings and regulators are the correct size and type. Consult your local gas supplier for type and size of cylinder valves and then select compatible pressure regulators based on the required valves. Keep the following considerations in mind:
 - Use quality pressure regulators with stainless steel diaphragms to reduce the high-source pressure at the tank to levels required by the AQUATek LVA.



NOTE

Teledyne Tekmar recommends using a single, two-stage regulator rather than two single-stage pressure regulators.

- ON/OFF valves, while not essential, are very useful when mounted on the outlet fitting of a two-stage regulator.
- If pipe thread connections are required in the gas supply lines, seal them with instrument-grade PTFE tape.



NOTE

Always use instrument-grade PTFE tape to seal thread connections. Do not use pipe dope or lower grades of PTFE tape. Volatile materials in the dope and/or low-grade tape will contaminate the tubing.

2.1.6 Minimum Computer Requirements

TekLink requires a computer that meets or exceeds the specifications shown in Table 2-1 "Minimum Computer Requirements".

Table 2-1 Minimum Computer Requirements	
Component	Specification
Processor	300 MHz Pentium II (Or Equivalent)
Memory	512 MB
Hard Drive Space	6.4 MB
Display	VGA
Drive	4x CD-ROM
Operating System	PC Interface through Windows® 7 Professional or higher. Windows® 10 is recommended.
Input	Mouse
Devices	Compatible speakers and sound system

2.2 Required Tools and Supplies for Installation and Operation



Caution

The AQUATek LVA access panels are secured using 1/4 turn captive screws. These screws only need to be turned 90 degrees to disengage and when free will remain attached to the panel. **Use of a powered screw driver will strip and/or damage the screws.**

The following tools and supplies will be required for the installation of the AQUATek LVA:

- Tubing cutters
- 7/16" (11 mm) Open-ended wrenches (2)
- 1/4" (8 mm) Open-ended wrench
- Phillips-head screwdriver
- Waste container (not supplied with the AQUATek LVA)
- Ultra-high purity (99.999%) nitrogen or helium, regulated to 65 -100 psi (4.48 bar - 6.89 bar) prior to the AQUATek LVA
- 40 mL VOC Vials
- Gastight® syringes (10 µL)
- Volumetric flasks
- If methanol extraction methods are to be used, purge and trap grade methanol
- VOC Standards
- If vial chilling is to be used, recirculating cooling bath tubing and connectors (available from Teledyne Tekmar)
- If an optional pH meter will be used, two known pH Reference Standards for calibration.

2.3 Unpacking the AQUATek LVA



Caution

Only lift and position the AQUATek LVA using the designated lift points. Do not lift the instrument by the XYZ robotic autosampler arm. The AQUATek LVA weighs 31.75 kg (70 lbs). If this weight exceeds your lifting ability, lift and position the AQUATek LVA using two people.

Unpack the AQUATek LVA, concentrator if not previously installed, Installation Kit Boxes for both instruments (if applicable) and any optional components and accessories. Inspect the contents against the packing list.

If there are any damaged or missing items contact Teledyne Tekmar Customer Support, using the information in Section P.2 "Teledyne Tekmar Customer Support Center", immediately. Claims for loss of a package or shipping damage should be promptly filed with the carrier.

2.4 Installation Kit Box

The AQUATek LVA is provided with an Installation Kit Box that contains parts for completing the installation. Throughout the installation procedure, obtain parts from the Installation Kit Box, when necessary.

2.5 AQUATek LVA System Overview

Figure 2-1 Front of AQUATek LVA

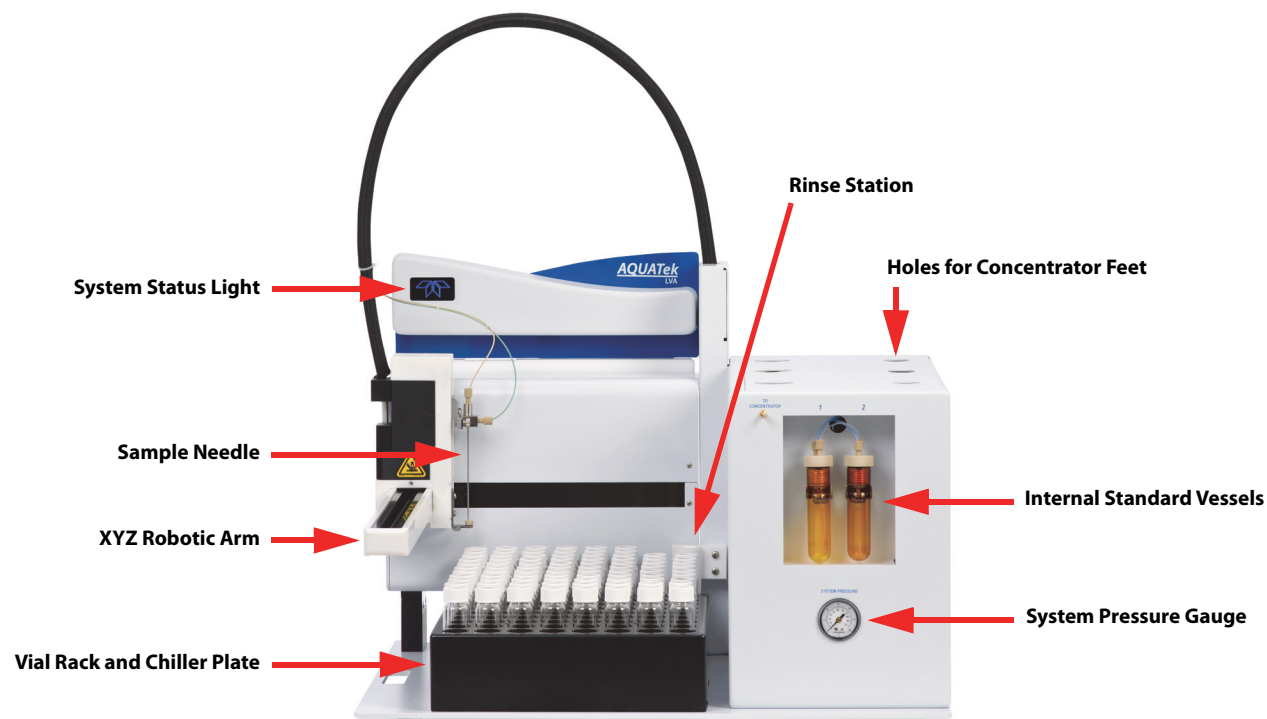
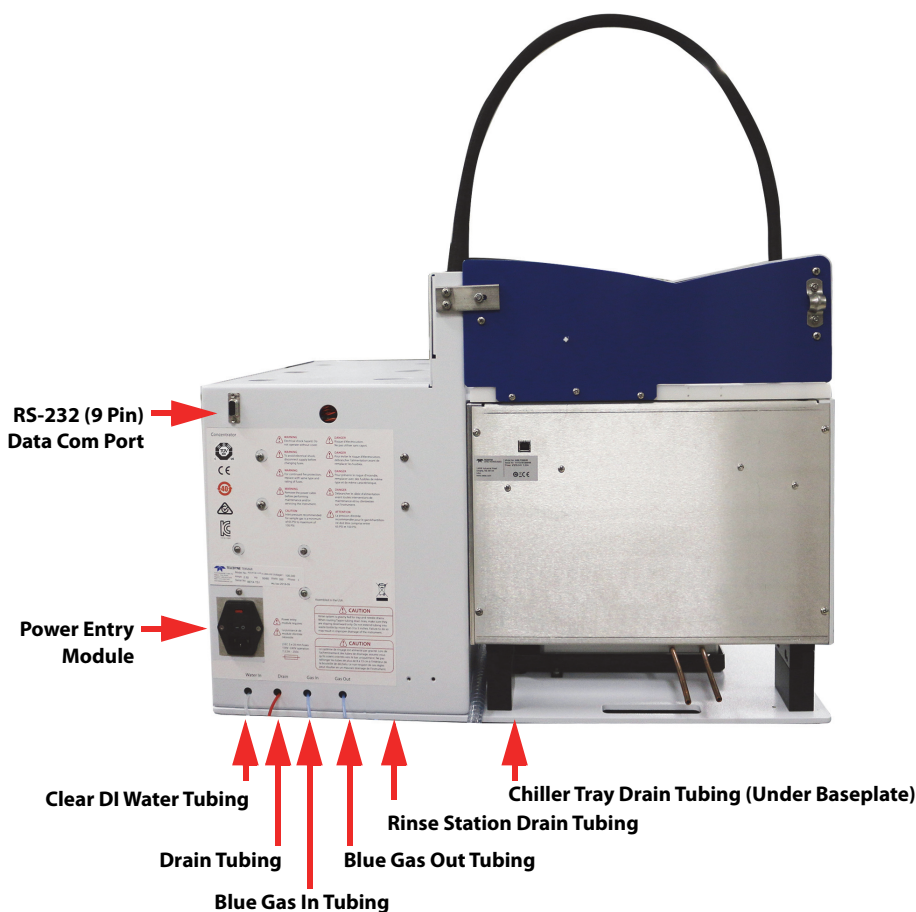


Figure 2-2 Back of AQUATek LVA



2.6 Bench Placement

Place the AQUATek LVA on the lab bench and ensure it sits firmly and evenly on the surface. A stable and even surface is required for proper autosampler operation. If the concentrator will not be placed in its intended position on top of the AQUATek LVA, ensure there is enough room to place it next to the AQUATek LVA along with the GC/MS, and that all cable and transfer line tubing can be routed without interfering with the operation of the autosampler arm.

2.7 Electrical Connections

2.7.1 AC Power Cord



NOTE

For electrical requirements, refer to Section 2.1.4 "Electrical Requirements".

1. Ensure the switch on the Power Entry Module (PEM) is in the OFF (O) position.
2. Plug the AC power cord into the AQUATek LVA PEM and connect it to a properly rated and grounded AC receptacle. **Do not power on the instrument at this time.**



WARNING

The circuit used to power the AQUATek LVA should be protected by a Certified/Listed 15/20 Circuit Breaker for short circuit protection.



WARNING

Ensure the power cable is routed away from, and is not capable of contacting, any hot surface.

Figure 2-3 AQUATek LVA Power Entry Module



2.8 Pressurization Gas Connection



NOTE

For information on making liquid and gas connections with the variety of nuts and ferrules used on the AQUATek LVA, refer to Section 6.2 "How to Make Gas and Liquid Connections".



NOTE

For pressurization gas requirements, refer to Section 2.1.5 "Gas Supply Requirements".

The blue, 1/8" (0.32 cm) tubing labeled "Gas In" (Figure 2-2) connects to the laboratory helium or nitrogen supply line. This gas is used to pressurize the system for a variety of sampling functions.

**NOTE**

AQUATek LVA pressurization gas is typically supplied through a tee union from the main laboratory helium or nitrogen supply.

1. Connect a 1/8" Swagelok brass tee (found in the Installation Kit Box) to the laboratory helium or nitrogen supply line by cutting the existing tubing and connecting the tee at each end. Ensure the nut and ferrule are oriented as shown in Section 6.2.1 "Swagelok Nut and Two-Piece Metal Ferrule", then insert the tubing into the union and tighten using two 7/16" (11 mm) open-ended wrenches. Hold the center of the union with one wrench, while tightening the nut that connects the tubing.

**Caution**

To prevent damage to metal nuts and ferrules, do not tighten them over 3/4 turn (270 °). Once swaged onto the tubing, it is only necessary to tighten a nut slightly to eliminate a leak. If leaking persists, look for other causes.

2. Route the blue, 1/8" (0.32 cm) "Gas in" tubing from the AQUATek LVA to the tee and connect. Orient the nut and ferrule correctly, insert the tubing into the union and tighten with a 7/16" wrench.

**WARNING**

Ensure the pressurization gas line is not within 10" of any heated components.

2.9 Liquid Connections

**NOTE**

To change the sample loop to another size, refer to Section 6.15 "Sample Loop Replacement/Change".

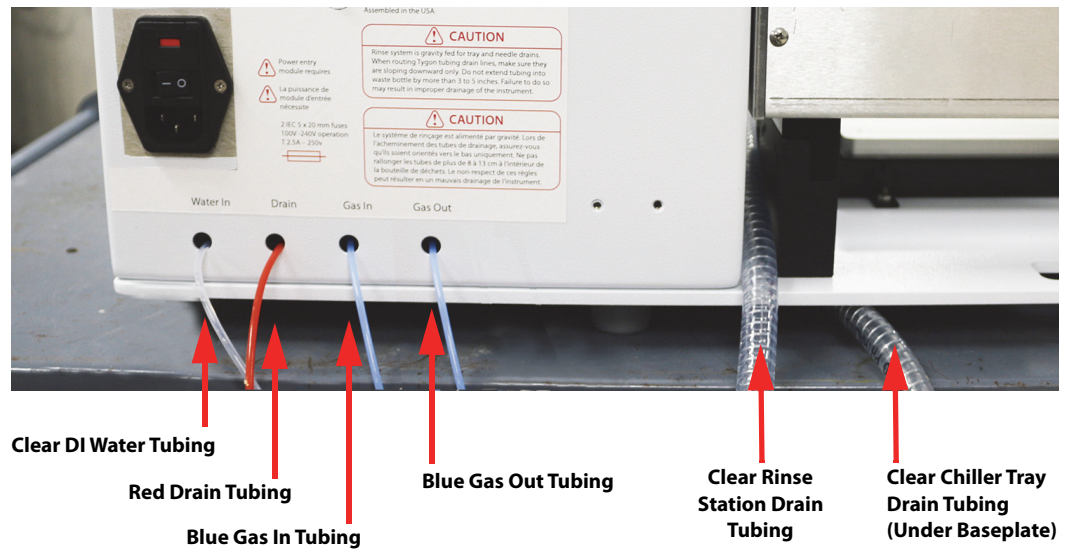
2.9.1 Drain Tubing

Run the following drain lines to a sink or waste bottle:

- Drain valve red, 1/8" (0.32 cm) tubing
- Rinse station clear, 1/2" (1.27 cm) wire re-enforced drain tubing
- Vial chiller plate clear, 1/2" (1.27 cm) wire re-enforced drain tubing

If a waste bottle is used, add an additional 7 - 13 cm (3 - 5") to the tubing length so that it can extend into the waste container, then cut to length. Make sure the drain tubing is not crimped or blocked in any way. Because drains are gravity fed, ensure that the drain lines do not include any loops and are lower than the AQUATek LVA.

Figure 2-4 Drain Tubing



2.9.2 DI Water Reservoir Connection

Figure 2-5 DI Water Reservoir



1. Refer to Section 2.15.1 "Preparing DI Water" to prepare DI water for the reservoir.
2. Unscrew the threaded retaining ring, remove the reservoir cap and fill the vessel with DI water leaving at least 15 cm (6") of headspace. Reinstall the cap on the reservoir, then tighten the threaded collar to seal it.
3. Connect the AQUATEk LVA pre-swaged clear, 1/8" (0.32 cm) "Water In" tubing to the reservoir's "Water Out" union using two 7/16" (11 mm) open-ended wrenches. Hold the center of the union with one wrench, while tightening the nut that connects the tubing.
4. Connect the AQUATEk LVA blue, 1/8" (0.32 cm) "Gas Out" tubing to the reservoir's "Gas In" quick-connect on the reservoir cap. Lift the quick-connect collar, join the fittings and then release the collar.
5. The DI water lines and reservoir will be primed later in the installation procedure to remove air from the system.

2.9.3 Vial Chiller Plate Tubing Connections



NOTE

The chiller tray drain tubing should already be routed to a suitable waste container.

1. Place the autosampler sample vial rack on top of the chiller plate.
2. Connect the chiller plate's copper tubing inlet and outlet lines to the recirculating cooling bath with user supplied 1/4" (0.64 cm) ID rubber tubing and hose clamps.

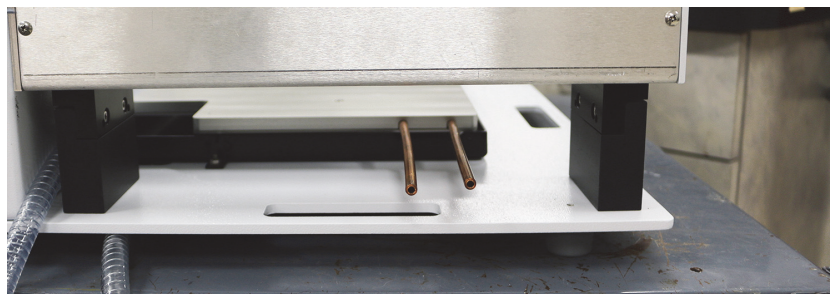


NOTE

Recirculating cooling bath tubing lines are connected according to customer preference and may be attached using Swagelok fittings or hose clamps. Teledyne Tekmar recommends the use of hose clamps and offers a recirculating cooling bath and tubing connection kit. For more information, contact Customer Support using the information in Section P.2 "Teledyne Tekmar Customer Support Center".

3. Once connected, ensure the entire length of the cooling lines are covered with insulation.

Figure 2-6 Vial Chiller Tray Copper Tubing Connections



4. Fill and power on the recirculating cooling bath, then check the tubing connections for leaks. Tighten the fittings if necessary.

2.10 Concentrator Placement on the AQUATek LVA



Caution

The Lumin weighs 12.2 kg (27 lbs) and the Stratum weighs 14.5 kg (32 lbs). If either concentrator weight exceeds your lifting ability, lift and position the concentrator onto the AQUATek LVA using two people.

1. Place the Lumin or Stratum purge and trap concentrator on top of the AQUATek LVA right instrument enclosure, ensuring that the concentrator's feet fall into the locator holes.

2. Secure the concentrator to the AQUATEk LVA by tightening the integrated foot locking mechanism at the top of the AQUATEk LVA enclosure. Locate the 3/16" hex wrench included in the Installation Kit Box and insert it into the hex drive screw located at the top of the right access panel. Rotate the drive screw counter-clockwise to move the foot locking bar into place and secure the concentrator. If resistance is felt, or the concentrator is not secured after moving the bar in place, repeat the procedure and ensure the concentrator feet are correctly positioned in the recessed holes on the top of the AQUATEk LVA.

The concentrator can be placed next to the AQUATEk LVA, but care should be taken to route cables away from the autosampler arm to prevent interference.



Caution

When repositioning or moving the system, remove the concentrator by releasing the concentrator foot lock mechanism on the AQUATEk LVA. Moving the concentrator and AQUATEk LVA as one unit makes the weight of the system highly imbalanced. This could cause the concentrator/LVA to fall, resulting in damage to the instruments and physical injury.

2.11 Purge and Trap (P&T) Concentrator Installation

The following items are concentrator specific installation procedures and should be accomplished according to the *Concentrator User Manual*.

- P&T Concentrator electrical connections
- GC I/O (Input/Output) cable connection
- P&T Concentrator gas connections
- P&T Concentrator liquid connections
- P&T Concentrator GC/MS heated sample transfer line connections

Once concentrator specific installation procedures have been accomplished, return to these procedures to:

- Connect the aqueous transfer line tubing between the AQUATEk LVA and the concentrator
- Install the TekLink software
- Connect the interface cable between the concentrator and the controlling PC
- Connect the AQUATEk LVA RS-232 data communication cable between the concentrator and the autosampler
- Create the instrument configuration in the TekLink software (concentrator with AQUATEk LVA configuration)

2.12 Connect the Aqueous Transfer Line to the Concentrator

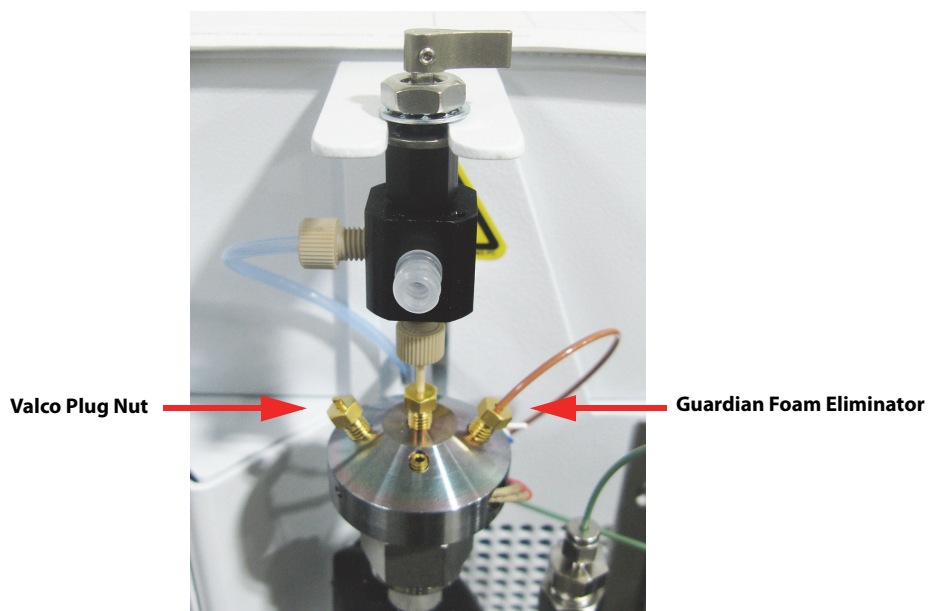
Connect the aqueous transfer line from the AQUATek LVA to the tubing access point on the concentrator sample mount using the procedures below.



Warning! Hot surface! The concentrator's sample mount may be heating to standby temperature. Turn the concentrator off and allow the concentrator's sample mount and surrounding area to cool to room temperature.

1. Power off the AQUATek LVA and remove the AC power cable from the back of the unit. Allow the concentrator's heated sample mount to cool.
2. Identify the 1/16" (.016 cm) aqueous transfer line exiting the "To Concentrator" hole on the front of the AQUATek LVA. Also locate a 1/16" (.016 cm) (o.d.) Valco® nut and ferrule in the concentrator's Installation Kit Box.
3. If a Guardian Foam Sensor and Eliminator (GFSE) system is installed, remove the gold plug nut on the left side of the sample mount. If a GFSE is not installed, remove either the left or right gold Valco plug nut on the concentrator sample mount.

Figure 2-7 Valco Plug Nut on Lumin Sample Mount Removed



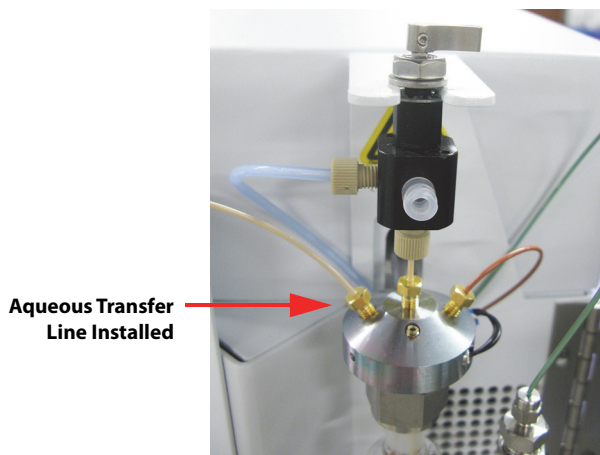
4. Thread the aqueous transfer line through the Valco nut and ferrule in the orientation shown in Figure 2-8.

Figure 2-8 Valco Nut and Ferrule Orientation



5. Insert the tubing and ferrule into the port on the sample mount **until the tip of the tubing is visible in the center of the bulb of the sparger glassware**. Tighten the Valco nut using a 1/4" (8 mm) open-ended wrench.

Figure 2-9 Aqueous Transfer Line Connected to Lumin Sample Mount



2.13 Lumin TekLink or Stratum TekLink2G Software Installation

The software version included with the AQUATEk LVA will be the most up-to-date version and designed to interface with the autosampler. For PC requirements, refer to Section 2.1.6 "Minimum Computer Requirements".



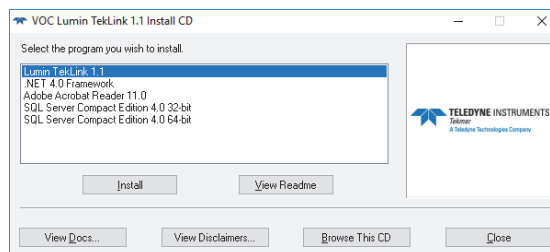
NOTE

Existing TekLink methods and schedules will be irretrievable after the installation of the new version of TekLink required to control the AQUATEk LVA.

To retain method and schedule information, record or print relative information prior to software installation.

1. If the controlling PC is connected to the concentrator, disconnect the PC to concentrator interface cable prior to the software installation.
2. According to the concentrator installed, locate the Lumin TekLink or Stratum TekLink2G software installation disc supplied with the AQUATEk LVA and insert it into the controlling PC. The TEKLINK INSTALLATION MENU will be displayed.
3. Select the software from the installation menu and then select the INSTALL BUTTON.

Figure 2-10 Lumin TekLink Software Installation Menu



4. The TEKLINK SETUP WIZARD will begin. Follow all prompts to the successful completion of the software installation.



NOTE

Some Stratum and Lumin concentrators may require a firmware update to operate the AQUATek LVA. The TekLink software will prompt for the update when the software is opened for the first time (and the PC, concentrator and AQUATek LVA are connected).

2.13.1 PC to Concentrator Interface Cable

Connect the PC to concentrator interface cable:

- Lumin: Connect one end of the cable to a USB port on the controlling PC. Connect the other end of the cable to the port labeled “USB” on the concentrator.
- Stratum: Connect one end of the cable to a serial port on the controlling PC. Connect the other end of the cable to the port labeled “PC-232” on the concentrator.

2.13.2 RS-232 Autosampler to Concentrator Interface Cable

The concentrator communicates with the AQUATek LVA autosampler via a 9-pin RS-232 autosampler cable. Connect the cable to the nine-pin RS-232 port on the back of the AQUATek LVA labeled “Concentrator” and the nine-pin RS-232 port on the concentrator labeled “Autosampler”. On Stratum installations, avoid accidentally connecting the autosampler cable to the 9-Pin “PC-232” port.



NOTE

Stratum models with serial numbers prior to US12066002 may have a 25-pin autosampler port installed on the rear panel and will require installation of a 9-pin autosampler adapter cable to connect to the AQUATek LVA. While many Stratum concentrators were supplied with a 9-pin autosampler adapter cable as an installation option (and may be previously upgraded), some early models were not.

If a 9-pin autosampler adapter cable is needed, contact Teledyne Tekmar Customer Support using the information in Section P.2 “Teledyne Tekmar Customer Support Center”. Install the 9-pin adapter cable according to 2.13.3 “Stratum 9-Pin Autosampler Adapter Cable for Concentrators with 25-Pin Autosampler Ports”.

2.13.3 Stratum 9-Pin Autosampler Adapter Cable for Concentrators with 25-Pin Autosampler Ports

1. Locate the 9-pin Stratum autosampler adapter cable supplied with the Stratum or order a new adapter cable by contacting Teledyne Tekmar Customer Support.



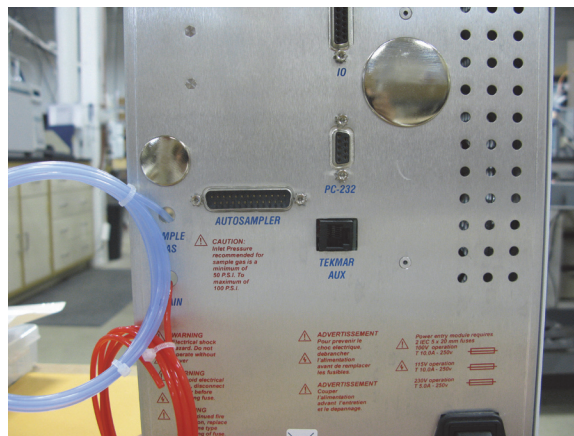
Warning! To avoid electrical shock turn OFF and unplug the AQUATek LVA before servicing.

2. Ensure the Stratum purge and trap concentrator is OFF and the AC power cable has been removed from the back of the unit.
3. Remove the concentrator’s right access panel.
4. Remove the two 3/16” (.48 cm) ke-p-nuts that secure the 25-pin port (labeled “Autosampler”) to the concentrator’s rear panel.



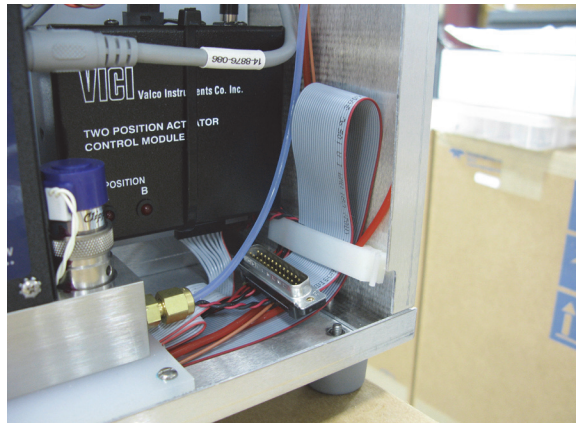
Do not disconnect the cable or remove it from the concentrator.

Figure 2-11 Stratum - 25-Pin Autosampler Port from the Back Panel



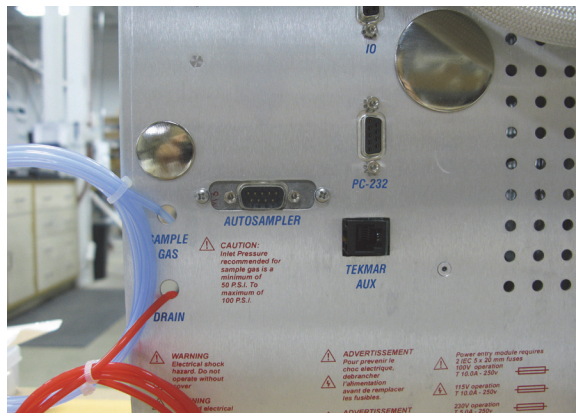
5. Leave the original 25-pin cable connected and stow it inside the concentrator using the cable wiring harness on the back panel.

Figure 2-12 Stratum - Stowing the 25-Pin Autosampler Port Cable



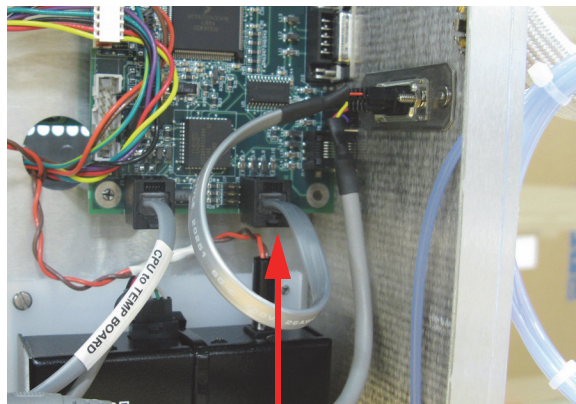
- Using the Phillips screws supplied with the adapter cable, secure the new 9-pin port (with filler plate) to the rear panel of the concentrator where the 25-pin port was previously installed.

Figure 2-13 Stratum - 9-Pin RS-232 Adapter Cable Port Installed



- Connect the 9-pin adapter cable to the concentrator's CPU board at location J8.

Figure 2-14 Stratum - Connecting the 9-Pin Autosampler Cable to the CPU Board



CPU Board J8

2.14 Create a New Instrument Configuration

Once the TekLink software has been installed, a new instrument configuration including the concentrator and AQUATEk LVA will need to be created using the procedures below.

1. Power on the AQUATEk LVA and the concentrator.
2. Ensure the concentrator is connected to the controlling PC and the communication cable is connected between the concentrator and the AQUATEk LVA.
3. If necessary, double-click the software shortcut on the computer desktop to open TekLink.
 - When Lumin TekLink is opened for the first time, a NO INSTRUMENT CONFIGURED NOTIFICATION MESSAGE will be displayed. Clicking the OK BUTTON of the notification will display the CONFIGURATION DIALOG to create a new instrument configuration.
 - When Stratum VOC TekLink2G is opened for the first time, a LOGIN REQUEST DIALOG will be shown requesting that the host computer be defined. Select the host computer and then the LOGIN BUTTON. When the CONNECT TO INSTRUMENT DIALOG is displayed, select the ADD BUTTON to create the new configuration.



NOTE

If a previous instrument configuration is currently active, select Tools>Instrument Manager. Select the active Instrument Configuration and then the Properties Button. Select Deactivate this Instrument Profile. Return to the Instrument Manager and select the Add Button, then follow the instructions below.

4. On the Stratum VOC TekLink2G NEW INSTRUMENT PROPERTIES DIALOG or Lumin TekLink CONFIGURATION DIALOG, select the GENERAL TAB:
 - Enter a NAME for the instrument configuration.

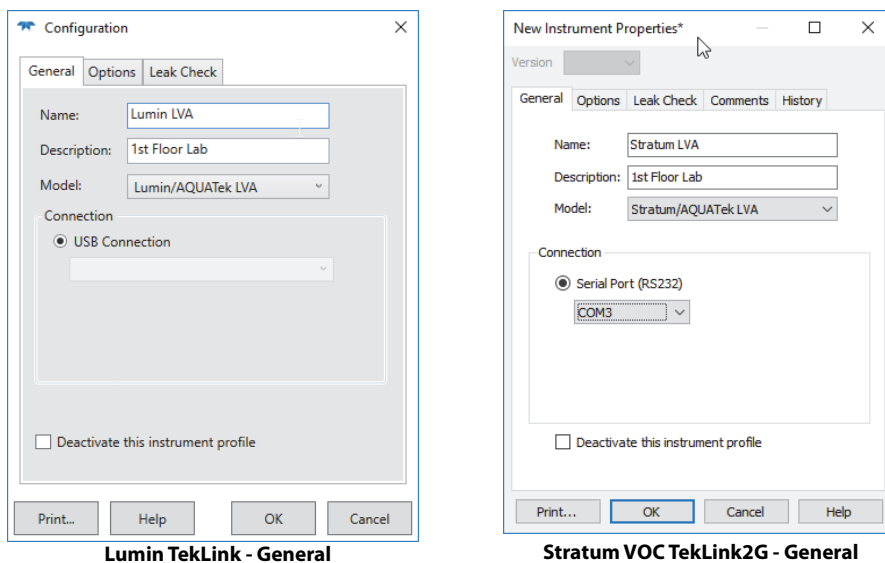


NOTE

If other Lumin or Stratum concentrators are on the same network, use the name and description to differentiate one instrument from another. This will assist when defining system properties and settings.

- Enter a DESCRIPTION that easily identifies the instrument.
- Under the MODEL DROP-DOWN MENU, select LUMIN/AQUATEK LVA or STRATUM/AQUATEK LVA according to the installation.

Figure 2-15 Lumin and Stratum VOC TekLink2G Configuration General Tab



- In Lumin TekLink, choose the appropriate USB connection from the drop-down menu. The instrument must be connected via USB cable for the connections to be shown. In Stratum VOC TekLink2G, select the appropriate COM port. Available ports for communication are auto-sensed by the software.

NOTE

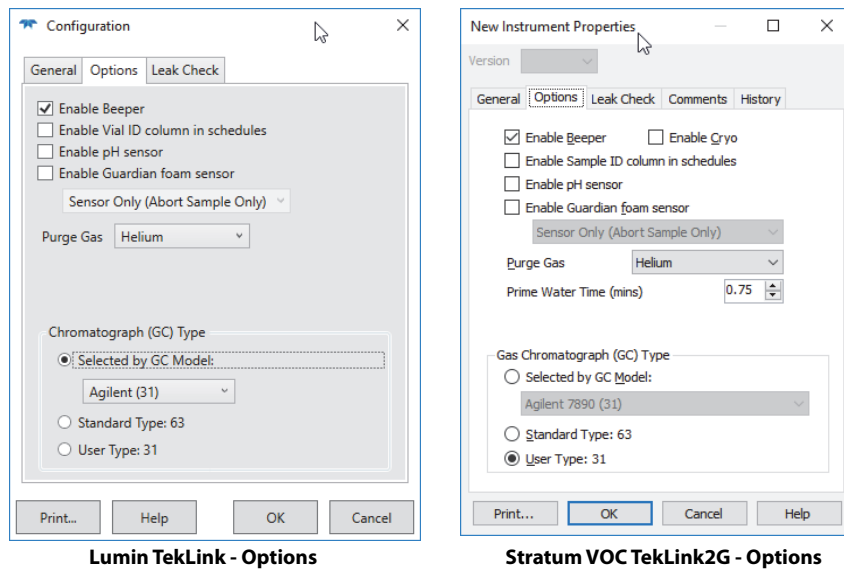
If an active instrument profile/configuration is assigned to a COM port, that COM port will not be available.

5. On the OPTIONS TAB make all necessary selections including PURGE GAS and CHROMATOGRAPH (GC) TYPE. If the following concentrator and AQUATek LVA accessories are installed, ensure they are selected:
 - AQUATek LVA pH probe
 - Concentrator Guardian Foam Sensor and Foam Eliminator - Select the configuration and action from the drop-down menu.

NOTE

If the specific model of the GC is not shown in the drop-down menu, use the Standard Type:63 or User Type:31 check-box. If necessary, refer to the GC manufacturer's instructions.

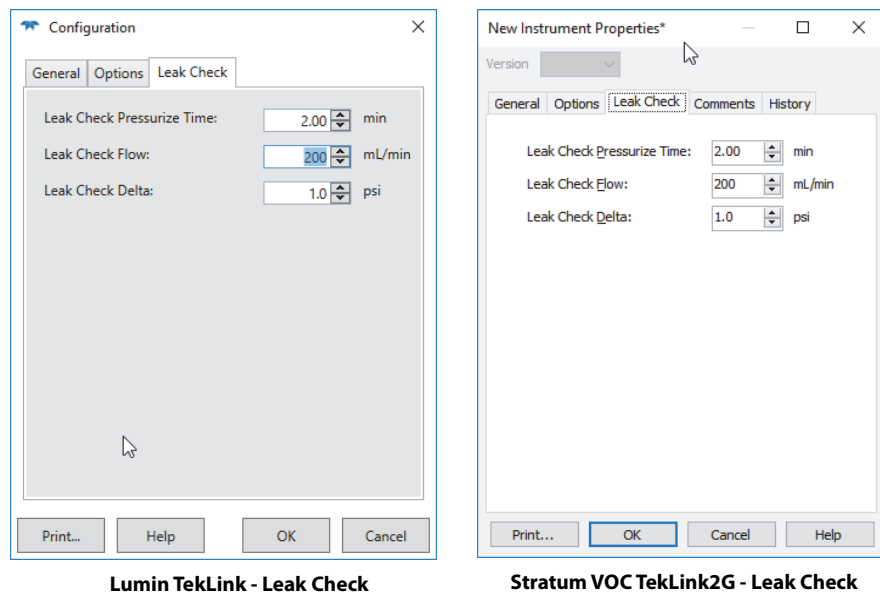
Figure 2-16 Lumin and Stratum VOC TekLink2G Configuration Options Tab



6. On the LEAK CHECK TAB:

- Customize LEAK CHECK PRESSURIZE TIME, LEAK CHECK FLOW pressure settings and LEAK CHECK DELTA (amount of change in pressurization that indicates a leak).

Figure 2-17 Lumin and Stratum VOC TekLink2G Configuration Leak Check Tab

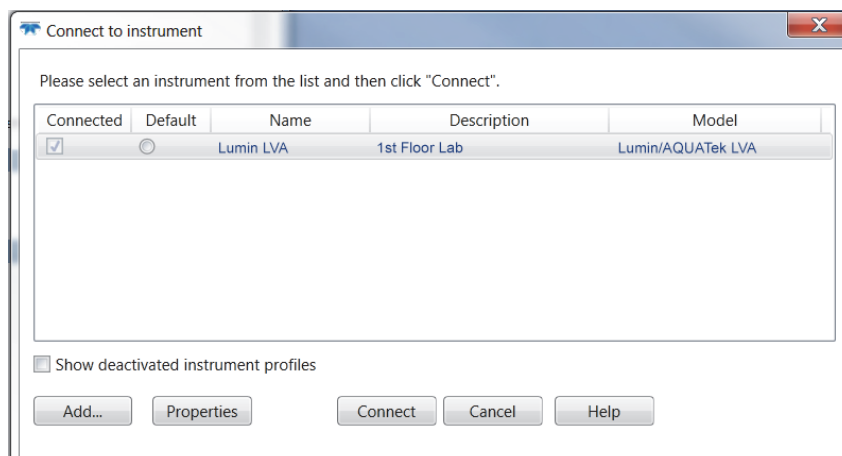


7. In Stratum VOC TekLink2G, enter any relevant comments on the COMMENT TAB.

8. Select the OK BUTTON to create the new instrument configuration.

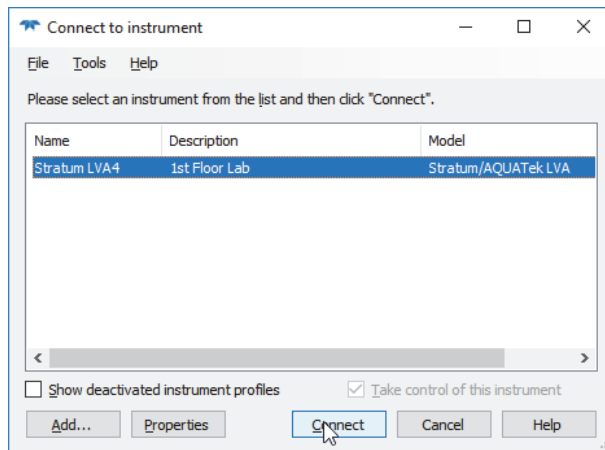
- If this is the initial instrument configuration, Lumin TekLink and Stratum VOC TekLink2G will automatically connect to the new configuration and set it to default as shown in the CONNECT TO INSTRUMENT DIALOG.

Figure 2-18 Lumin TekLink Connect to Instrument Dialog



- If a previous instrument configuration was created and then deactivated in Lumin TekLink, select the RADIO BUTTON next to the new configuration and then select the CONNECT BUTTON.
- If a previous instrument configuration was created and then deactivated in Stratum VOC TekLink2G, close then reopen the software. TekLink will display the CONNECT TO INSTRUMENT DIALOG at startup. Highlight the new configuration and select the CONNECT BUTTON.

Figure 2-19 Stratum VOC TekLink2G Connect to Instrument Dialog



9. The INSTRUMENT STATUS PANEL, METHODS SCREEN and SCHEDULES SCREEN will display the connected instrument configuration name. Once created, methods, schedules, system properties and preferences can be saved to that configuration.
10. If the concentrator/AQUATEk LVA instrument configuration has been set up correctly, AQUATEk LVA options will be shown in the following locations:
 - METHOD SCREEN - In Lumin TekLink an AQUATEK LVA TAB will be shown. In Stratum VOC TekLink2G an AQUATEK LVA selection will be shown in the left-side menu.
 - SCHEDULE SCREEN - STD 1 and STD 2 check box options will be shown as new columns in each schedule row. Select the check box, then choose the

quantity from the drop-down menu. If a pH probe is installed, a PH COLUMN will also be shown on the SCHEDULE SCREEN.

- **DIAGNOSTICS**

In Lumin TekLink: For internal standard controls, AQUATek LVA valve controls, autosampler controls and pH probe feedback (if installed), select TOOLS>AQUATEK LVA BUTTON. If a pH probe is installed, a PH PROBE CHECK BUTTON will be shown under the TOOLS SCREEN COMMANDS MENU.

In Stratum VOC TekLink2G: For internal standard controls, AQUATek LVA valve controls and pH probe feedback (if installed), select TOOLS>DIAGNOSTICS>AQUATEK LVA TAB. For AQUATEk LVA autosampler controls select TOOLS>DIAGNOSTICS>AUTOSAMPLER TAB. If a pH probe is installed, a PH PROBE CHECK STANDARD/CALIBRATION option will be active under TOOLS on the MENU BAR.

2.15 Materials and Reagents

2.15.1 Preparing DI Water

The AQUATek LVA requires a source of DI water for system rinsing, auto-blanks and high-temperature system rinse. To avoid contamination problems, use blank (organic-free) water. Teledyne Tekmar recommends using deionized (DI) water. Several methods for preparing blank water are listed below.

- Pass distilled water through a column of activated carbon at least 12" (3.66 m) deep. Locate the supply vessel at a higher elevation than the collection vessel, with the supply line entering the column at the bottom.
- Boil water, then purge it at 80 °C to 90 °C (176 °F to 194 °F) with helium or nitrogen for at least one hour.
- Pass water through a freshly charged water purifier (such as Millipore Super Q®).

2.15.2 Methanol Supply Grade

If methanol extraction methods are to be used, purge and trap grade methanol is recommended.

2.15.3 Preparing Working Standards

Commercial standards, in various mixtures and concentrations, are available for volatile analysis. These standards should be stored at 0 °C (32 °F) with a minimum of headspace. The longevity of the standard is generally defined by the manufacturer or the specific analytical method.

In order to use the internal standard vessels and the automatic spiking capability, a working solution must be created. This requires dilution of the stock standard and final concentration calculation.

2.16 AQUATek LVA Preparation for Analysis

2.16.1 Supply Regulator Confirmation

Confirm an incoming (supply) pressure of 65 - 100 psi (4.48 - 6.89 bar).

2.16.2 System Pressure Confirmation

Verify the system pressure is set to 6-8 psi using the system pressure gauge on the front of the AQUATek LVA. If the system pressure requires adjustment, refer to Section 6.9 "Setting/Adjusting System Pressure".

2.16.3 System Leak Check

Perform a leak check to ensure the system is air tight. Refer to Section 6.22.2 "Leak Check".

2.16.4 Prime DI Water Tubing Lines

1. Ensure the DI water reservoir has been filled and primed. Refer to Section 6.10 "Refill DI Water Reservoir and Prime Lines".

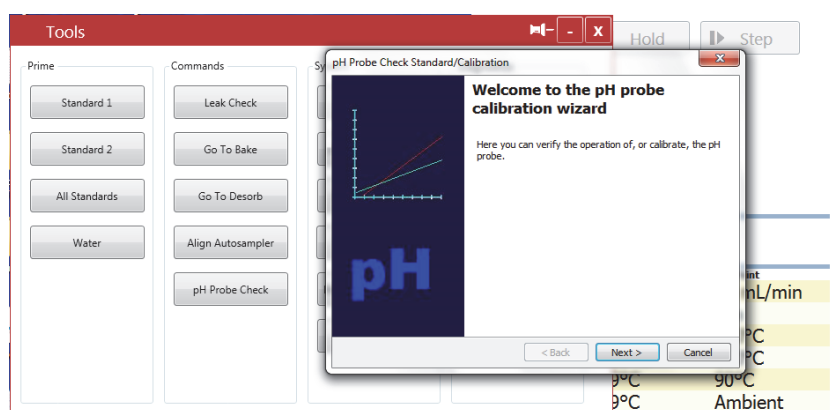
2.16.5 Fill and Prime Internal Standard Vessels

1. Prepare standards according to Section 2.15.3 "Preparing Working Standards".
2. Fill the internal standard vessels and prime the supply lines. Refer to Section 6.11 "Fill and Prime Internal Standard Vessels".

2.16.6 Optional pH Probe Configuration

1. Connect the pH probe according to the instructions provided with the probe.
2. Calibrate the pH probe prior to analysis. Refer to Section 5.2 "Calibrate pH Probe or Verify an Existing Calibration".

Figure 2-20 pH Probe Check Wizard



2.17 Concentrator Preparation for Analysis

Refer to the *Concentrator User Manual* to perform the following actions prior to analysis:

- If an optional Guardian Foam Sensor and Eliminator system is installed on the concentrator, fill the eliminator water and defoamer vessels.

- Configure method parameters according to the *Concentrator User Manual*. For AQUATek LVA method parameters, refer to Section 3.1 "AQUATek LVA Method Parameters".
- Build a sample schedule according to the *Concentrator User Manual*. For AQUATek LVA schedule tasks, refer to Section 3.2 "AQUATek LVA Schedule Screen Tasks".
- If a new trap has been installed, condition the trap according to the *Concentrator User Manual*.

AQUATEk LVA User Manual

Chapter 3: TekLink Software Overview

3.1 AQUATEk LVA Method Parameters

Method parameters for the AQUATEk LVA autosampler are configured on the AQUATEK LVA TAB of the TekLink METHODS SCREEN.

To display the METHOD SCREEN:

- In Lumin TekLink, select the METHODS BUTTON on the HOME SCREEN, then select the AQUATEK LVA TAB.
- In Stratum VOC TekLink2G, select the NEW DROP-DOWN MENU from the MENU BAR and then select METHOD. Select AQUATEK LVA from the menu on the left side of the screen.

Figure 3-1 Lumin TekLink AQUATEk LVA Method Screen - AQUATEk LVA Tab

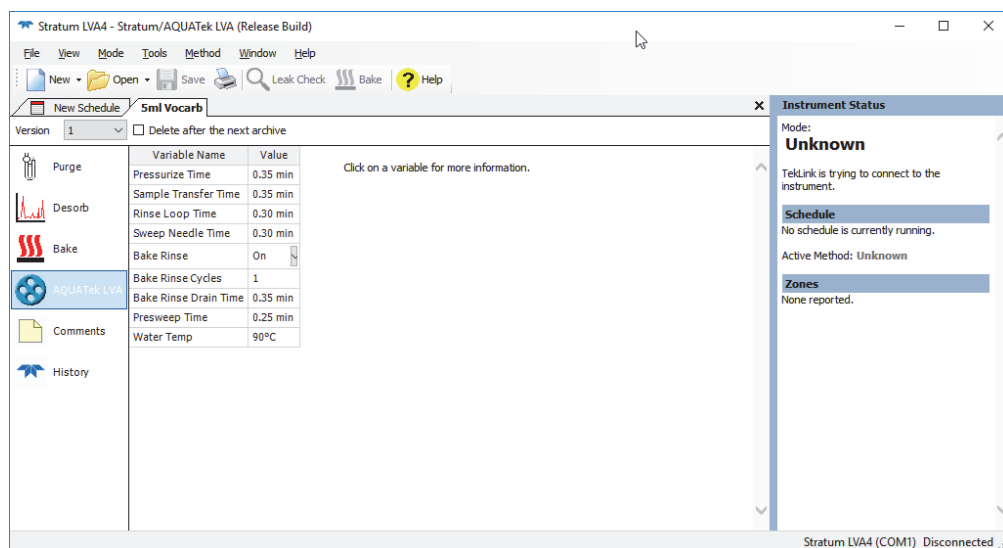
Name	Value	Unit
Sample Loop Time	0.35	min
Sample Transfer Time	0.35	min
Rinse Loop Time	0.30	min
Sweep Needle Time	0.30	min
Presweep Time	0.25	min
Water Temp	90	°C
Bake Rinse Cycles	1	
Bake Rinse Drain Time	0.35	min

Delete after the next archive

Sample Loop Time
The amount of time the vial is pressurized to allow for sample to be displaced to fill the sample loop.

Maximum 299.99 min
Default 0.35 min
Minimum 0.00 min

Figure 3-2 Stratum VOC TekLink2G Method Screen - AQUATek LVA Tab



AQUATek LVA parameters include:

- **SAMPLE LOOP TIME (PRESSURIZE TIME)** - The amount of time the vial is pressurized to allow for sample to be displaced to fill the sample loop (Minimum: 0.00 min, Maximum: 299.99 min, Recommended 0.35 min).



The amount of Sample Loop Time (Pressurization Time) is dependent on the sample loop volume. Ensure the Sample Loop Time (Pressurization Time) on the AQUATek LVA Tab is long enough to fully fill the sample loop. If the time is too short, the volume will be inaccurate.

- **SAMPLE TRANSFER TIME** - The amount of time the sample and standards are swept to the sparge vessel of the concentrator (Minimum: 0.00 min, Maximum: 299.99 min, Recommended 0.35 min).
- **RINSE LOOP TIME** - The amount of time the sample loop and stage one of the sample needle is rinsed with hot water (Minimum: 0.00 min, Maximum: 299.99 min, Recommended 0.30 min).
- **SWEEP NEEDLE TIME** - The amount of time stage two of the sample needle is flushed with inert gas (Minimum: 0.00 min, Maximum: 299.99 min, Recommended 0.30 min)
- **PRESWEEP TIME** - The amount of time the sample lines and needle are swept with inert gas prior to filling the sample loop (Minimum: 0.00 min, Maximum: 299.99 min, Recommended 0.25 min).
- **WATER TEMP** - Water temperature for rinsing the sample pathway, sample needle and glassware (Minimum: 20 °C [68 °F], Maximum: 100 °C [212 °F], Recommended: 90 °C [194 °F]).

NOTE

The system does not actively attempt to control temperatures below 40 °C (104 °F) (ambient) unless the laboratory temperature requires it.

- BAKE RINSE CYCLES - The total number of Bake Rinses between samples (Minimum: 1, Maximum: 3, Recommended: 1)
- BAKE RINSE DRAIN TIME - The amount of time allowed to drain the Bake Rinse water from the sparge vessel (Minimum: 0.00 min, Maximum: 299.99 min, Recommended 0.30 min)

3.2 AQUATEk LVA Schedule Screen Tasks

3.2.1 Adding Standards 1 and 2

Add internal standards to the schedule by clicking in the STD1 OR STD 2 COLUMN cell and selecting the volume from the drop-down menu (0, 1, 2, 5, 10, 20 µL). A maximum of 40 µL can be added to each sample, if both standards are used.

Figure 3-3 Lumin TekLink Schedule Screen with Add Standard Check Boxes

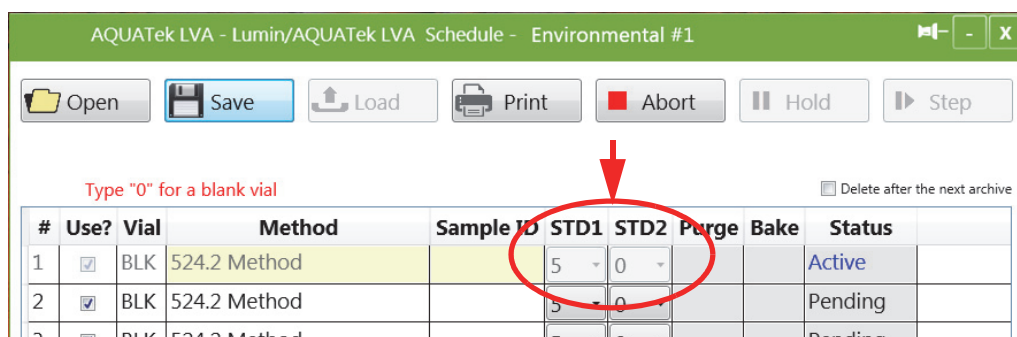
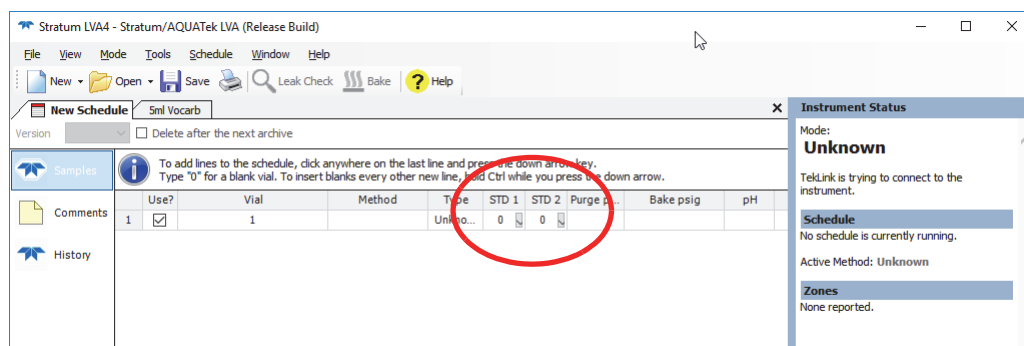


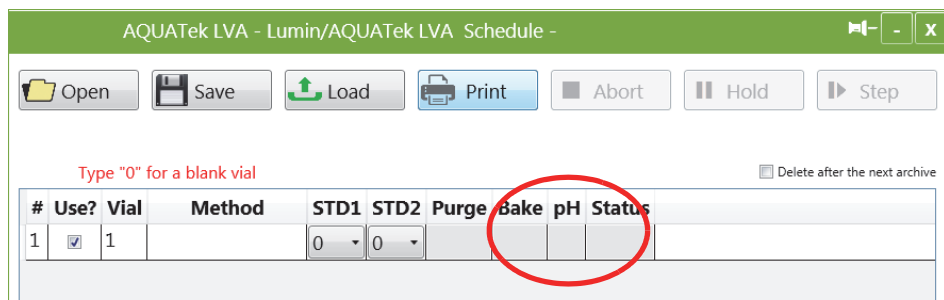
Figure 3-4 Stratum VOC TekLink2G Schedule Screen with Add Standard



3.2.2 Optional pH Probe

If a pH probe is installed and configured in the INSTRUMENT PROPERTIES, a pH COLUMN will also be shown on the SCHEDULE SCREEN. pH Results will populate this cell as the data is received.

Figure 3-5 Lumin Schedule with pH Columns



3.3 Lumin TekLink AQUATEk LVA Diagnostics

Caution

Exercise caution when using the Diagnostics Screen. Damage to the AQUATEk LVA autosampler can result.

The AQUATEK LVA DIAGNOSTICS SCREEN provides manual control of the AQUATEk LVA autosampler and should only be used for diagnostics and troubleshooting. In Lumin TekLink select the TOOLS BUTTON, then select the AQUATEK LVA BUTTON under the DIAGNOSTICS MENU. Diagnostic functions include:

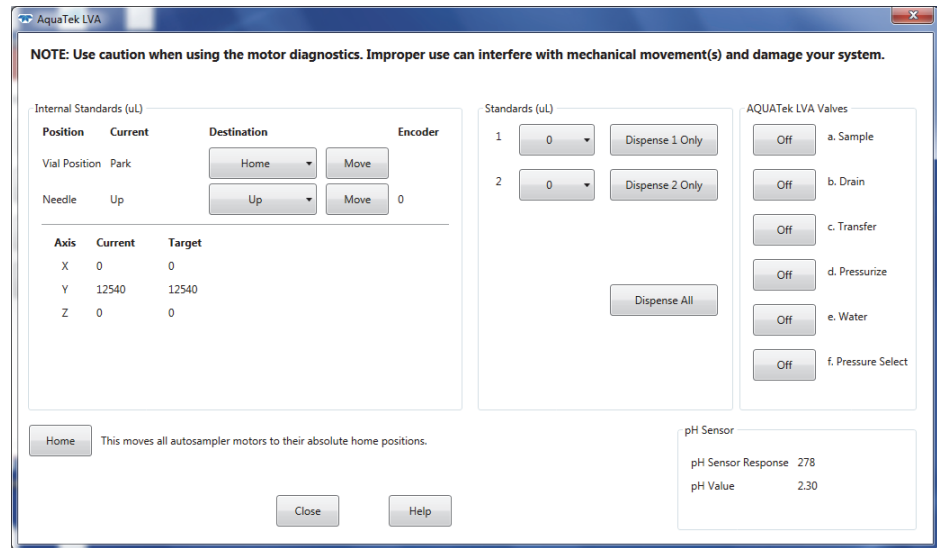
- Direct control of the autosampler arm, vial position and needle elevator.
- Fill/Dispense Internal Standards 1, 2 or both standards at the same time.
- Individual control of each AQUATEk LVA valve including:
 - Sample Valve
 - Drain Valve
 - Transfer Valve
 - Pressurize Valve
 - Water Valve
 - Pressure Select Valve

Caution

The Valves and Flows controls are for diagnostic and troubleshooting purposes and should only be used by someone who understands their functions. Exercise caution when manually turning on the AQUATEk LVA valves. Damage to the AQUATEk LVA can result.

- pH Probe feedback:
 - pH Probe Response
 - pH Value
- Direct control of the XYZ robotic arm and needle including sending the arm to the HOME position, a specific vial location and raising and lowering the sample needle.

Figure 3-6 Lumin TekLink AQUATek LVA Diagnostics



3.4 Stratum VOC TekLink 2G AQUATek LVA Diagnostics

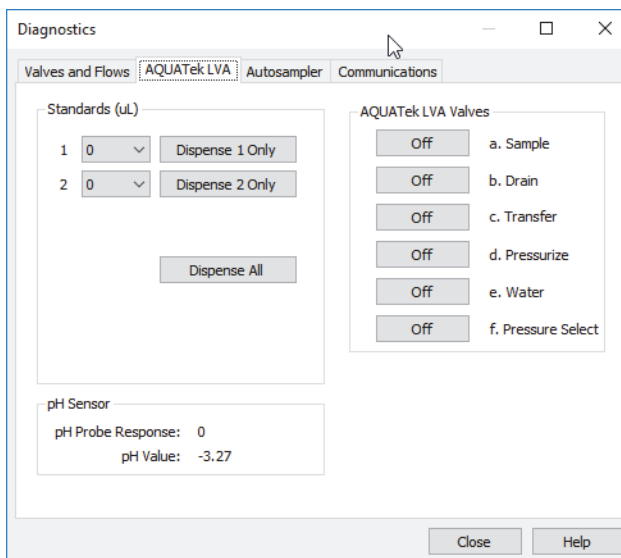


Exercise caution when using the Diagnostics Screen. Damage to the AQUATEK LVA autosampler can result.

The AQUATEK LVA and AUTOSAMPLER TABS provide manual control of the AQUATEK LVA autosampler and should only be used for diagnostics and troubleshooting.

3.4.1 AQUATek LVA Tab - Valves, Internal Standards and pH Sensor Diagnostics

Figure 3-7 Stratum VOC TekLink2G AQUATek LVA Standards, pH Sensor and Valve Diagnostics



In Stratum VOC TekLink2G select TOOLS>DIAGNOSTICS>AQUATEK LVA TAB under the DIAGNOSTICS MENU. This tab provides control of valves, internal standards and pH sensor feedback. Diagnostic functions include:

- Fill/dispense Internal Standards 1, 2 or both standards at the same time.
- Individual control of each AQUATEK LVA valve including:
 - Sample Valve
 - Drain Valve
 - Transfer Valve
 - Pressurize Valve
 - Water Valve
 - Pressure Select Valve

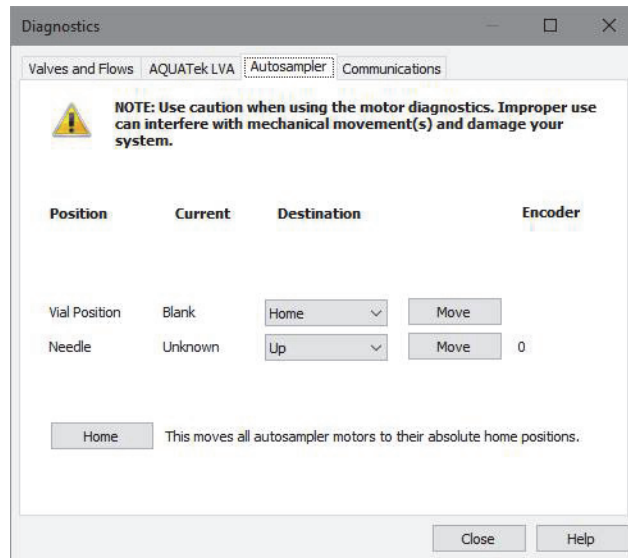


The Valves and Flows controls are for diagnostic and troubleshooting purposes and should only be used by someone who understands their functions. Exercise caution when manually turning on the AQUATEK LVA valves. Damage to the AQUATEK LVA can result.

- pH Sensor feedback:
 - pH Probe Response
 - pH Value

3.4.2 Autosampler Tab - Autosampler Diagnostics

Figure 3-8 Stratum VOC TekLink2G AQUATek LVA
Autosampler Movement Diagnostics



In Stratum VOC TekLink2G select TOOLS>DIAGNOSTICS>AUTOSAMPLER TAB under the DIAGNOSTICS MENU for XYZ robotic arm diagnostics. This tab provides direct control of the XYZ robotic arm and needle including sending the arm to the HOME position, a specific vial location and raising and lowering the sample needle.

AQUATek LVA User Manual

Chapter 4: Instrument Operations



NOTE

For information on optimizing the concentrator for analysis, refer to the Concentrator User Manual.

4.1 Operational Mode Descriptions

The AQUATek LVA performs a programmed series of operating steps in conjunction with the Purge & Trap (P&T) concentrator. These steps are referred to as modes and vary depending on the type of methodology being completed. Basic mode descriptions are provided below. For detailed information on concentrator and AQUATek LVA functions according to mode, refer to Section 4.2 "AQUATek LVA/Lumin P&T Concentrator Valve Output Chart".

Table 4-1 AQUATek LVA Modes

Mode	Description
Standby	This mode indicates that the system is waiting for all temperature zones and flow rates to reach their setpoints.
Purge Ready	This mode indicates all method setpoints are at equilibrium and the system is ready to analyze samples.
Pre Sweep A	This mode sweeps the top stage of the sample needle with inert gas prior to piercing the vial to eliminate any lab air contamination.
Pre Sweep B	This mode sweeps the bottom stage of the sample needle and the sample loop with inert gas prior to piercing the vial to eliminate any lab air contamination.
Move Arm to Sample	The autosampler arm is moved to the appropriate location and the needle is positioned over the vial. The needle is then lowered to pierce the septum of the sample vial.
Loop - Sample Fill	This mode allows an aliquot to be removed from the sample vial by pressurizing the vial and filling the sample loop.
Needle to Drain	The sample needle returns to the drain position during this mode.
Dispensing Standard	This mode allows internal standards to be added to the sample pathway for transfer to the sparge vessel with the sample.
Sample Transfer	This mode indicates that a liquid sample is being introduced into the sparging vessel.
Pre-Purge	<p>This mode is only available when a sample heater is installed on the concentrator and enabled in the Method Parameters. This mode is used to direct purge gas to the sparge vessel to remove excess oxygen, prior to heating and subsequent purging.</p> <p>Note: This mode is not required when using the AQUATek LVA, as no oxygen is introduced into the sparge vessel. It can still be used for sample heating, if desired.</p> <p>Note: The pre-purge flow is routed through the analytical trap to ensure no VOCs are lost during the process.</p>

Table 4-1 AQUATek LVA Modes

Mode	Description
Sample Preheat	This mode is only available when a sample heater is installed on the concentrator and enabled in the Method Parameters. This mode allows the sample to reach a uniform temperature prior to sample purging.
Purge	This mode is used to extract VOCs. An inert gas (such as Helium) is dispersed through the sample matrix in the sparger for a preset time and flow rate. The gas containing the analytes is directed to the analytical trap for concentration. The gas passes through the trap, deposits the analytes and is vented to the atmosphere.
Purge (Rinse Loop)	The sample needle returns to the drain position during this mode. During the purge mode the sample loop and the bottom stage of the sample needle are rinsed with hot water to clean the sample pathway, prior to accepting the next sample.
Purge (Sweep Needle)	During the purge mode, the top stage of the needle is swept with inert gas to clean it prior to accepting the next sample.
Dry Purge	This mode is used to drive excess water from the analytical trap. The inert gas is directed to the analytical trap without passing through the sample glassware, ensuring that no additional moisture is transferred to the trap.
Desorb Ready	This mode indicates that the concentrator is waiting for a GC ready signal prior to stepping to Desorb.
Desorb Preheat	This mode heats the analytical trap to a preset temperature in a static state, allowing the analytes to release from the sorbent.
Desorb	This mode heats the analytical trap to its final point and rotates the 6-port valve so that carrier gas is back-flushed through the trap, transferring the analytes to the GC for separation and detection. This mode will also start the GC column program and drain the sample from the concentrator glassware.
Bake Rinse Fill	This mode allows hot water to fill the sample loop to clean the system between samples.
Bake Rinse Transfer	This mode transfers the rinse water through the transfer line to the sparge vessel of the concentrator.
Bake Rinse Drain	This mode drains the rinse water from the sparge vessel to waste.
Bake	This mode sweeps the sample pathway and the analytical trap (which is being held at a high temperature) with dry purge gas to clean the system between samples.

4.2 AQUATek LVA/Lumin P&T Concentrator Valve Output Chart



NOTE

For information on the Stratum concentrator valve outputs according to mode, refer to the *Stratum User Manual*.

Table 4-2 AQUATek LVA/Lumin P&T Concentrator Valve Output Chart

	Lumin P&T Concentrator								AQUATek LVA									
	Drain	Bake	Vent	Purge	Eliminator Rinse	Defoamer	6-Port	MFC	Sample	Drain	Transfer	Pressurize	Water	Pressure Select	Standard #1	Standard #2	Arm Index	Needle
	1	2	3	4	5	6			A	B	C	D	E	F				
Standby	ON	ON	OFF	OFF	OFF	OFF	A	Standby Flow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Drain	Down
Purge Ready	OFF	OFF	ON	OFF	OFF	OFF	A	Standby Flow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Drain	Down
Pre Sweep A	ON	ON	OFF	OFF	OFF	OFF	A	Standby Flow	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	Drain	Down
Pre Sweep B	ON	ON	OFF	OFF	OFF	OFF	A	Standby Flow	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	Drain	Down
Move Arm	ON	ON	OFF	OFF	OFF	OFF	A	Standby Flow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Position	Down
Sample Loop Fill	ON	ON	OFF	OFF	OFF	OFF	A	Standby Flow	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	Position	Down
Needle to Drain	ON	ON	OFF	OFF	OFF	OFF	A	Standby Flow	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	Drain	Down
Standard Dispense	ON	OFF	ON	OFF	OFF	OFF	A	0	ON	ON	ON	OFF	OFF	ON	ON	ON	Drain	Down
Sample Transfer	OFF	OFF	ON	OFF	OFF	OFF	A	0	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	Drain	Down
Pre-Purge (Sample Heater Only)	OFF	OFF	ON	ON	OFF	OFF	A	Pre-Purge Flow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Drain	Down
Sample Preheat (Sample Heater Only)	OFF	OFF	ON	OFF	OFF	OFF	A	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Drain	Down
Purge	OFF	OFF	ON	ON	OFF	OFF	A	Purge Flow	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Drain	Down
Purge / Rinse Loop	OFF	OFF	ON	ON	OFF	OFF	A	Purge Flow	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	Drain	Down
Purge / Sweep Needle	OFF	OFF	ON	ON	OFF	OFF	A	Dry Purge Flow	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	Drain	Down
Dry Purge	OFF	OFF	ON	OFF	OFF	OFF	A	Dry Purge Flow	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	Drain	Down
Desorb Ready	OFF	OFF	OFF	OFF	OFF	OFF	A	0	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	Drain	Down

Table 4-2 AQUATek LVA/Lumin P&T Concentrator Valve Output Chart (Continued)

	Lumin P&T Concentrator								AQUATek LVA									
	Drain	Bake	Vent	Purge	Eliminator Rinse	Defoamer	6-Port	MFC	Sample	Drain	Transfer	Pressurize	Water	Pressure Select	Standard #1	Standard #2	Arm Index	Needle
	1	2	3	4	5	6			A	B	C	D	E	F				
Cryo Cool down	OFF	OFF	OFF	OFF	OFF	OFF	A	0	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	Drain	Down
Desorb Preheat	OFF	OFF	OFF	OFF	OFF	OFF	A	0	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	Drain	Down
Desorb	ON	OFF	OFF	ON	OFF	OFF	B	Desorb Flow	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	Drain	Down
Cryo Inject	OFF	OFF	OFF	OFF	OFF	OFF	A	0	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	Drain	Down
Bake Rinse Fill	ON	ON	OFF	OFF	OFF	OFF	A	100	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	Drain	Down
Bake Rinse Transfer	OFF	OFF	ON	ON	OFF	OFF	A	0	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	Drain	Down
Bake Rinse Drain	ON	OFF	OFF	ON	OFF	OFF	A	Bake Flow	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	Drain	Down
Bake	ON	ON	OFF	OFF	OFF	OFF	A	Bake Flow	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Drain	Down

AQUATEk LVA User Manual

Chapter 5: Automated pH Sensing Option



NOTE

For pH probe installation information, refer to the instruction sheet included with the probe.

The AQUATEk LVA can be configured with an automated pH sensing option designed to operate with both the Lumin and Stratum concentrators. The pH of samples is measured as the sample drains from the concentrator's sparger to the pH probe, during the desorb mode. As the AQUATEk LVA completes scheduled samples, the pH field in the schedule is populated with the sample's pH value. The pH values are also recorded in the INSTRUMENT HISTORY LOG. Recording the pH value confirms that samples have been preserved at the proper pH, according to US EPA method protocol.

5.1 pH Probe Specifications

Table 5-1 pH Probe Specifications	
pH Range and Accuracy	2 to 12 +/- 10% with two-point calibration
Power Requirements	5.0 VDC
Operating Temperature	10 to 40 °C (50 to 104 °F)
Probe Dimensions	Length: 102 mm (4.0") Diameter: 16 mm (0.63")

5.2 Calibrate pH Probe or Verify an Existing Calibration

Before accurate pH values can be measured, the pH probe must be calibrated using the PH PROBE CALIBRATION WIZARD in Lumin TekLink or Stratum VOC TekLink2G. This same wizard can also be used to verify the calibration and ensure analytical accuracy. The frequency of calibration will depend on the level of accuracy required and the coating/fouling nature of the samples being measured. To start the wizard, navigate to TOOLS>PH PROBE CHECK (STANDARD/CALIBRATION). Follow all PH PROBE CALIBRATION WIZARD prompts to completion.

5.2.1 Required Standards

- Calibration Verification - One pH Check Standard
- Calibration - Two known pH Reference Standards

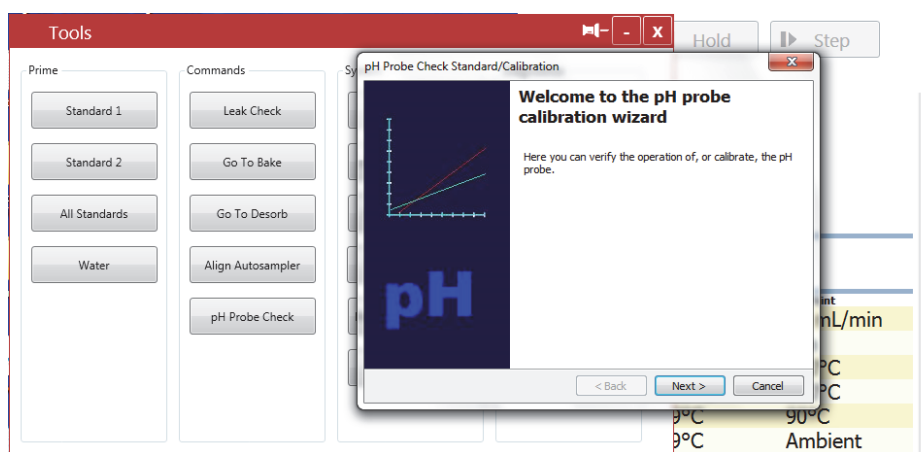
NOTE

When recalibrating, Teledyne Tekmar recommends using two standards that bracket the expected pH measurements. If 2 is the expected pH of the samples, reference standards of 1.68 and 4 would allow for the greatest accuracy.

5.2.2 Procedure

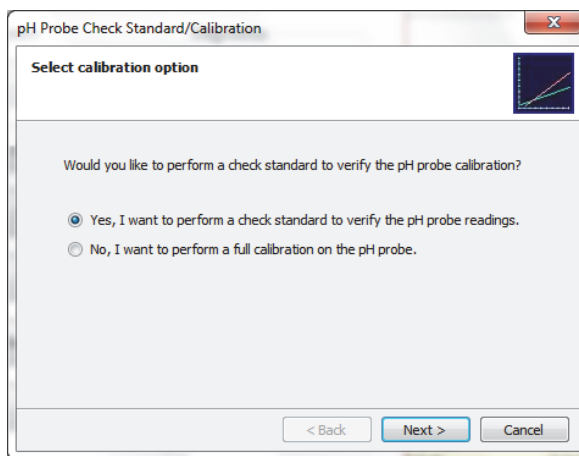
1. Navigate to the TOOLS SCREEN, then select the PH PROBE CHECK BUTTON to open the PH PROBE CHECK WIZARD.

Figure 5-1 pH Probe Check Wizard



2. The wizard will prompt to verify the pH probe calibration or perform a full calibration.

Figure 5-2 pH Probe Check Wizard - Select Option



5.3 pH Probe Maintenance

Teledyne Tekmar recommends that the pH probe be cleaned and calibrated periodically to ensure accurate readings.

5.3.1 pH Probe Cleaning

Contamination on the diaphragm will block the built-in reference electrode, severing electrical contact between the electrode and the probe chip and causing the probe not to function. Consequently, regular cleaning is recommended. The frequency of cleaning required depends on the quality of the water being measured. The “soapy water method” of cleaning is recommended:

1. Place the tip of the probe in soapy 50 to 60 °C (122 to 140 °F) water and allow to soak for five minutes.
2. Rinse thoroughly with deionized water.
3. If necessary, lightly scrub the tip of the probe with a toothbrush to remove debris.



Caution

To prevent scratching the chip, a toothbrush should only be used after soaking in soapy water. Most scratches occur when hard particles are rubbed with a toothbrush on the chip's surface. This can cause irreversible damage to the probe.

4. Next place the probe in 20 °C (68 °F) saturated potassium chloride (KCl) solution. Keep the probe in solution for approximately 30 minutes.
5. Rinse the probe thoroughly with deionized water.
6. After cleaning, calibrate the probe according to Section 5.2 "Calibrate pH Probe or Verify an Existing Calibration".

5.4 pH Probe Troubleshooting

The most common causes for erroneous pH data include:

- Contaminated or dried out diaphragm
- Probe chip is scratched
- Damaged cable or bad connection at circuit board

Table 5-2 pH Probe Troubleshooting

Issue	Cause	Solution
Output signal is frozen	Probe is not inserted all the way into the probe support tube.	Ensure the probe is fully inserted and reaches the bottom of probe support tube.
	Diaphragm is contaminated.	Clean probe according to Section 5.3.1 "pH Probe Cleaning".
	Diaphragm is dried out.	Soak probe for 10 minutes in saturated KCl solution.
	Damaged cable or poor connection.	Inspect cable and connection.
	Probe chip is scratched.	Replace the probe. The probe cannot be repaired, if the chip has been scratched.
Probe response is very slow	Diaphragm is contaminated.	Clean probe according to Section 5.3.1 "pH Probe Cleaning".
Probe signal is drifting	Probe is not inserted all the way into the probe support tube.	Ensure the probe is fully inserted and reaches the bottom of probe support tube.
	Diaphragm is dried out.	Soak probe for 10 minutes in saturated KCl solution.
	Probe chip is scratched.	Replace the probe. The probe cannot be repaired, if the chip has been scratched.

5.4.1 pH Probe Diagnostics

In Lumin TekLink select the **TOOLS** BUTTON, then select the **AQUATEK LVA** BUTTON under the **DIAGNOSTICS** MENU. In Stratum VOC TekLink2G select **TOOLS>DIAGNOSTICS>AQUATEK LVA** TAB.

The **SENSOR PANEL** will show the following feedback:

- PH PROBE RESPONSE
- PH VALUE

AQUATek LVA User Manual

Chapter 6: Maintenance and Troubleshooting

For pH probe maintenance and troubleshooting, refer to Chapter 5: "Automated pH Sensing Option".



Caution

The AQUATek LVA access panels are secured using 1/4 turn captive screws. These screws only need to be turned 90 degrees to disengage and when free will remain attached to the panel. **Use of a powered screw driver will strip and/or damage the screws.**



NOTE

Caution and Warning Symbols are defined in Section P.5 "AQUATek LVA Safety Symbols Defined" and Section P.6 "AQUATek LVA Safety Labels".

Les symboles d'Alerte et de Danger sont définis dans la section P.5 "Symboles Sécurité AQUATek LVA la section P.6 "Label Sécurité AQUATek LVA" (Section P.5 "AQUATek LVA Safety Symbols Defined" and Section P.6 "AQUATek LVA Safety Labels").



DANGER

DANGER: Remove the power cable before performing maintenance and/or servicing the instrument.

DANGER - Débrancher le câble d'alimentation avant toutes interventions de maintenance et/ou d'entretien sur l'instrument.

6.1 Replacing AQUATek LVA Parts



NOTE

For replacement part numbers contact Teledyne Tekmar Customer Support using the information in Section 6.28 "Technical Assistance" or use the Teledyne Advanced Chemistry Systems Online Store (<https://store.teledyneacs.com/account/login>).

Appendix A: "Diagrams" and the Printed Circuit Board (PCB) connection schematic affixed to the interior of the instrument can be valuable resources when any doubt exists about making the correct connections.



WARNING

Only use replacement parts supplied or approved by Teledyne Tekmar when performing maintenance on the AQUATek LVA. Use of unapproved parts could result in damage to the instrument, as well as personal injury.



DANGER

Do not replace the AQUATek LVA mains supply AC power cable with a cable of any other type or rating. Only replace fuses with those of the same type and rating. Refer to Section 6.8 "AQUATek LVA Power Entry Module Fuse Replacement".

6.2 How to Make Gas and Liquid Connections

To make gas and liquid tubing connections, compression nuts and ferrules, as well as quick-connect fittings, are used. This section explains how to make these connections properly to prevent leaks.



NOTE

If the nuts and ferrules are the wrong sizes or are not properly swaged, leaks can occur.

Tubing connections must be made with:

- Swagelok® nut and two-piece metal ferrule (typically brass or stainless steel) (Figure 6-1)
- PEEK nut and one-piece plastic ferrule (Figure 6-2)
- PEEK nut and two-piece PEEK/metal ferrule (Figure 6-3)
- Valco nut and metal ferrule (Figure 6-4)
- Quick-connect fittings (Figure 6-5)

All procedures will designate what type of fitting to be used for a given connection.

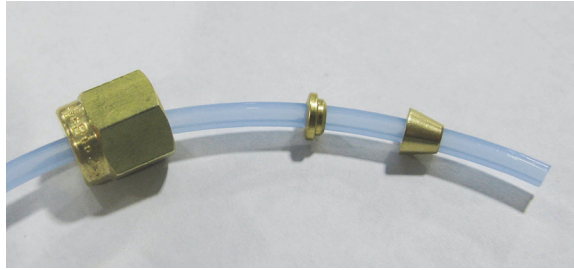


NOTE

To check if a nut and ferrule have been properly swaged, loosen the nut and pull on the ferrule. The ferrule should not slide.

6.2.1 Swagelok Nut and Two-Piece Metal Ferrule

Figure 6-1 Swagelok Nut and Two-Piece Metal Ferrule



1. Slide the nut onto the tubing with the threads toward the end of the tubing.
2. Slide the small rear ferrule onto the tubing with the wide face toward the nut.
3. Slide the front cone-shaped ferrule onto the tubing with the wide end toward the nut.
4. Thread onto the fitting and tighten with an appropriately sized open-ended wrench.

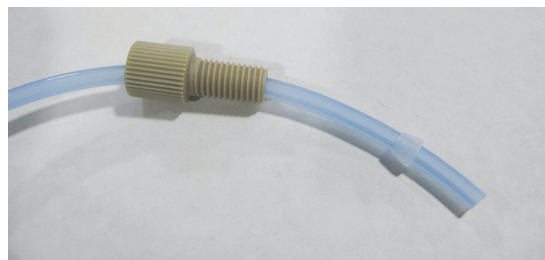


NOTE

For metal ferrules (such as to the gas supply), use a wrench to tighten the nut further. Turning the nut 1/4 turn (90°) to 1/2 turn (180°) is usually adequate. However, the amount of force required can vary, depending on the friction between the nut and threads, as well as the composition and thickness of the tubing or line.

6.2.2 PEEK Nut and One-Piece Plastic Ferrule

Figure 6-2 PEEK Nut and One-Piece Plastic Ferrule



1. Slide the nut onto the tubing with the threaded end toward the end of the tubing.
2. Slide the plastic ferrule onto the tubing with the narrow end oriented toward the nut.
3. Insert the tubing into the designated connector on the instrument.
4. Finger-tighten the nut, but do not over-tighten.

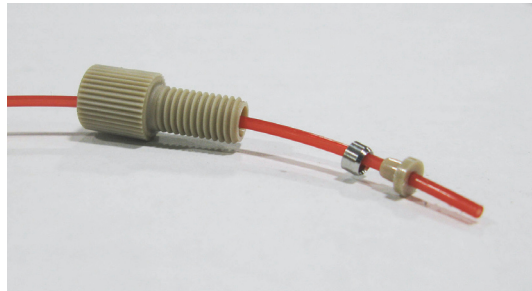


NOTE

For most connections the end of the tubing should be flush with the end of the ferrule.

6.2.3 PEEK Nut and Two-Piece PEEK/Metal Ferrule

Figure 6-3 PEEK Nut and Two-Piece PEEK/Metal Ferrule



1. Slide the PEEK nut onto the tubing with the threaded end toward the end of the tubing.
2. Slide the rear metal ferrule onto the tubing with the flat towards the nut and the rounded end towards the end of the tubing.
3. Slide the front t-shaped plastic ferrule onto the tubing with the narrow end toward the metal ferrule.
4. Insert the tubing into the designated connector on the instrument.
5. Finger-tighten the nut, but do not over-tighten.

6.2.4 Valco Nut and Metal Ferrule

Figure 6-4 Valco Nut and Ferrule Orientation



1. Slide the Valco nut onto the tubing with the threaded end toward the end of the tubing.
2. Slide the metal ferrule with the wide, flat end toward the nut.
3. Insert the tubing and ferrule into the designated connector on the instrument.
4. Tighten the nut using an open-ended wrench, but do not over-tighten.



Caution

To prevent damage to metal nuts and ferrules, do not tighten them over 3/4 turn (270 °). Once swaged onto the tubing, it is only necessary to tighten a nut slightly to eliminate a leak. If leaking persists, look for other causes.

6.2.5 Quick-Connect/Disconnect Fittings

10 Liter DI Water Reservoir Quick Connect/Disconnect

The 10 Liter DI water reservoir quick connect/disconnect uses two interlocking brass fittings. To connect/disconnect, retract the brass collar to engage/disengage the brass fittings.

Figure 6-5 DI Reservoir Quick-Connect Fitting



6.3 Preventative Maintenance Checks

The following checklists outline the maintenance required for successful operation of the AQUATek LVA.



NOTE

In addition to AQUATek LVA preventative maintenance checks, also perform all concentrator preventative maintenance checks as specified in the Concentrator User Manual to ensure the system maintains optimal performance.

6.3.1 Daily Maintenance Checks

Table 6-1 Daily Maintenance Checklist	
Optional pH Probe	Regular cleaning of the probe is recommended. The frequency of cleaning required depends on the quality of the water being measured. Refer to Section 5.3.1 "pH Probe Cleaning".
Optional pH Probe Calibration Verification	Verify that the probe is calibrated using the pH Probe Check Wizard and a check standard. Refer to Section 5.2 "Calibrate pH Probe or Verify an Existing Calibration".
Pressurization Gas Supply	500+ psi from tank
Verify Stage 2 Carrier Pressure	65 - 100 psi (4.48 bar - 6.89 bar)
DI Water Supply	Fresh and ample supply. Refer to Section 2.15.1 "Preparing DI Water" and Section 6.10 "Refill DI Water Reservoir and Prime Lines".
Internal Standard Supply	Ample amount for the analytical schedule. Refer to Section 2.15.3 "Preparing Working Standards" and Section 6.11 "Fill and Prime Internal Standard Vessels".
Leak Check	Leak check the instrument according to Section 6.22.2 "Leak Check".

6.3.2 Weekly Maintenance Checks

Table 6-2 Weekly Maintenance Checklist	
Previous Checks	Perform Daily Checks.
Check System Pressure	Verify System Pressure is 6-8 psi (.41 - .55 bar) by checking the system pressure gauge on the front of the instrument.

6.3.3 AQUATek LVA Monthly Maintenance Checks

Table 6-3 Monthly Maintenance Checklist	
Previous Checks	Perform Daily and Weekly Checks.
Autosampler	Clean the autosampler according to Section 6.16.1 "Monthly XYZ Arm External Cleaning".
Inspect Glassware	Clean or replace glassware as necessary. Refer to Section 6.12 "Glassware Good Practices and Cleaning Procedures".
Inspect Aqueous Transfer Line	Inspect the aqueous transfer line and replace if necessary. Refer to Section 6.14 "Aqueous Transfer Line Replacement".
Inspect Drain Tubing	Inspect all draining tubing and replace as necessary.

6.3.4 Quarterly Maintenance Checks

Table 6-4 Quarterly Maintenance Checks	
Previous Checks	Perform Daily, Weekly and Monthly Checks.
Autosampler	Clean the autosampler according to Section 6.16.2 "Quarterly XYZ Arm Cleaning".

6.4 Preventative Maintenance Chart

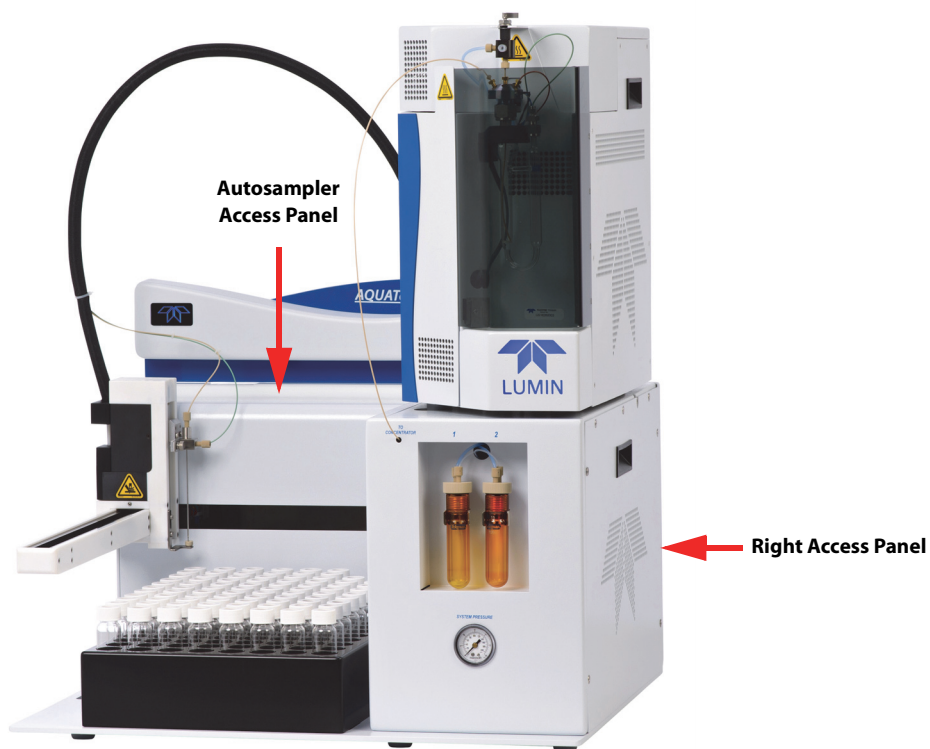
Table 6-5 Preventative Maintenance Chart							
Rate	Action	Check When Completed					
Daily	pH Probe Cleaning						
	pH Probe: Verify Calibration with Check Standard						
	Pressurization Gas: 500+ psi From Tank						
	Verify Stage 2 Pressure: 65 - 100 psi (4.48 bar - 6.89 bar)						
	DI Water: Fresh and Ample Supply						
	Internal Standard Supply						
	Leak Check						
	Initials & Date						
Weekly	Previous Checks: Daily Maintenance Items						
	Verify System Pressure is 6-8 psi (.41 - .55 bar)						
	Initials & Date						
Monthly	Previous Checks: Daily and Weekly Maintenance Items						
	Clean Autosampler						
	Inspect Glassware						
	Inspect Aqueous Transfer Line						
	Inspect Drain Tubing						
	Initials & Date						
Quarterly	Previous Checks: Daily, Weekly and Monthly Maintenance Items						
	Autosampler Cleaning						
	Initials & Date						

6.5 Instrument Access Panels

The AQUATek LVA has the following access panels:

- Right-Side Access Panel
- Autosampler Access Panel

Figure 6-6 AQUATek LVA Access Panels



 **Caution**

The AQUATek LVA access panels are secured using 1/4 turn captive screws. These screws only need to be turned 90 degrees to disengage and when free will remain attached to the panel. **Use of a powered screw driver will strip and/or damage the screws.**

 **WARNING**

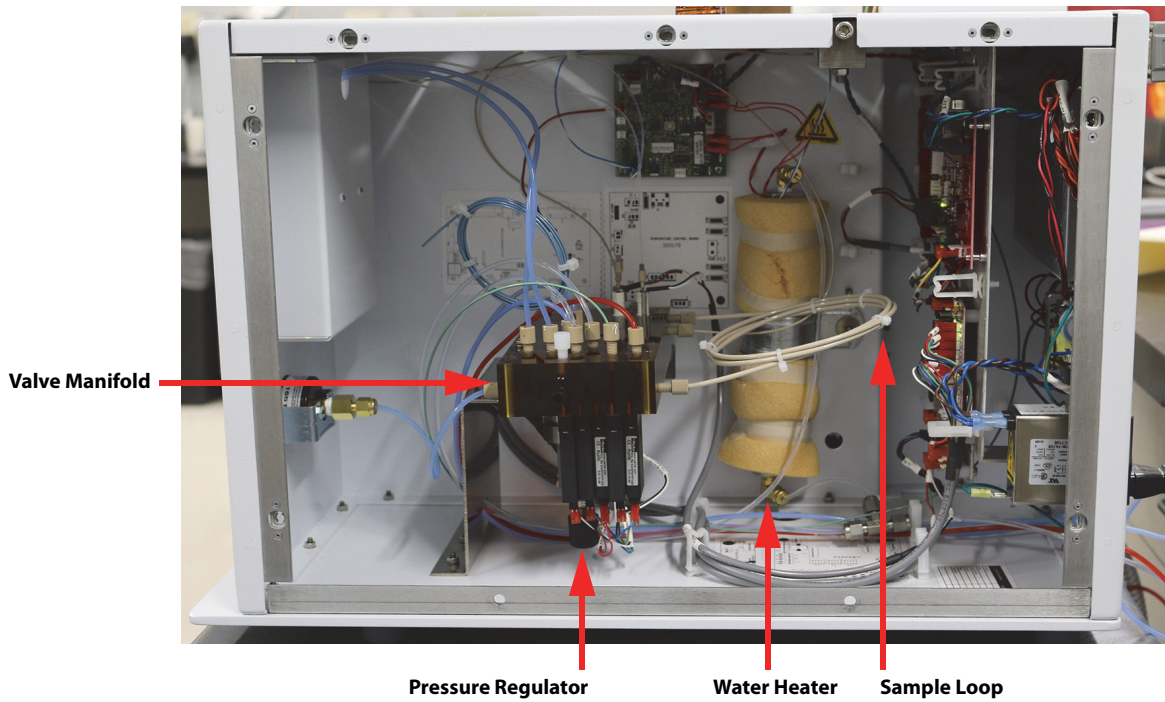
The AQUATek LVA access panels must be installed prior to turning the instrument ON. The AQUATek LVA is designed to keep liquid spills from coming in contact with electronics inside the unit.

6.6 Plumbing Overview

 **NOTE**

Also refer to Section A.2 "Plumbing Diagram".

Figure 6-7 Plumbing Components



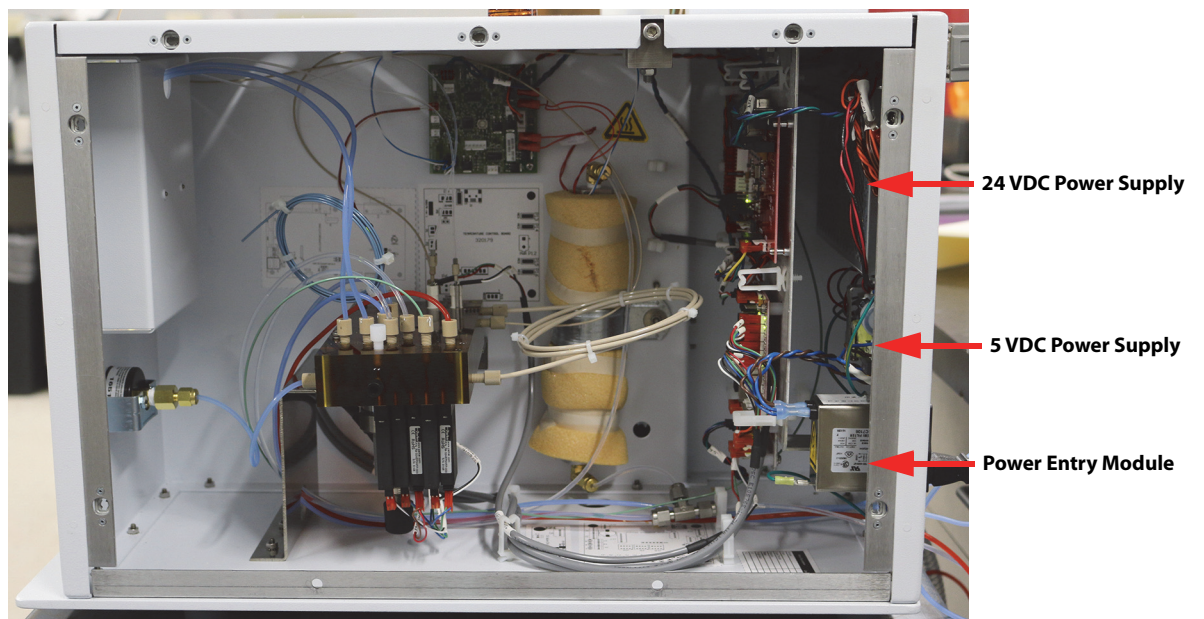
6.7 Electrical Overview



NOTE

Also refer to Section A.1 "Electrical Diagram".

Figure 6-8 AQUATek LVA Electrical Components



6.7.1 Printed Circuit Boards

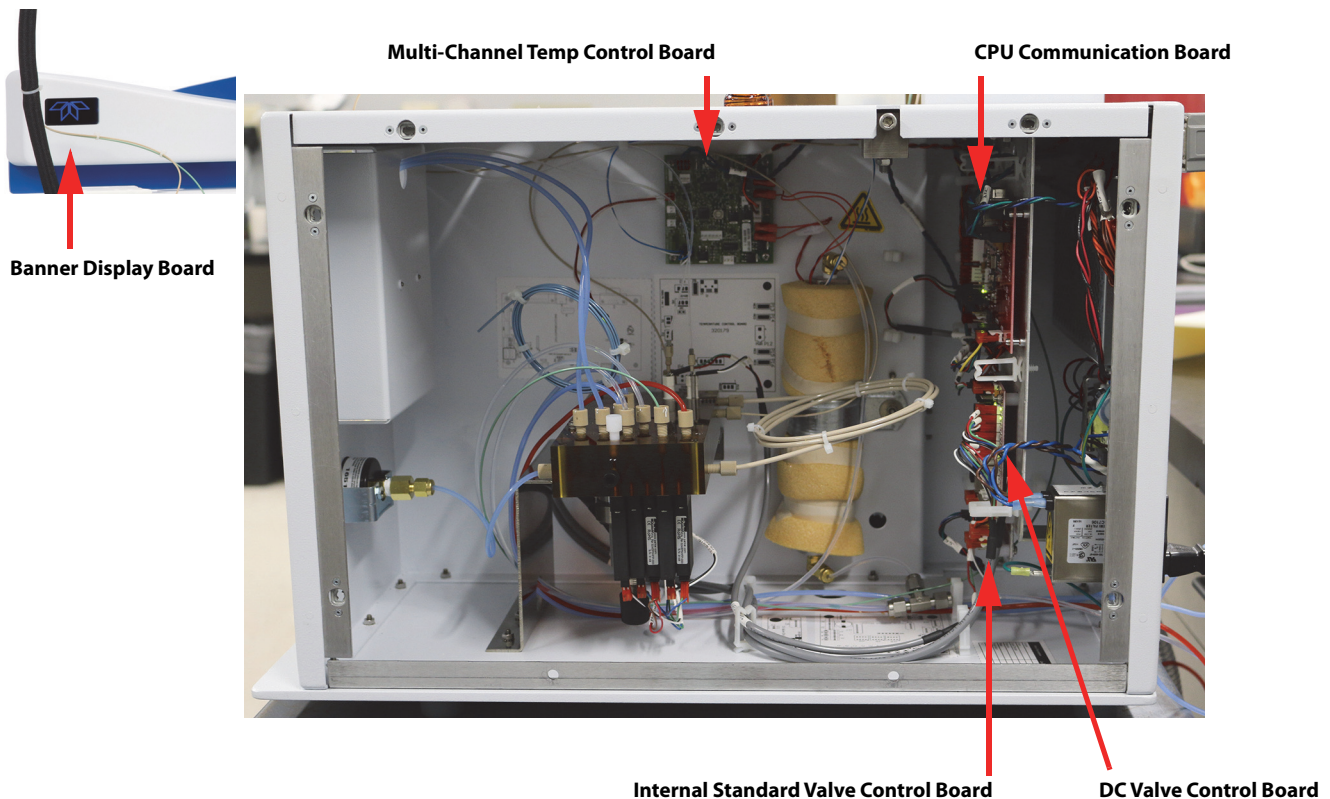
AQUATek LVA

The AQUATek LVA contains the following Printed Circuit Boards (PCB):

- CPU Communication Board (Master Board)
- Multi-Channel Temperature Control Board
- DC Valve Control Board
- Banner Display Board
- Internal Standard Valve Control Board

Locations of the boards are shown in Figure 6-9. Diagrams of the boards are affixed to the interior of the instrument.

Figure 6-9 AQUATek LVA Printed Circuit Boards



CPU Communication Board (Master Board)

Communicates to the concentrator and controlling PC via the RS-232 data communication cable. Also responsible for control of the optional pH probe, if installed.

Multi-Channel Temperature Control Board

Responsible for control of the water heater.

DC Valve Control Board

Actuates the AQUATek LVA solenoid valves.

Banner Board

Controls the status indicator LED.

Internal Standard Control Board

Controls the two standard injection system 2-way dosing valves mounted on the valve manifold.

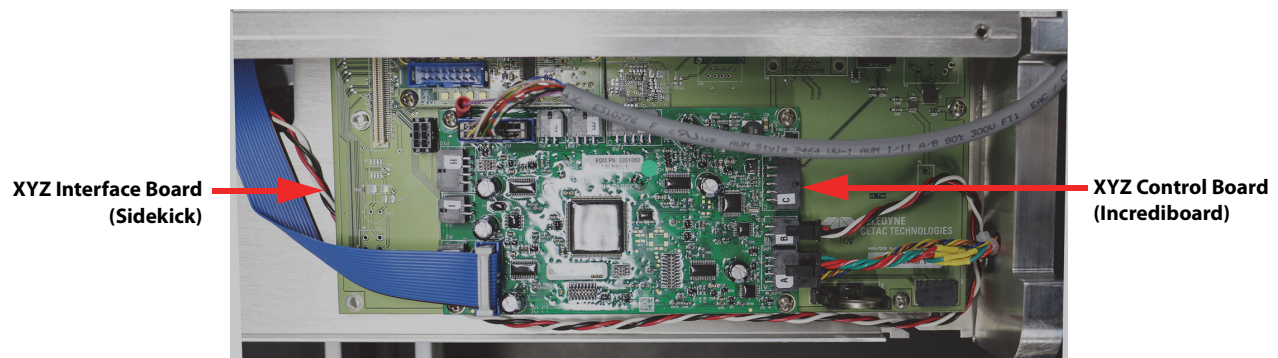
XYZ Robotic Arm

The AQUATek LVA XYZ robotic arm contains the following PCBs:

- XYZ Interface Board (Sidekick)
- XYZ Control Board (Incrediboard)

Locations of the boards are shown in Figure 6-10.

Figure 6-10 XYZ Robotic Arm Printed Circuit Board Locations



XYZ Interface Board (Sidekick)

Located beneath the XYZ Control Board (Incrediboard). This board is responsible for communications between the XYZ Control Board (Incrediboard) and the XYZ robotic arm.

XYZ Control Board (Incrediboard)

Located on top of the XYZ Interface Board. This board controls all autosampler arm movements.

6.7.2 Power Supplies

AQUATek LVA has the following power supplies:

- 24VDC Power Supply - Supplies 24V Direct Current (DC) to the AQUATek LVA valves and motors.
- 5VDC Power Supply - Supplies 5V Direct Current (DC) to the AQUATek LVA Printed Circuit Boards (PCBs).

6.8 AQUATek LVA Power Entry Module Fuse Replacement



NOTE

This section explains the procedure for replacing blown fuses. If a fuse has blown, the root cause of the blown fuse should be determined before re-powering the instrument. If you require assistance, contact Teledyne Tekmar Customer Service using information in Section 6.28 "Technical Assistance".

To replace the fuses, follow the steps below. Required fuses are shown Table 6-6 "AQUATek LVA PEM Fuse Ratings (2 IEC 5 x 20 mm Fuses)".

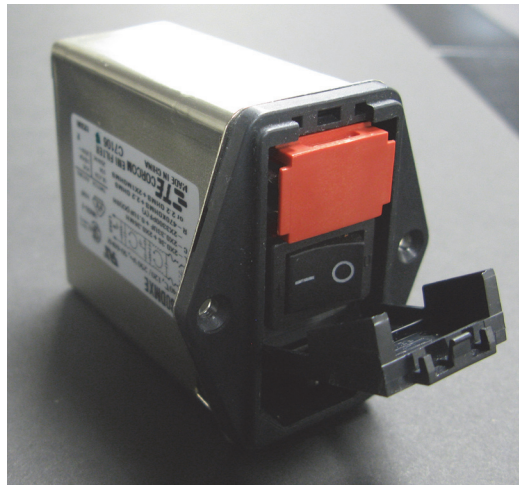
Figure 6-11 AQUATek LVA Power Entry Module (PEM)



Warning! To avoid electrical shock turn OFF and unplug the AQUATek LVA before servicing.

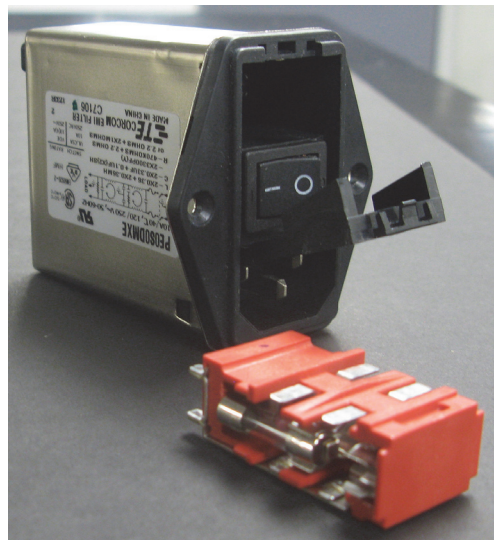
1. Power off the AQUATek LVA and remove the AC power cable from the back of the unit.
2. Open the module's hinged fuse cover by inserting a small flat-head screwdriver at the top and then pulling the cover down.

Figure 6-12 PEM Fuse Module Cover Open (PEM Removed for Clarity)



3. Remove the fuse module from the PEM.

Figure 6-13 Fuse Module Removed



4. Remove the blown fuse(s).
5. Install fuses by pressing them into the fuse module. The correct fuse ratings and specifications are listed on the back of the instrument below the PEM as well as in Table 6-6 "AQUATek LVA PEM Fuse Ratings (2 IEC 5 x 20 mm Fuses)". Fuses should be installed toward the rear of the module (toward the electrical contacts).

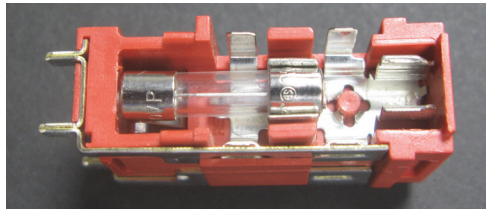


DANGER

The fuses are rated 2.5A for 100V-240V. Only replace fuses with those of the same type and rating.

Table 6-6 AQUATek LVA PEM Fuse Ratings (2 IEC 5 x 20 mm Fuses)		
Electrical Configuration	Rating	Description
100 VAC - 240 VAC Operation	T 2.5A – 250V	Time Delay Fuse

Figure 6-14 Fuse Orientation in Fuse Module



6. Push the fuse module back into the PEM until fully seated. Close the cover over the fuse module.
7. Connect the AC power cable and turn the unit ON.
8. Start the TekLink software, if necessary.

6.9 Setting/Adjusting System Pressure

The AQUATek LVA requires a system pressure of 6-8 psi (.41 - .55 bar) which can be confirmed using the system pressure gauge on the front of the instrument. If the system pressure requires adjustment use the procedures below.

Figure 6-15 System Pressure Gauge



Tools Required

- Phillips-head screwdriver

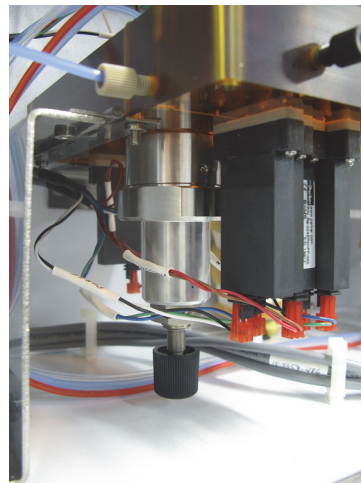
Procedure



Warning! To avoid electrical shock turn OFF and unplug the AQUATek LVA before servicing.

1. Ensure the pressurization gas supply regulator is supplying 65 - 100 psi (4.48 bar - 6.89 bar) at the tank regulator.
2. Power off the AQUATek LVA and remove the AC power cable from the back of the unit.
3. Remove the right access panel by loosening the 1/4 turn screws that secure it.
4. Adjust the system pressure using the regulator mounted to the bottom of the valve manifold block. Turn the knob clockwise to increase pressure and counter-clockwise to reduce pressure.

Figure 6-16 System Pressure Regulator



5. As the regulator knob is turned, observe the pressure reading on the system pressure gauge.
6. Once the correct system pressure of 6 - 8 psi is achieved, reinstall the right access panel using the screws that secure it.
7. Reconnect the AC power cable and power the instrument ON.

6.10 Refill DI Water Reservoir and Prime Lines

6.10.1 Refill DI Water Reservoir

Figure 6-17 DI Water Reservoir



1. Refer to Section 2.15.1 "Preparing DI Water" to prepare DI water for the reservoir.
2. Disconnect the AQUATEk LVA blue, 1/8" (0.32 cm) "Gas Out" tubing at the reservoir's "Gas In" quick-connect on the reservoir cap by lifting the quick-connect collar and then separating the fittings. Allow the pressure in the tank to decrease.



Caution

Failure to release pressure can cause the lid to burst from the top of the reservoir, when the threaded retaining ring is removed. This can result in injury, cause a spill and waste gas. Once the pressure has been released from the DI reservoir, it is safe to remove the lid.

3. Unscrew the threaded retaining ring, remove the reservoir cap and fill the vessel with DI water leaving at least 15.2 cm (6") of headspace. Reinstall the reservoir cap, then tighten the threaded retaining ring to seal it.
4. Reconnect the AQUATEk LVA blue, 1/8" (0.32 cm) "Gas Out" tubing to the reservoir's "Gas In" quick-connect on the reservoir cap. Lift the quick-connect collar and then join the fittings.
5. Prime the DI water line to remove air from the system according to Section 6.10.2 "Prime DI Water Lines".

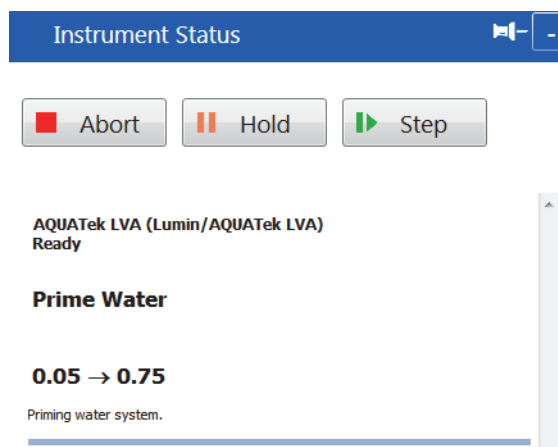
6.10.2 Prime DI Water Lines

Priming should be performed each time the DI water reservoir is filled or when DI water supply tubing and components (e.g. water heater) are replaced.

1. Select TOOLS>PRIME MENU>WATER to remove the air from both the cold and hot DI water supply lines.

2. Once the PRIME WATER BUTTON has been selected, the priming progress can be viewed on the STATUS PANEL.

Figure 6-18 Instrument Status Panel Showing Prime Water Progress

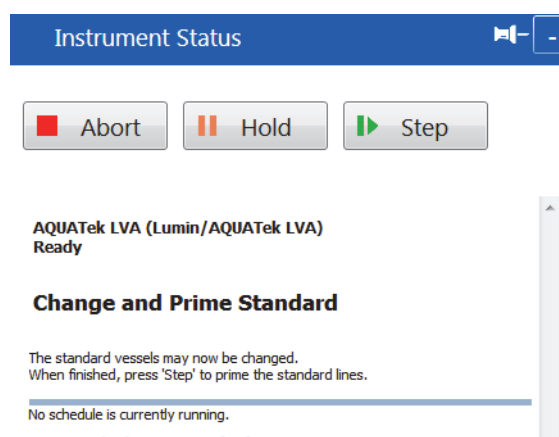


6.11 Fill and Prime Internal Standard Vessels

Priming should be performed each time the internal standard vessels are filled or when internal standard supply tubing is replaced.

1. Prepare standards according to Section 2.15.3 "Preparing Working Standards".
2. Select TOOLS>ALL STANDARDS BUTTON (or TOOLS>PRIME/CHANGE STANDARDS>ALL STANDARDS in Stratum VOC TekLink2G) to redirect the pressurization gas away from the internal standard vessels. Use the individual standard vessels buttons if filling/priming is only required for one standard vessel.
3. Follow the prompts on the INSTRUMENT STATUS PANEL. Remove the standard vessel from the retaining clip and unscrew the vessel from the PEEK cap. Inspect the cap, vessel and supply lines; clean or replace any components and then refill. For cleaning procedures, refer to Section 6.12 "Glassware Good Practices and Cleaning Procedures".

Figure 6-19 Instrument Status Panel Showing Prime Standards Progress



6.12 Glassware Good Practices and Cleaning Procedures

Clean glassware is essential for trouble-free analyses. This glassware includes spargers, samplers, flasks, cylinders - anything used in handling samples, standards or blank water. Glassware used for other procedures, such as extractions, is usually not clean enough to use for trace applications.

Consult your laboratory's Standard Operating Procedures (SOPs) for keeping glassware clean. In addition to your standard glassware protocol Teledyne Tekmar recommends the following:

- Use dedicated glassware. Dedicated glassware is glassware that is used for the AQUATek LVA and Purge and Trap Concentrator only.
- Only clean glassware with DI water and do not use soaps or cleaning products which could introduce contamination.

6.13 Sample Needle Assembly Replacement

6.13.1 Tools Required

- None

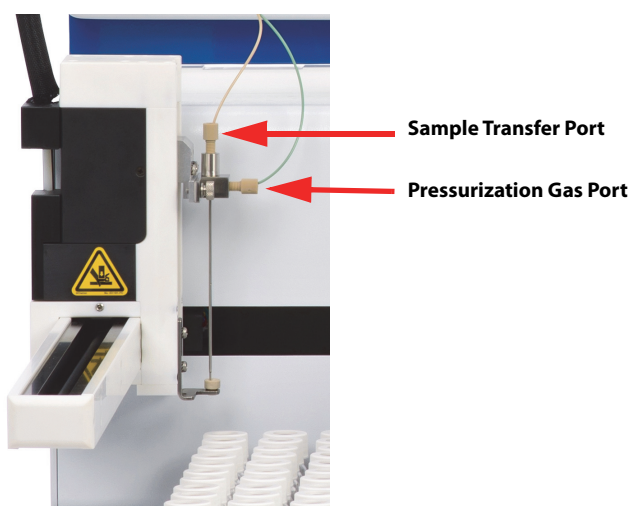
6.13.2 Procedure



Warning! Ensure the instrument is powered off and the AC power cable removed, prior to placing hands and/or other appendages in the path of travel of the XYZ robotic arm.

1. Power off the AQUATek LVA and remove the AC power cable from the back of the unit.

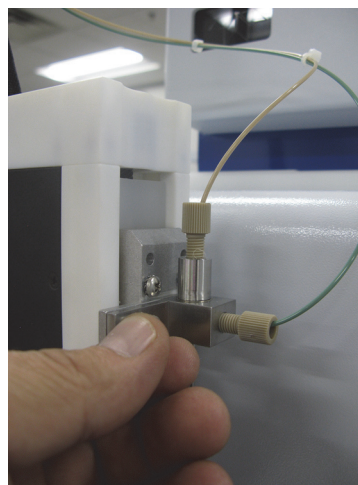
Figure 6-20 Sample Needle Assembly



2. Disconnect the green, 1/16" (0.1 cm) pressurization gas tubing (side port of the sample needle assembly) and tan, 1/16" (0.1 cm) sample transfer tubing (top port of the sample needle assembly) by unscrewing the PEEK nut.

3. Unscrew the thumbscrew that secures the needle assembly and then remove the needle.

Figure 6-21 Sample Needle Assembly Thumbscrew



4. Place the new sample needle assembly on the needle mount, aligning the locator hole with the alignment pin on the mount.
5. Reinstall the needle assembly thumbscrew and finger-tighten.
6. Reconnect the green, 1/16" (0.1 cm) pressurization gas tubing to the side port and tan, 1/16" (0.1 cm) sample transfer tubing to the top port of the sample needle assembly by reinstalling the PEEK nuts.
7. Reconnect the AC power cable and power the instrument ON.
8. Perform a leak check according to Section 6.22.2 "Leak Check".

6.14 Aqueous Transfer Line Replacement



Warning! Hot surface! The concentrator's sample mount may be heating to standby temperature. Turn the concentrator off and allow the concentrator's sample mount and surrounding area to cool to room temperature.

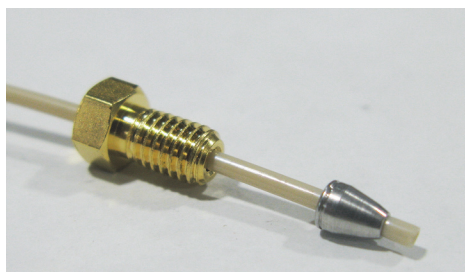


To avoid electrical shock turn OFF and unplug the AQUATEk LVA before servicing.

1. Power off the AQUATEk LVA and remove the AC power cable from the back of the unit. Allow the concentrator's heated sample mount to cool.
2. Remove the right access panel by loosening the 1/4 turn screws that secure it.
3. Trace the aqueous transfer line back to the valve manifold and disconnect by unscrewing the PEEK nut.

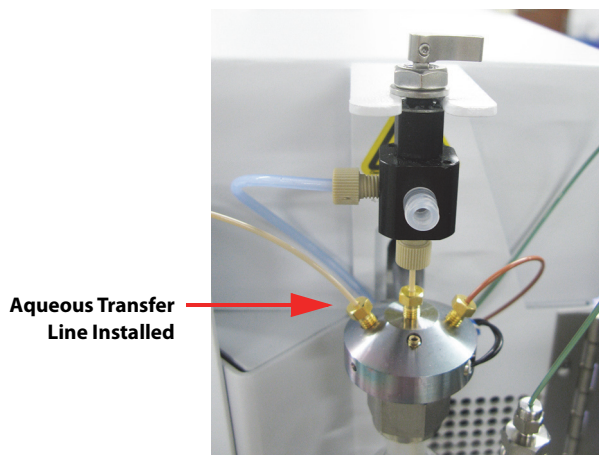
4. Cut the PEEK nut and ferrule off of the line and then pull it out of the hole labeled “To Concentrator” at the front of the instrument. Where the transfer line attaches to the concentrator sample mount, disconnect by unscrewing the Valco nut. Retain the Valco nut.
5. Cut a 6’ (1.83 m) piece of tan, 1/16” (0.16 cm) OD PEEK tubing.
6. Thread the aqueous transfer line through the Valco nut and a new ferrule in the orientation shown in Figure 6-22.

Figure 6-22 Valco Nut and Ferrule Orientation



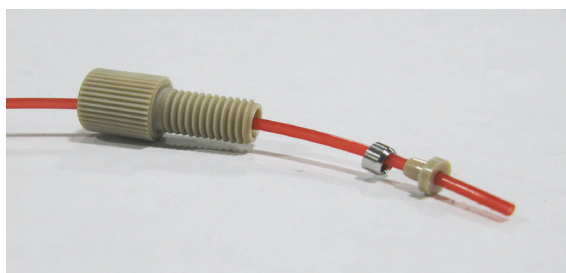
7. Insert the tubing and ferrule into the port on the sample mount **until the tip of the tubing is visible in the center of the bulb of the sparger glassware**. Using a 1/4” open ended wrench, tighten the Valco nut.

Figure 6-23 Aqueous Transfer Line Connected to Lumin Sample Mount



8. Route the other end of the aqueous transfer line through the AQUATek LVA “To Concentrator” hole to the valve manifold. Thread the PEEK nut and a new 2-piece PEEK/metal ferrule onto the tubing in the orientation shown in Figure 6-24. Ensure a white washer is in the aqueous transfer line port, then connect. Finger-tighten the nut, but do not over-tighten.

Figure 6-24 PEEK Nut and 2-Piece Metal PEEK Ferrule Orientation



9. Reinstall the right access panel using the screws that secure it.
10. Reconnect the AC power cable and power the instruments ON.
11. Perform a leak check according to Section 6.22.2 "Leak Check".

6.15 Sample Loop Replacement/Change

6.15.1 Tools Required

- Phillips-head screwdriver

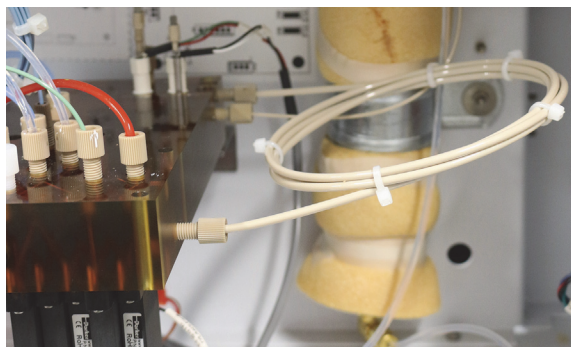
6.15.2 Procedure



To avoid electrical shock turn OFF and unplug the AQUATek LVA before servicing.

1. Power off the AQUATek LVA and remove the AC power cable from the back of the unit.
2. Remove the right access panel by loosening the 1/4 turn screws that secure it.
3. Disconnect both ends of the sample loop at the valve manifold by unscrewing the PEEK nuts.

Figure 6-25 Sample Loop Connected to the Valve Manifold



4. Ensure there is a white washer in the bottom of each sample loop port on the valve manifold.

5. Install the new sample loop by threading the pre-swaged PEEK nuts and ferrules into the ports on the side of the valve manifold and finger-tighten.
6. Reinstall the right access panel using the screws that secure it.
7. Reconnect the AC power cable and power the instrument ON.
8. Perform a leak check according to Section 6.22.2 "Leak Check".



NOTE

If the new sample loop has a different volume from the one previously installed, ensure the method's Sample Loop Time (Pressurization Time) on the AQUATek LVA Tab is revised appropriately. If the time is too short, the sample volume will be inaccurate. If the time is too long, sample will be wasted.

6.16 XYZ Robotic Arm Cleaning Procedure



Caution

Never lubricate the lead screws. The lead screw nuts are compounded with a dry film lubricant. Oiling the lead screws will cause gumming, galling and binding of the gripper assembly.

The autosampler must be cleaned both monthly and quarterly to prevent damage and extend its life. It is especially important to clean up spills and remove contaminants, such as abrasives, from the autosampler's moving parts.



NOTE

If a spill occurs, follow the appropriate laboratory-defined Standard Operating Procedure (SOP) to remove it from the autosampler.

6.16.1 Monthly XYZ Arm External Cleaning



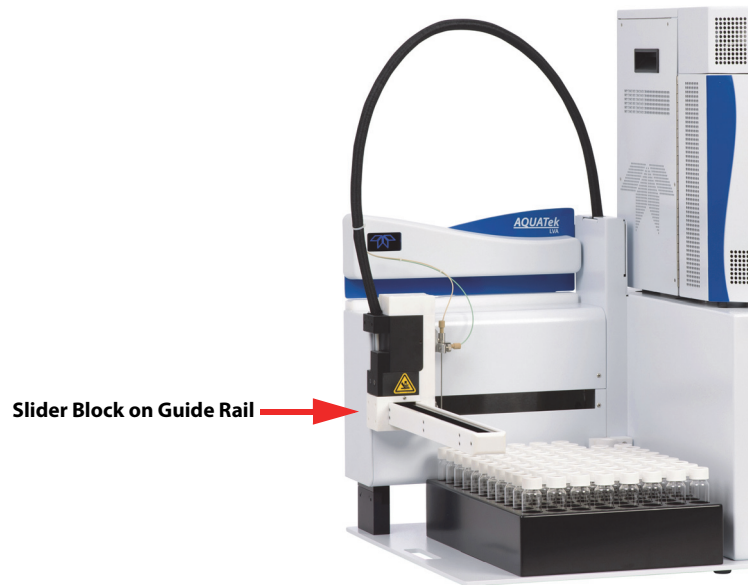
Warning! Ensure the instrument is powered off and the AC power cable removed, prior to placing hands and/or other appendages in the path of travel of the XYZ robotic arm.

1. Power off the AQUATek LVA and remove the AC power cable from the back of the unit.
2. Remove the autosampler vial rack and clean using a towel dampened with a lab-grade cleaning agent, followed by a towel dampened with clear water.
3. Wipe the autosampler exterior and base using a towel dampened with a lab-grade cleaning agent, followed by a towel dampened with clear water. Pay special attention to the slider block and guide rails along the side of the robotic arm.

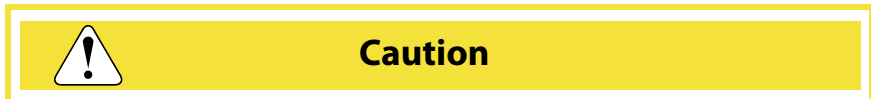


Do not allow the cleaning agent to come into contact with the lead screws.

Figure 6-26 XYZ Robotic Arm



4. Dry all components using a dry, lint-free cloth.



The autosampler must be thoroughly dry before turning the power on.

5. Replace the autosampler vial rack, connect the AC power cord and turn the unit ON.

6.16.2 Quarterly XYZ Arm Cleaning



Warning! Ensure the instrument is powered off and the AC power cable removed, prior to placing hands and/or other appendages in the path of travel of the XYZ robotic arm.

Perform Section 6.16.1 "Monthly XYZ Arm External Cleaning" with the following additional procedure:

1. Power off the AQUATek LVA and remove the AC power cable from the back of the unit.
2. Wipe loose particles off the Y-Axis lead screw (the large metal screw located inside the robotic arm) with a dry, lint-free cloth.

Figure 6-27 XYZ Robotic Arm



6.17 XYZ Robotic Arm Alignment (Lumin TekLink Only)

Only Lumin TekLink supports the AUTOSAMPLER ALIGNMENT WIZARD. Stratum VOC TekLink2G users needing to align the autosampler, should contact Teledyne Tekmar Customer Support using the information in Section 6.28 "Technical Assistance".

6.18 When is Alignment Needed?

The autosampler may need alignment if:

- The needle is not able to locate the correct vial or rinse station or is not adequately centered over the vial septa/rinse station.



NOTE

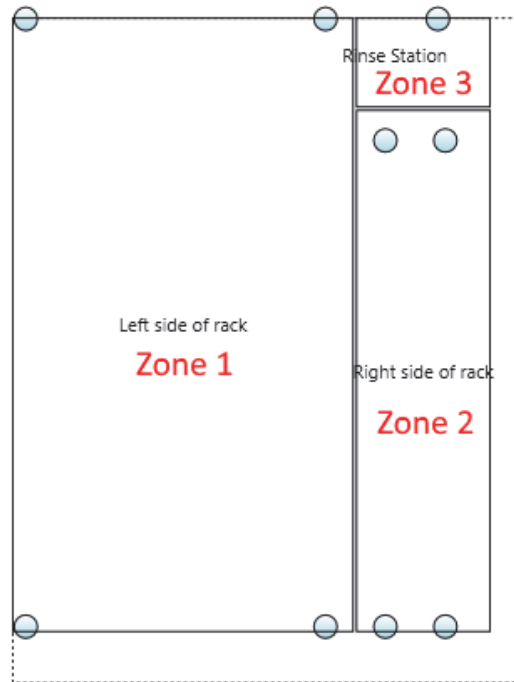
Note that exact alignment is not necessary as long as the needle clears the vial cap edge and rinse cup by at least 2 mm; the autosampler's precision is very repeatable.

- A motor or lead screw has been replaced.
- The XYZ autosampler has been subjected to extreme shock or vibration.

6.19 Alignment Overview





The AUTOSAMPLER ALIGNMENT WIZARD is used to align and test the X and Y axes of the robotic arm. When the alignment procedure is begun, the current alignment is disabled. The wizard then sequentially performs the X and Y-axis alignment of the autosampler vial rack's three zones (Figure 6-28).

Figure 6-28 Autosampler Zones



For zones 1 and 2, three landmarks per zone are manually aligned using a target placed in the vial rack landmark position. The fourth landmark (the last corner of the zone) is then calculated and tested. The X and Y-axis of the single alignment landmark of Zone 3, the rinse station, is then aligned using the sample needle and target and tested.

As the alignment progresses, the autosampler zone diagram of the AUTOSAMPLER ALIGNMENT WIZARD will update the color of each alignment landmark to indicate its status. Status colors are shown in Table 6-7 "Alignment Landmark Color Codes".

Table 6-7 Alignment Landmark Color Codes	
	Location of an alignment landmark.
	Location of an alignment test point (tested when the Test Alignment Button is selected). Test points are not manually aligned; they are calculated from the previous alignment landmark coordinates.
	Location of the current alignment landmark.
	Alignment completed.

Once the alignment has been completed, the coordinates are then programmed into the autosampler and enabled.

 **NOTE**

Once an alignment is initiated, all zones must be completed. It is possible to exit and re-enter the wizard and use the Align Zone Buttons to advance to the necessary alignments requiring completion.

6.20 Tools and Supplies

- Alignment Target (Installation Kit Box)

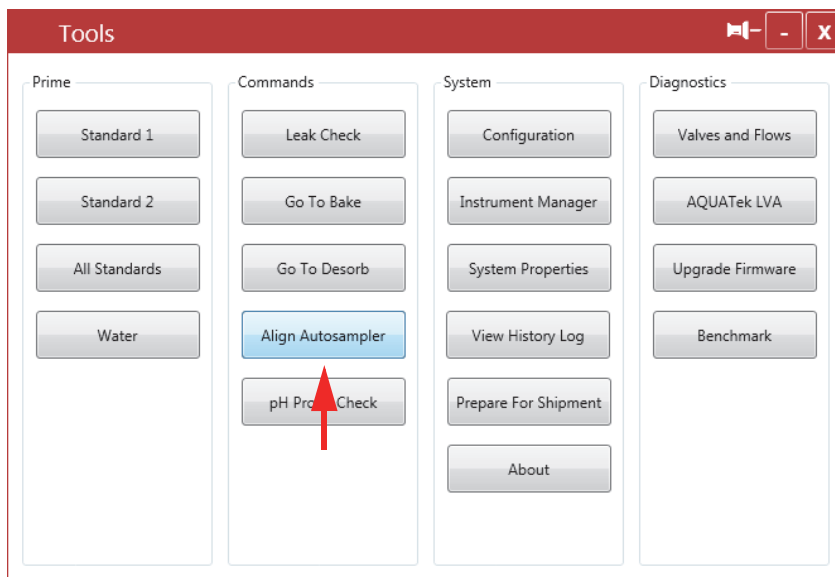
6.21 Procedure



Warning! XYZ robotic arm alignment should only be performed by trained personnel. The instrument must be powered and the XYZ robotic arm moving for the alignment procedure. Do not place hands and/or other appendages in the path of travel of the XYZ robotic arm or under the sample needle, when in motion.

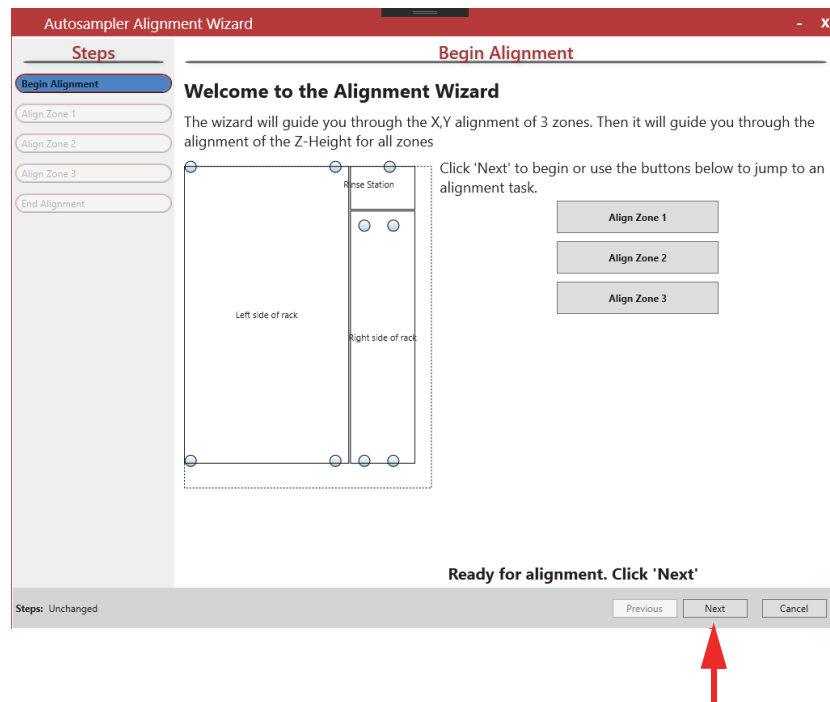
1. The sample needle should be installed for the alignment procedure.
2. Locate the autosampler alignment target in the Installation Kit Box.
3. Ensure the autosampler vial rack is fully seated in the rack locator slots and all vial positions are empty.
4. Select the ALIGN AUTOSAMPLER BUTTON on the TOOLS SCREEN to open the AUTOSAMPLER ALIGNMENT WIZARD.

Figure 6-29 Lumin TekLink Tools Screen and Align Autosampler Button



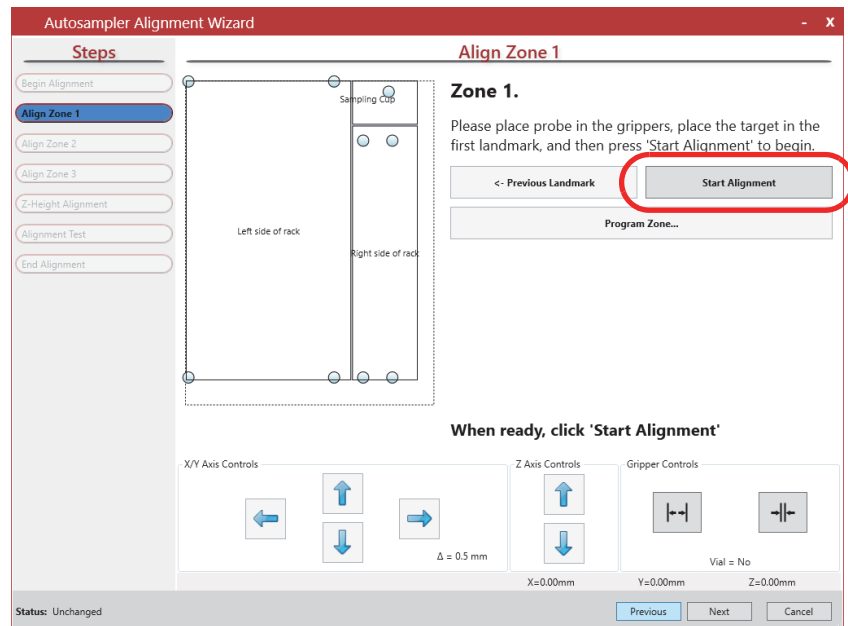
5. The AUTOSAMPLER ALIGNMENT WIZARD will be displayed and prepare for the alignment by disabling all current alignment corrections. When the wizard is ready for the alignment procedure, the NEXT BUTTON will be enabled. Select the NEXT BUTTON to advance.

Figure 6-30 Autosampler Alignment Wizard - Ready to Begin Alignment



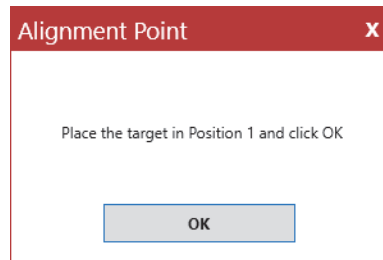
6. Select the START ALIGNMENT BUTTON.

Figure 6-31 Align Zone 1 - Start Alignment Button



7. The autosampler will move the sample needle over the first alignment landmark indicated by a purple dot on the autosampler vial rack diagram. The wizard will then display a user prompt to place the alignment target in the corresponding location (Figure 6-32).

Figure 6-32 Align Zone 1 - Place Target in Position 1



In the next procedure the needle will descend to the target. Keep hands and other appendages away from the needle's vertical path!

8. Once the target is in place, click the OK BUTTON on the dialog. The needle will descend to a position just above the target (Figure 6-32).
9. Use the X/Y-AXIS CONTROLS to align the sample needle over the opening in the target. Use the Z-AXIS CONTROLS to move the needle into the target opening. When properly aligned, the sample needle will be centered in the target. It is adequate to visually center the needle without measurement.

The current x and y coordinates of the needle are shown in the bottom, right-hand corner of the screen. As the needle is moved, these values will briefly be displayed in red indicating that the needle has moved, but the instrument has not reported the new value back to the wizard. The text will change back to black once the instrument reports the new position to the wizard.



The distance the needle moves is defined by the $\Delta = \text{mm}$ Field beneath the control boxes. Right-click on the field to decrease the distance, left-click to increase the distance.

Figure 6-33 Needle Alignment Buttons

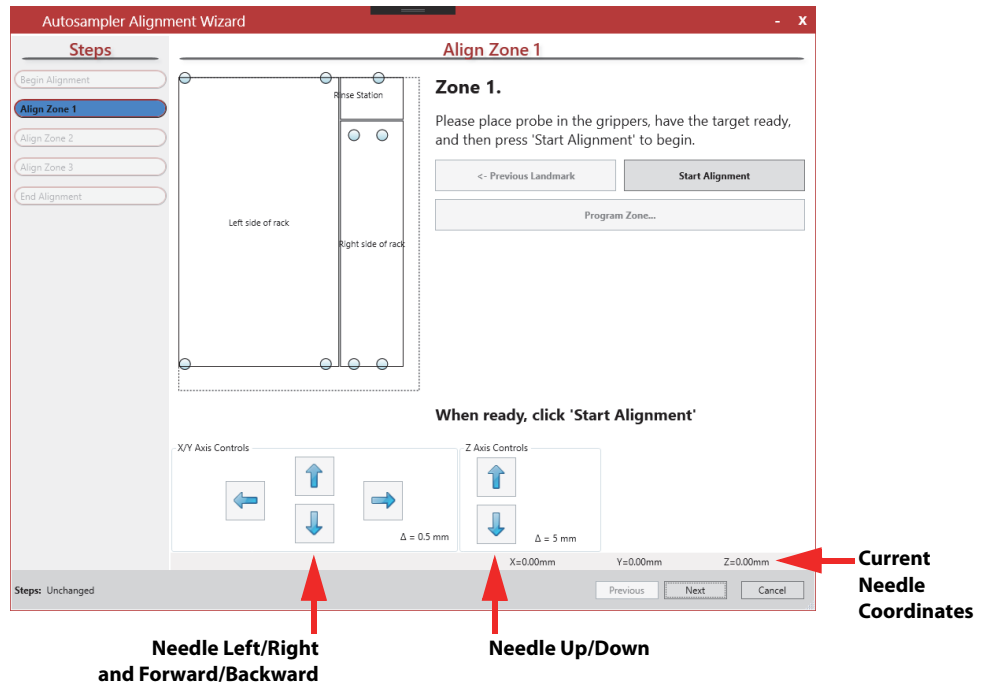
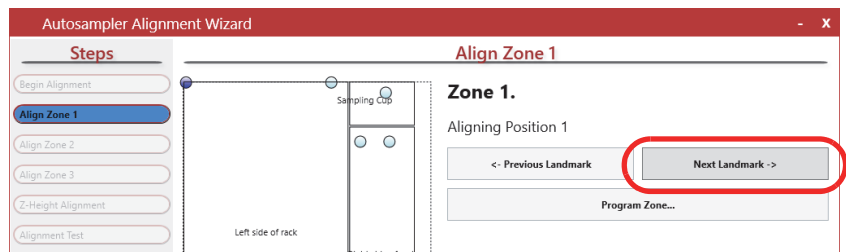


Figure 6-34 Target in Location 1



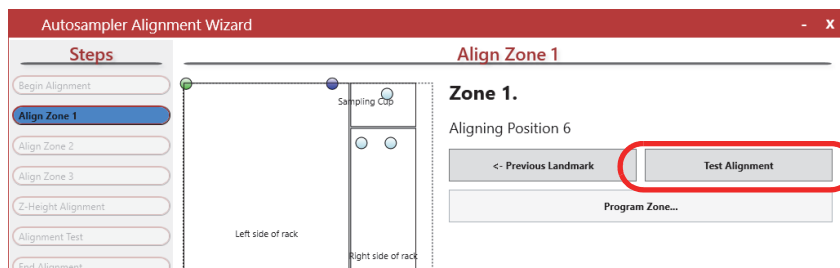
- Once the needle is correctly aligned in the target, click the NEXT LANDMARK BUTTON. The wizard will repeat the previous steps for the next two landmarks.

Figure 6-35 Align Zone 1 - Next Landmark Button



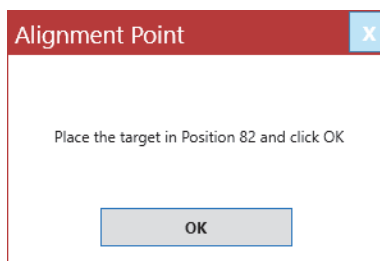
11. Once the third landmark in the zone has been aligned, select the TEST ALIGNMENT BUTTON. The wizard will calculate the correction values for Zone 1 and then apply them to the landmarks.

Figure 6-36 Align Zone 1 - Test Alignment



The wizard will then move the needle to the test point (the fourth corner of the zone) and prompt for placement of the alignment target.

Figure 6-37 Align Zone 1 - Prompt to Place Target in Position 82

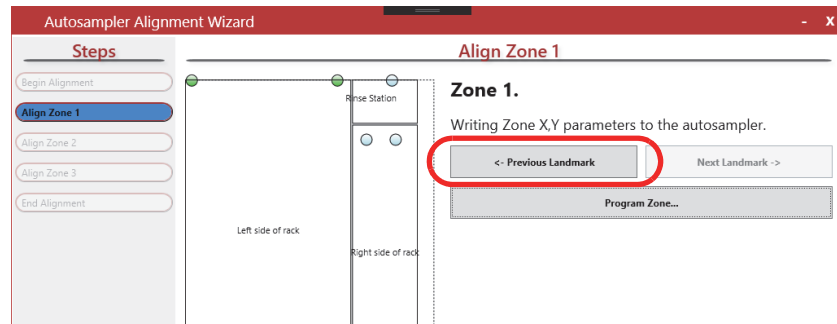


In the next procedure the needle will descend to the target. Keep hands and other appendages away from the needle's vertical path!

12. Once you have placed the target in the test point, click the OK BUTTON. The wizard will then lower the needle over the test point so that alignment can be verified. The needle should be close to the center of the alignment target. The wizard's Z-AXIS CONTROLS may be used to lower the needle for visual confirmation. The alignment does not have to be perfect. As long as the needle is roughly centered in the hole of the target, the alignment will be adequate and the needle will pierce the vial septa.

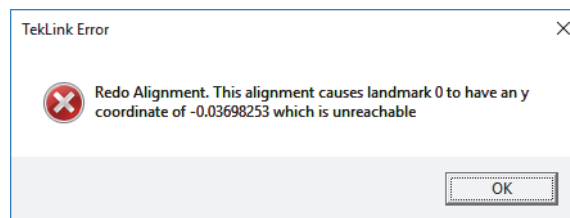
If the alignment of the needle to the alignment target requirements adjustment, use the PREVIOUS LANDMARK BUTTON to realign the previous landmarks again and then retest.

Figure 6-38 Align Zone 1 - Previous Landmark Button



If the calculated value for one of the landmarks falls outside the bounds of the autosampler, an error notification will be displayed. Use the PREVIOUS LANDMARK BUTTON to repeat the landmark alignments.

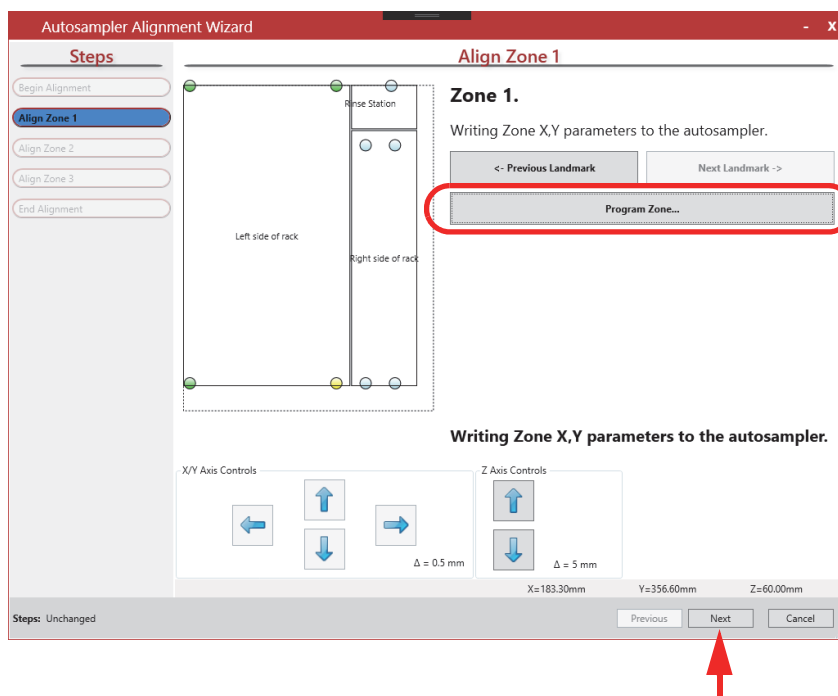
Figure 6-39 Alignment Error



If realignment fails to resolve the test point misalignment, note the coordinates at the bottom, right-hand corner of the screen. The minimum uncorrected x, y position is 0, 0 and the maximum is 254.0, 360.0. If any of the aligned points are at the minimum or maximum, contact Teledyne Tekmar Customer Support using the contact information in Section 6.28 "Technical Assistance" and request an "Origin Alignment" for the autosampler.

13. If the alignment is acceptable, select the PROGRAM ZONE... BUTTON to save the X and Y correction factors to the autosampler. Once the programming for the zone is complete, the wizard will activate the NEXT BUTTON at the bottom of the screen (Figure 6-40).

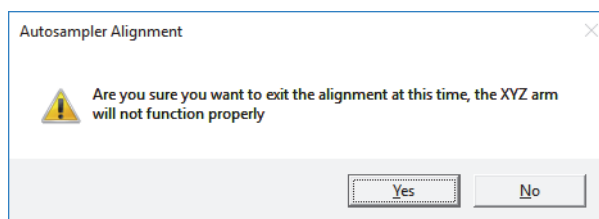
Figure 6-40 Program Zone 1 Alignment and Next Button



NOTE

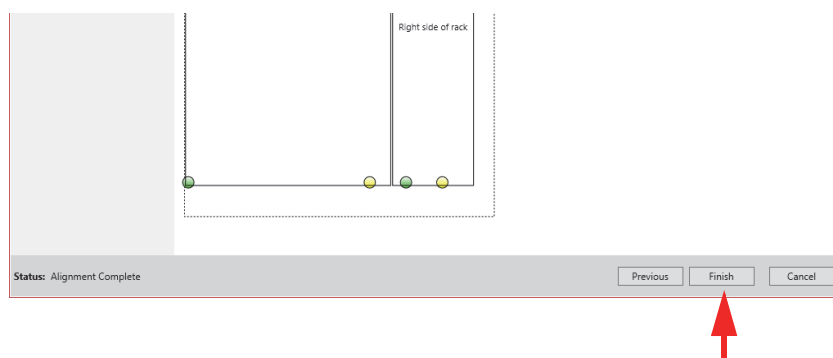
Selecting the Close Box or the Cancel Button during the alignment procedure will display the warning in Figure 6-41. It is possible to exit and re-enter the wizard and use the Zone Buttons to advance through the alignment process and complete the necessary alignments.

Figure 6-41 Cancel Alignment Notification



14. Repeat the alignment procedure for Zone 2. Once the zone is programmed, select the NEXT BUTTON to continue to Zone 3. Zone 3 is the rinse station and only has one alignment landmark (the Zone 3 landmark is also the test point).
15. When the alignment has been found for Zone 3, select the PROGRAM ALL ZONES BUTTON to save the correction factors to the autosampler. Allow the wizard time to write the new parameters to the autosampler.
16. Once the wizard completes the programming, select the NEXT BUTTON. Select the FINISH BUTTON to exit the AUTOSAMPLER ALIGNMENT WIZARD.

Figure 6-42 Alignment Complete



6.22 Troubleshooting



NOTE

For pH probe troubleshooting, refer to Section 5.4 "pH Probe Troubleshooting".

6.22.1 Concentrator and AQUATek LVA Benchmark Test

The benchmark test is a troubleshooting tool that tests the components and software routines (heaters, LEDs, continuity of inputs and outputs on the CPU communication board, etc.) to ensure that the system is in working order. If any portion of the benchmark test fails, the failure should be addressed before analysis of samples is attempted.

Some tests will be completed automatically, while others will require user response. The benchmark test may be stopped at any time by clicking the STOP BENCHMARK BUTTON in the BENCHMARK DIALOG. Advance to a specific section of the test by selecting the item in the TEST SEQUENCE WINDOW.



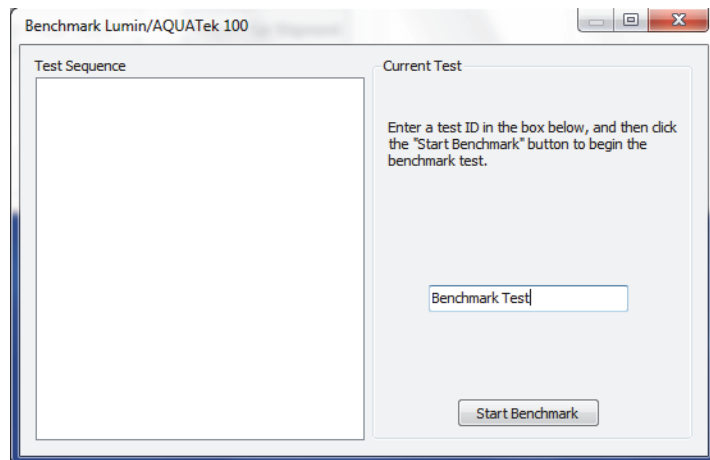
NOTE

Make sure to give the concentrator and AQUATek LVA the necessary time to complete the task.

The results of the benchmark test can be printed at the completion of the test and are automatically saved in the INSTRUMENT HISTORY LOG using the name entered at the beginning of the test.

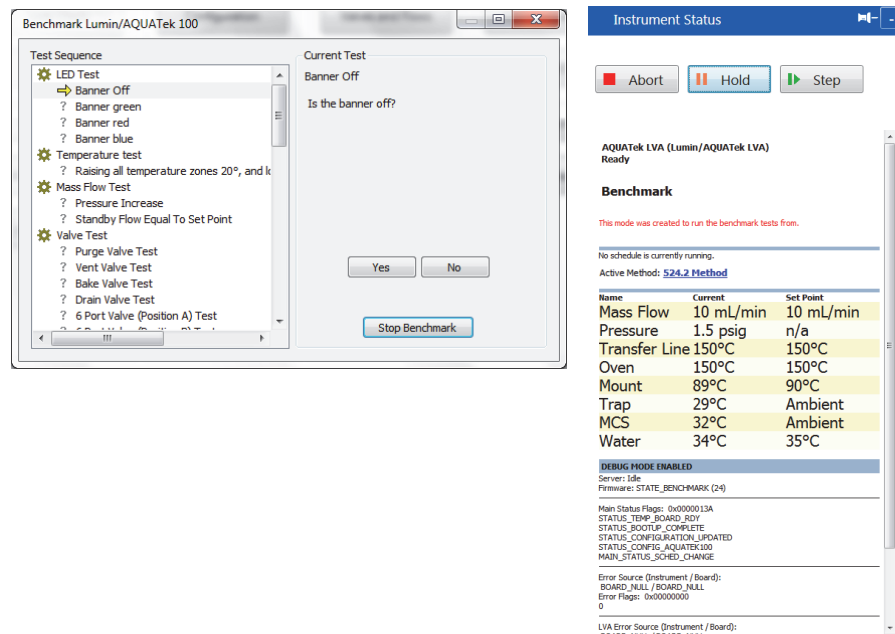
1. From the TOOLS SCREEN select the BENCHMARK BUTTON to start the benchmark function.
2. Name the benchmark test, then select the START BENCHMARK BUTTON.

Figure 6-43 Benchmark Test



3. Once started, the TEST SEQUENCE WINDOW will display the actions of the benchmark test. The CURRENT TEST section of the dialog will explain the item being tested and prompt the user to respond. The INSTRUMENT STATUS PANEL will also indicate that a benchmark test is being conducted.

Figure 6-44 Benchmark Test Prompt and Instrument Status



4. As the software moves through the benchmark test, TekLink will prompt the user for responses. Read the prompt and respond accordingly using the buttons in the BENCHMARK TEST WINDOW.
5. Prior to completion of the test, TekLink will prompt if the benchmark test report should be printed. Once completed, results of the test are saved in the INSTRUMENT HISTORY LOG as a BENCHMARK REPORT. To access a saved benchmark test, go to TOOLS>VIEW HISTORY LOG>INSTRUMENT HISTORY TAB. Select the RESTRICT BY EVENT TYPE FILTER CHECK BOX, then select BENCHMARK REPORT from the selections.

6.22.2 Leak Check

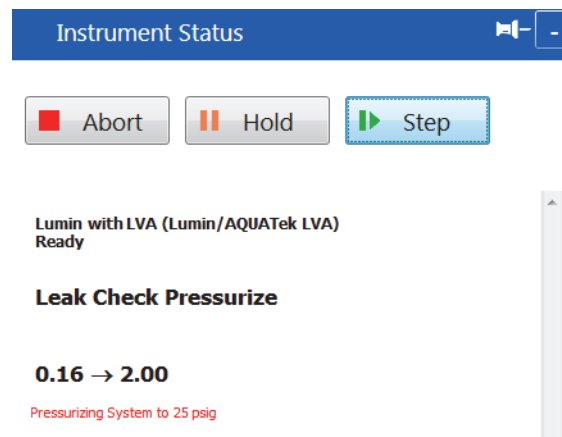


The leak check settings are defined via Tools>Configuration>Leak Check Tab.

1. Select TOOLS>LEAK CHECK to initiate the automated system leak check.

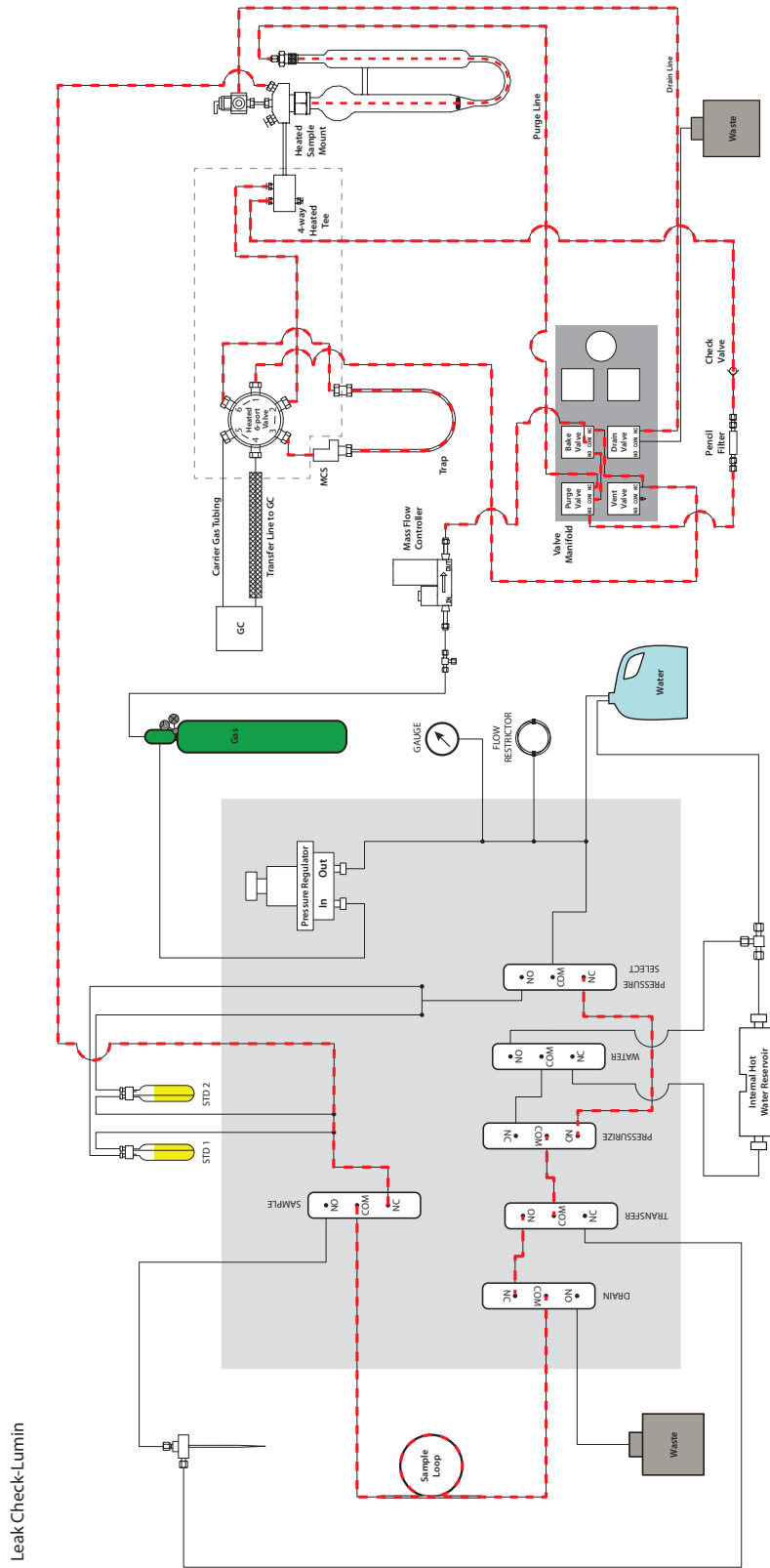
As the software moves through the leak check, the INSTRUMENT STATUS PANEL will be updated.

Figure 6-45 Lumin TekLink Instrument Status - Leak Check

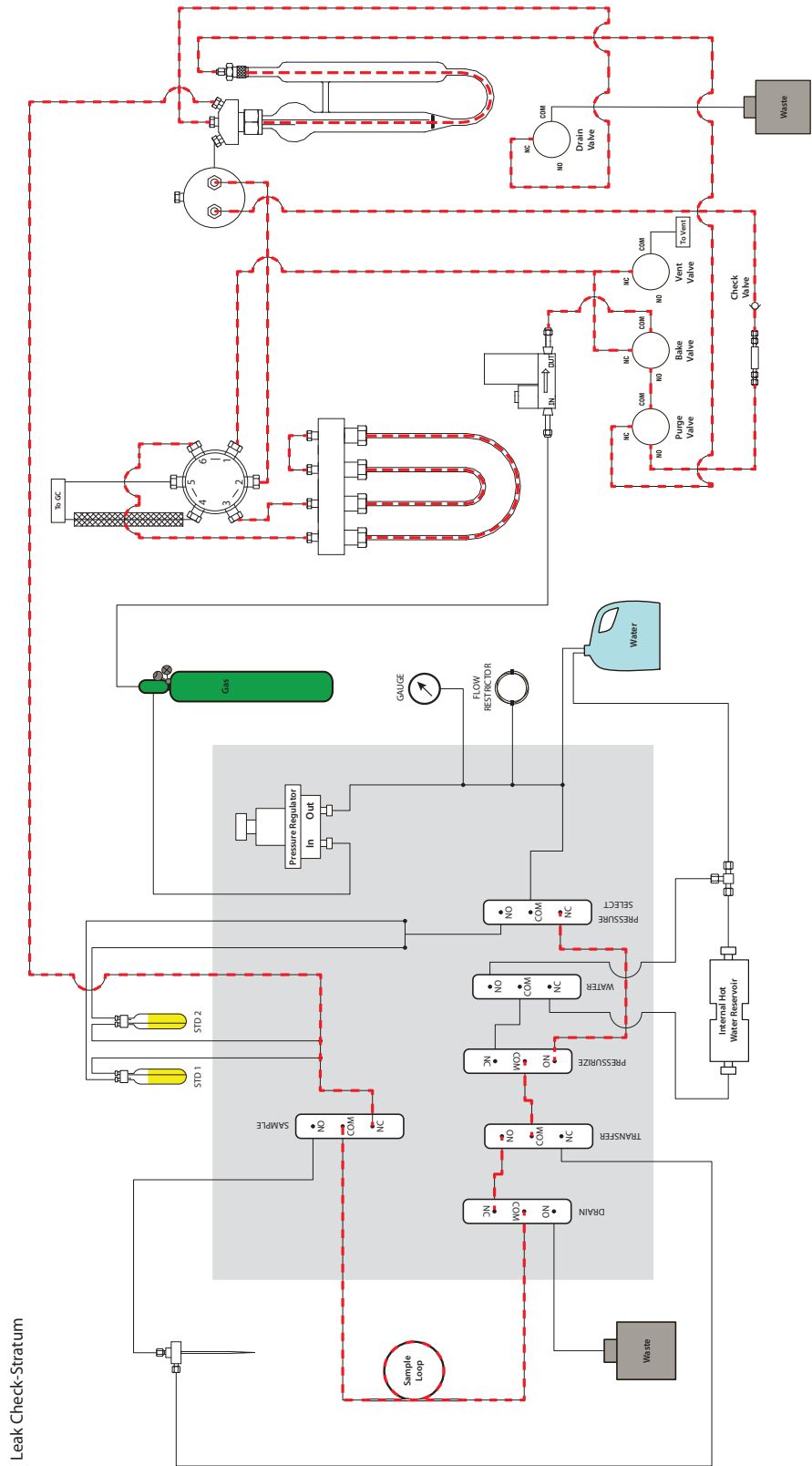


2. If the concentrator **and** AQUATEk LVA fail the initial automated leak check:
 1. Turn off the concentrator and allow the sample mount to cool.
 2. Disconnect the aqueous transfer line at the concentrator sample mount and place a Valco plug (Installation Kit Box) in the port, then run the automated leak check again to determine if the leak is in the concentrator or the AQUATEk LVA.
 3. If the leak is in the concentrator, refer to the advanced leak check procedures in *Concentrator User Manual*.
 4. If the leak is in the AQUATEk LVA, sequentially snug all fittings in the gas flow path, reconnect the aqueous transfer line and run the automated leak check again.
3. If the system continues to fail the leak check, contact Customer Support using the information in Section 6.28.1 "Teledyne Tekmar Customer Support".

6.22.3 Lumin with LVA System Leak Check Flow Diagram



6.22.4 Stratum with LVA System Leak Check Flow Diagram



Leak Check-Stratum

6.23 Upgrade AQUATek LVA Firmware



NOTE

The AQUATek LVA autosampler XYZ robotic arm PCB firmware must be upgraded using a procedure that differs from the firmware upgrade procedure below. Refer to Section 6.24 "Upgrade XYZ Robotic Arm Firmware".

6.23.1 Download Firmware



NOTE

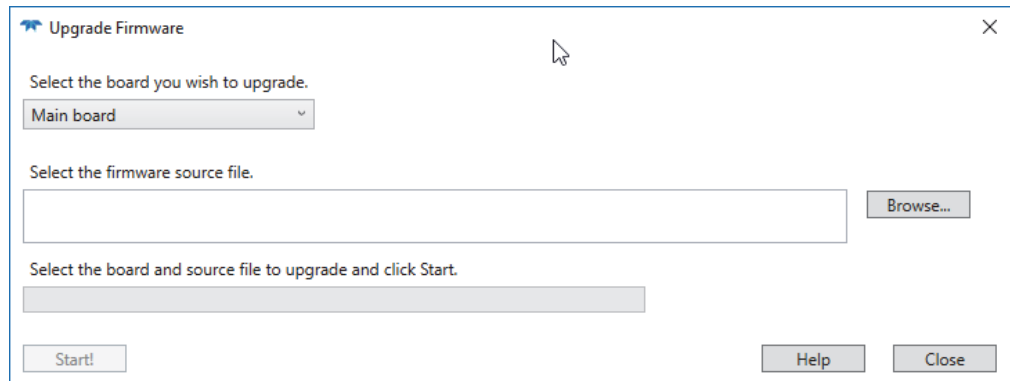
The current concentrator and AQUATek LVA PCB firmware version is shown on the About Dialog (Tools>About).

1. To download firmware, click this hyperlink: Software Downloads (<http://www.teledynetekmar.com/Resource-Center/software-firmware-updates>) or go to the Software/Firmware downloads page at www.teledynetekmar.com
2. Under VOC Firmware and Software, find the appropriate firmware upgrade.
3. Follow all prompts to download the new firmware.

6.23.2 Upgrade Concentrator PCB Firmware

1. Navigate to TOOLS>UPGRADE FIRMWARE.

Figure 6-46 Upgrade Firmware Dialog



2. In the UPGRADE FIRMWARE DIALOG, select the board to upgrade from the BOARD DROP-DOWN MENU.
3. Using the BROWSE BUTTON, navigate to the firmware source file that was downloaded.
4. Select the START BUTTON and follow all installation prompts.

6.24 Upgrade XYZ Robotic Arm Firmware

The AQUATek LVA's XYZ robotic arm PCB firmware must be upgraded using a procedure that differs from the AQUATek LVA PCB firmware upgrade procedure. The update is accomplished using a CETAC Field Programming Utility software for the XYZ robotic arm firmware update and a USB cable connected to the USB port at the back of the autosampler module (Figure 6-47). This USB port is **only** used for autosampler firmware updates and should **not** be used for instrument communication. **The USB cable must be 9 ft (3 m) or less in length.**

6.24.1 Tools Required

- USB Cable 9 ft (3 m) or less in length
- CETAC Field Programming Utility software (located on the Lumin TekLink or Stratum VOC TekLink2G software installation disc)
- A current version of the XYZ robotic arm firmware file

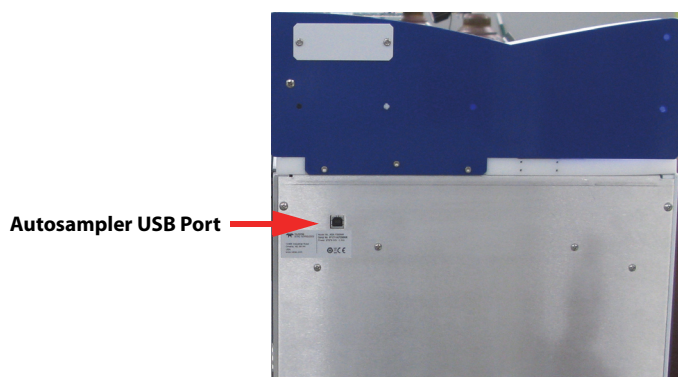
6.24.2 Install the Firmware Upgrade Utility Software

1. Insert the software installation disc into the PC controlling the concentrator and AQUATek LVA. When the disc menu is displayed, select the CETAC Field Programming Utility software. Follow all prompts to install the software.

6.24.3 XYZ Robotic Arm PCB Firmware Upgrade Procedure

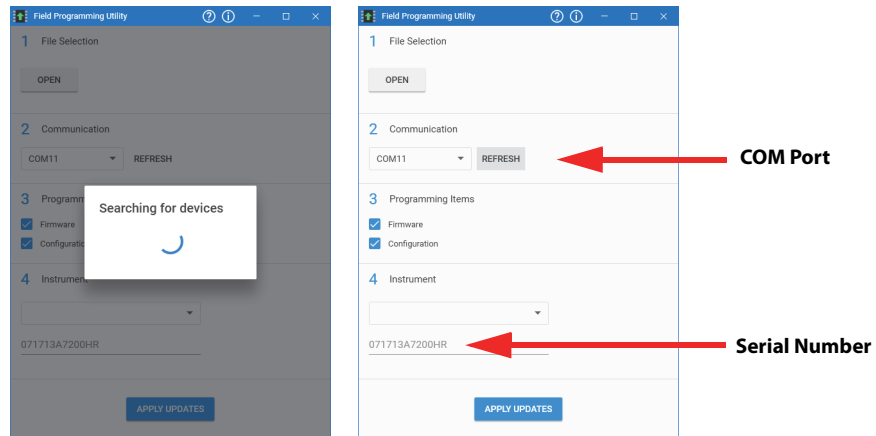
1. Power off the AQUATek LVA using the switch at the back of the instrument.
2. Remove the factory installed plug in the XYZ robotic arm USB port (Figure 6-47).

Figure 6-47 Plug Removed from Autosampler USB Port



3. Connect a USB cable (9 ft [3 m] maximum length) between the computer USB port and the XYZ robotic arm USB port.
4. Power on the AQUATek LVA instrument. The banner board may display a red error indication. TekLink may also show an error stating that the instrument has lost communications with the XYZ arm. This behavior is normal and can be disregarded.
5. If necessary, start the CETAC Field Programming Utility software. The utility will search for the AQUATek LVA autosampler. Once found, the dialog will show the COM port number of the autosampler module along with its serial number. The search can be restarted by selecting the REFRESH BUTTON (Figure 6-48).

Figure 6-48 Firmware Update Utility Software Searching for the XYZ Robotic Arm



- Under the FILE SELECTION section of the dialog, select the OPEN BUTTON and navigate to the firmware file (.cfwu file extension).

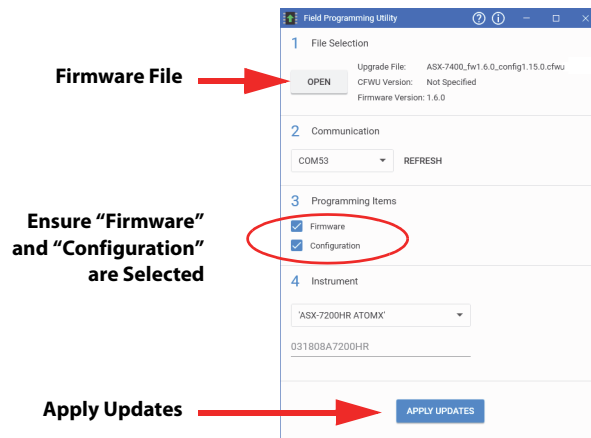
☑

NOTE

The original firmware file is located on the TekLink software installation disc under the Firmware Folder>Autosampler Folder.

- Under the PROGRAMMING ITEMS section of the dialog, place a check mark in the FIRMWARE and CONFIGURATION CHECK BOXES. Leave the information under the COMMUNICATION and INSTRUMENT sections unchanged. Select the APPLY UPDATES BUTTON at the bottom of the dialog to begin the firmware installation (Figure 6-49).

Figure 6-49 File Selected

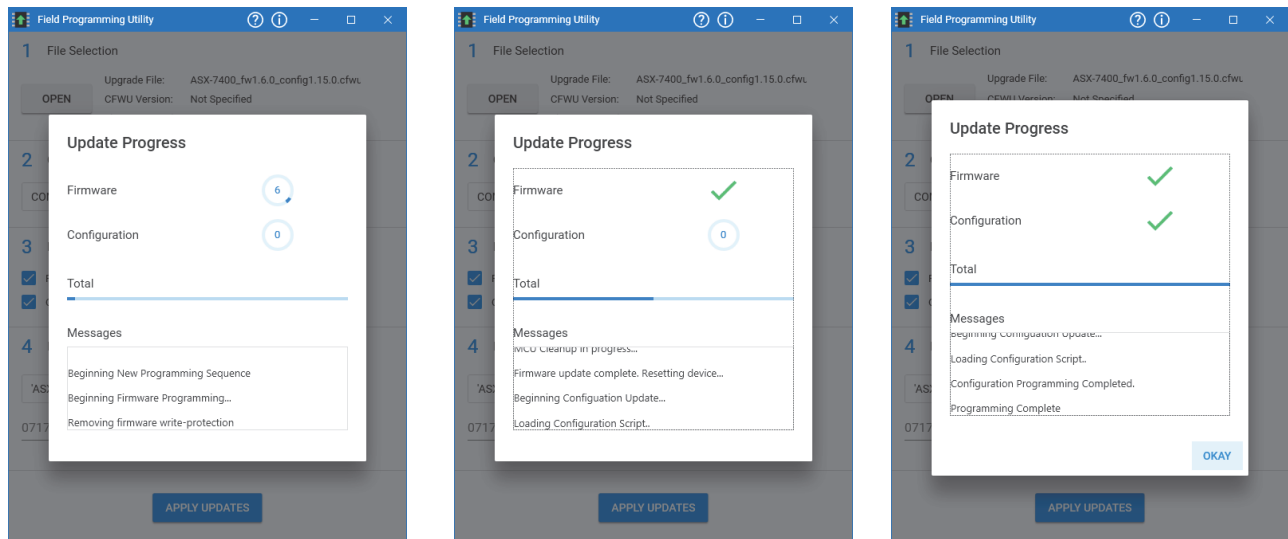


- The firmware upgrade occurs in two steps beginning with the firmware file itself and then the system configuration. The update process will take approximately 3 minutes. Once each step is complete, the dialog will indicate success with a check mark (Figure 6-50). **Do not turn off the AQUATEk LVA while the update is being installed!**



During the update, the XYZ robotic arm may home at the middle and end of the update process. Keep hands and appendages out of the XYZ robotic arm's path of travel.

Figure 6-50 Update Showing Completed Steps



9. Once the firmware upgrade is complete, select the OKAY BUTTON and then close the CETAC Field Programming Utility software.
10. Power off the AQUATek LVA and disconnect the USB cable from the computer and autosampler USB port.
11. Replace the plug in the autosampler USB port to prevent future inadvertent USB connection.
12. Power on the AQUATek LVA and allow it to boot up normally.

6.25 Upgrade Software



Upgrade the concentrator/AQUATek LVA software according to the *Concentrator User Manual*.

6.26 Returning the AQUATek LVA

Do not return the AQUATek LVA unless a Teledyne Tekmar Representative authorizes you to do so. A Customer Support Representative may be able to help you solve the problem over the telephone. If the instrument must be returned, the representative can tell you how to prevent damage during shipment. The representative must give you a return authorization number and instructions on how to return the instrument properly.

To prepare the AQUATek LVA for return shipment:

1. In Lumin TekLink, select the TOOLS BUTTON on the HOME SCREEN and then select the PREPARE FOR SHIPMENT BUTTON. In Stratum VOC TekLink2G, select TOOLS>PREPARE FOR SHIPMENT from the MENU BAR. The instrument will automatically drain all liquids from the system and send the autosampler arms to their home positions. Once the automated process has been completed, power off the concentrator and AQUATek LVA.
2. Disconnect the aqueous transfer line between the AQUATek LVA and concentrator at the concentrator's sample mount.
3. Disconnect the purge and trap concentrator liquid, gas and data connections and then remove it from the top of the AQUATek LVA by releasing the foot lock mechanism.
4. Empty both internal standard vessels, if they contain liquid.
5. Place the AQUATek LVA back into its original shipping container with all packing aids in place to prevent movement and/or damage to the unit during shipment.
6. Follow any further instruction given to you by the Teledyne Tekmar Customer Service Representative.

6.27 Unit and Parts Disposal



NOTE

Refer to Section P.9.1 "Unit Disposal".

6.28 Technical Assistance

If you need assistance solving a problem, follow the steps below:

1. Write down the model name, model number and serial number of the instrument.
2. Note the type of problem you are having. Write down the conditions under which the problem occurred, the display, mode of operation, activity or result that indicated the presence of a problem.
3. Have an electronic or paper copy of this manual and any other pertinent information, accessible from the telephone. Your Customer Support Representative may refer to diagrams or other information contained in this manual.
4. Call Teledyne Tekmar using Section 6.28.1 "Teledyne Tekmar Customer Support".

6.28.1 Teledyne Tekmar Customer Support

U.S. Phone: (800) 874-2004

U.S. Email: tekmarsupport@teledyne.com

International Phone (Outside the U.S.): Country Code + 1 (513) 229-7000

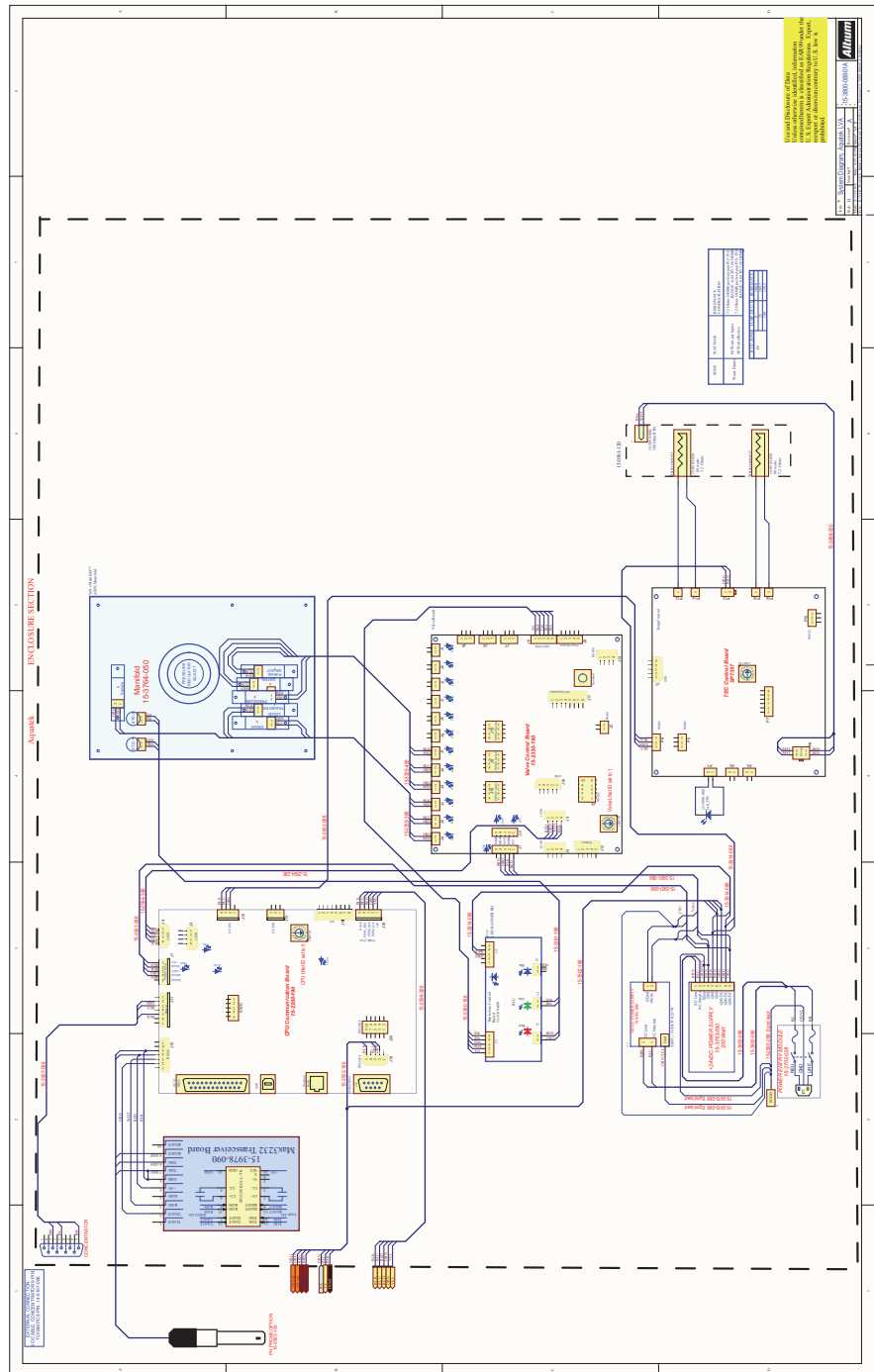
International Email: Tekmar_Intltech@teledyne.com

AQUATek LVA User Manual

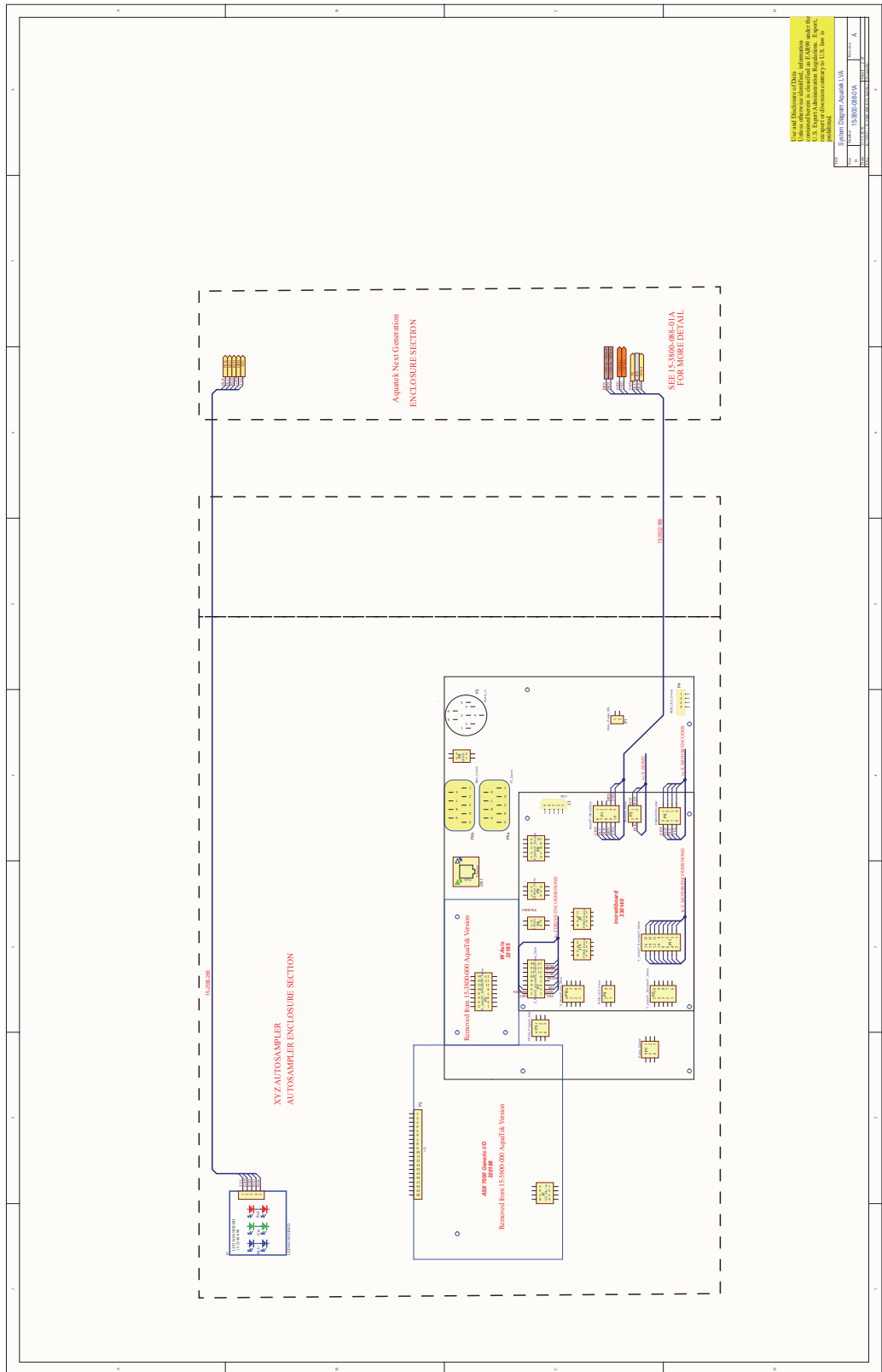
Appendix A: Diagrams

A.1 Electrical Diagram

A.1.1 AQUATek LVA Electrical Diagram



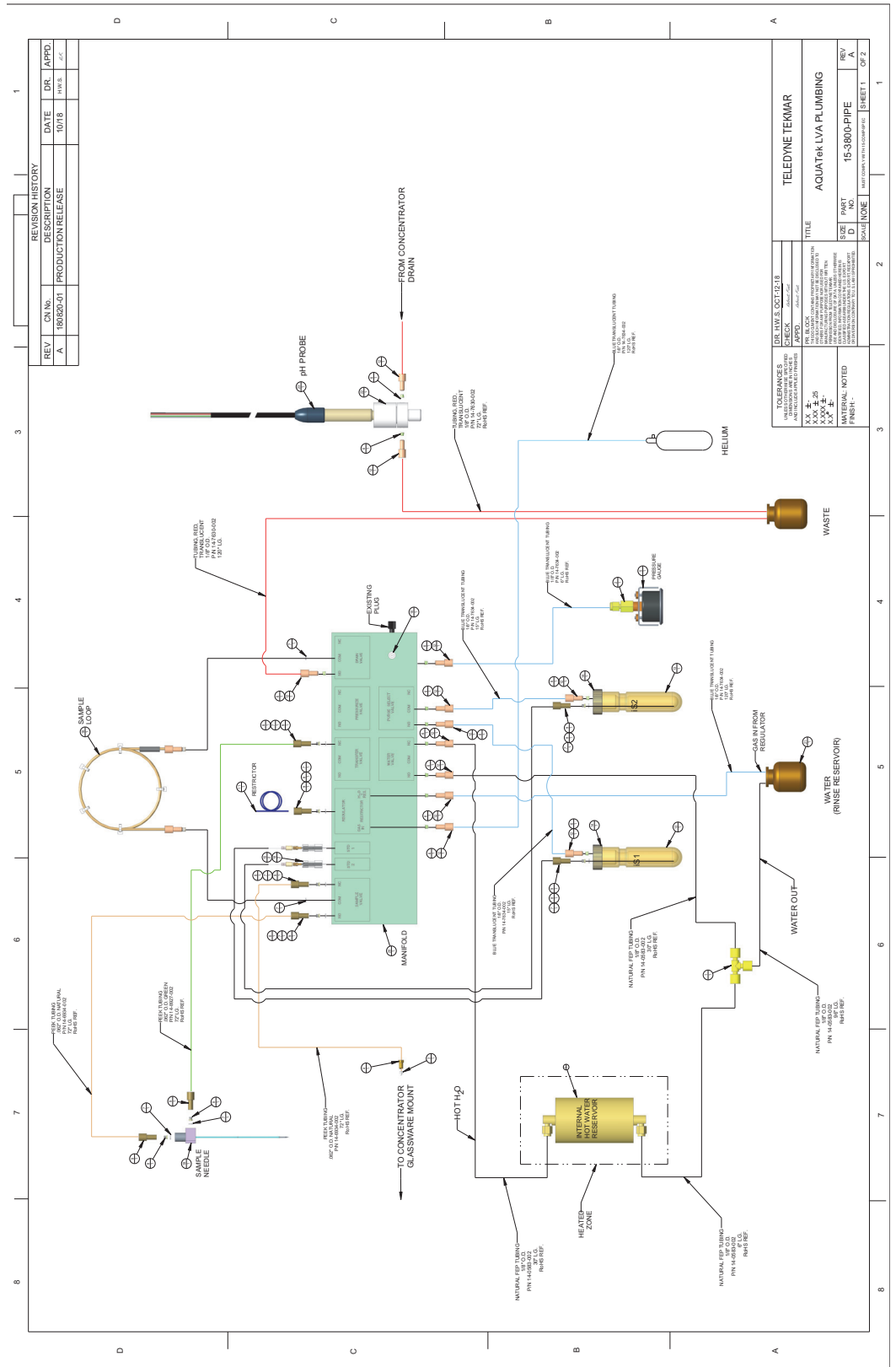
A.1.2 XYZ Autosampler Arm Electrical Diagram



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 is prohibited.

15-3806-008-01A
 15-3806-008-01A
 15-3806-008-01A
 15-3806-008-01A

A.2 Plumbing Diagram



ITEM	PART NUMBER	DESCRIPTION	QTY.
1	12-0070-016	1/8" BRASS "T"	1
2	14-0056-000	CONN. 1/8" FEM NPT-1/8" SWAGE	1
3	14-0241-016	FERRULE, VALCO 1/16" SST	1
4	14-0243-016	NUT, SHORT 1/16 MALE, VALCO	1
5	14-3940-000	GAUGE, 30 PSI, PANEL MOUNT, 1/8 MIN PAN.	1
6	14-7038-016	BUSHING, 1/8"	12
7	14-7201-009	WASHER, TEFLON	10
8	14-7671-016	FERRULE, SUPER FLANGELESS, 1/16", PEEK	8
9	14-7695-016	NUT, 1/16 " PEEK	8
10	14-8470-016	PLUG NUT, 1/4-28, TEFZEL, FLAT BOTTOM	1
11	14-9384-002	TUBING, PEEK, BLUE, .010 X 1/16	1
12	14-9778-016	NUT, 1/8", 1/4-28, PEEK (LONG)	12
13	15-0201-024	VESSEL, 15ml, AMBER-I.S.	2
14	15-0202-079	BUSHING, PEEK W/ VITON O-RING, I.S. VESSEL	2
15	15-0272-002	LINE ASSY, IS, W/MINSTAC CONNECTOR	2
16	15-0545-467	SAMPLE LOOP, COILED 5ml (PEEK)	1
17	15-0561-120	ASSEMBLY, WATER RESERVOIR / HEATERS	1
18	15-3447-200	LEE VALVE KIT W/BUILT-IN FILTERS	2
19	15-3734-053	NEEDLE, (2) STAGE-.012 DIA. HOLES	1
20	15-3764-000	MANIFOLD ASSEMBLY (PARKER)	1
21	15-3820-000	ASSEMBLY, PRESSURIZED WATER RESERVOIR	1
22	15-3873-079	TUBE, SUPPORT-pH PROBE	1
23	15-3903-100	ASSEMBLY, SENSOR, PH W/RS232 INTERFACE	1

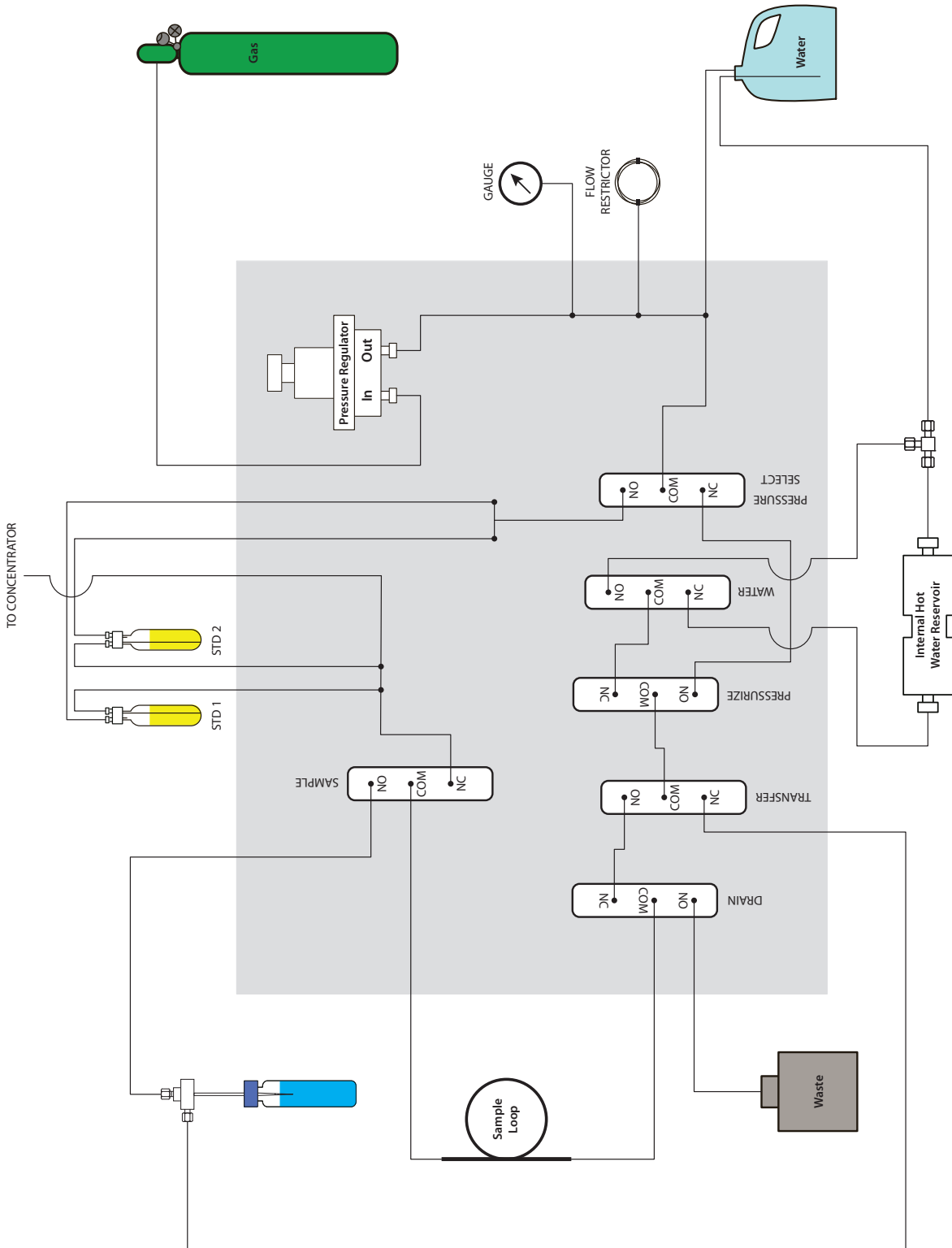
A.3 Flow Diagrams



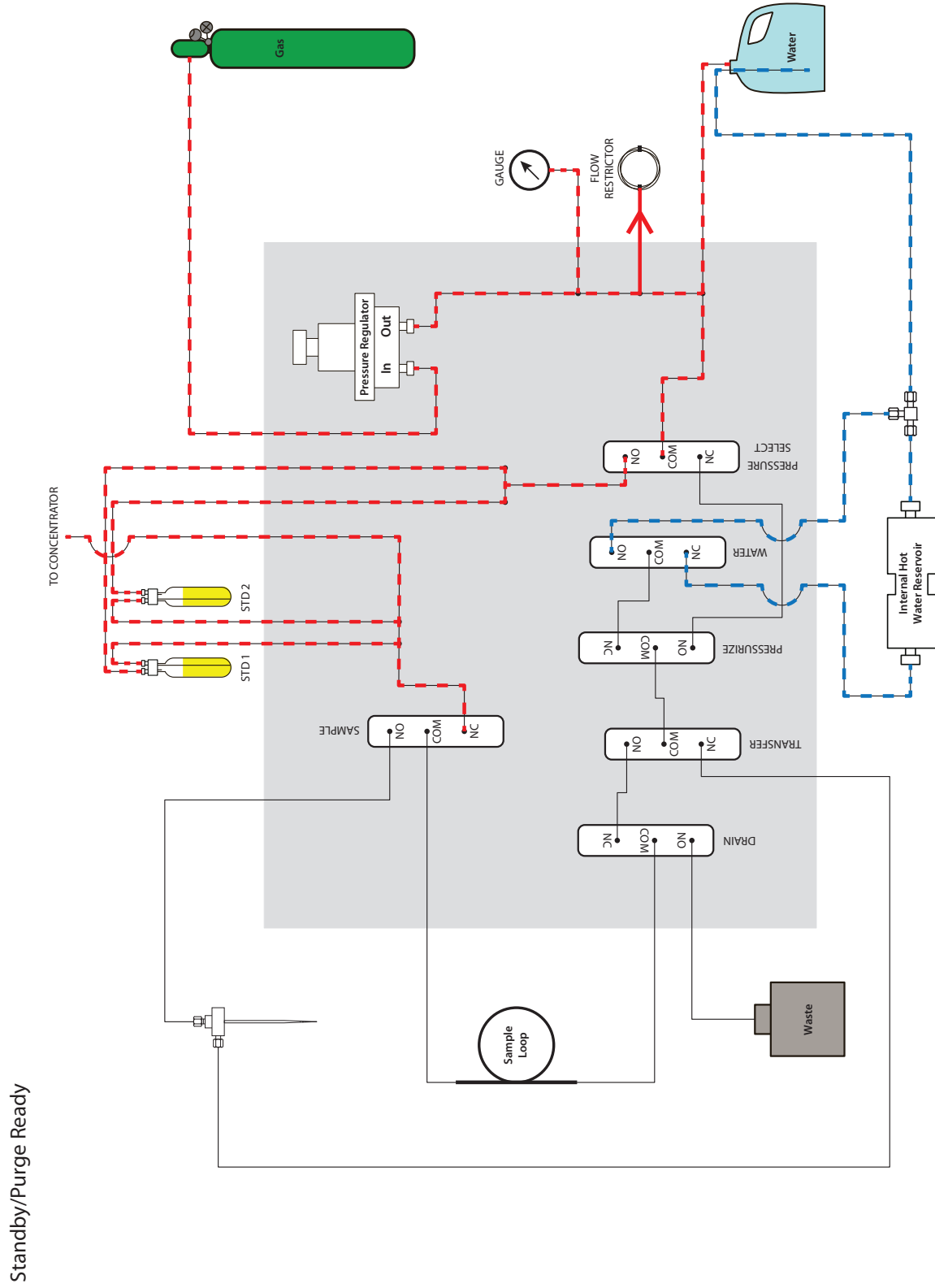
NOTE

For leak check flow diagrams, refer to Section 6.22.3 "Lumin with LVA System Leak Check Flow Diagram" and Section 6.22.4 "Stratum with LVA System Leak Check Flow Diagram". For concentrator flow diagrams by mode, refer to the Lumin or Stratum User Manual.

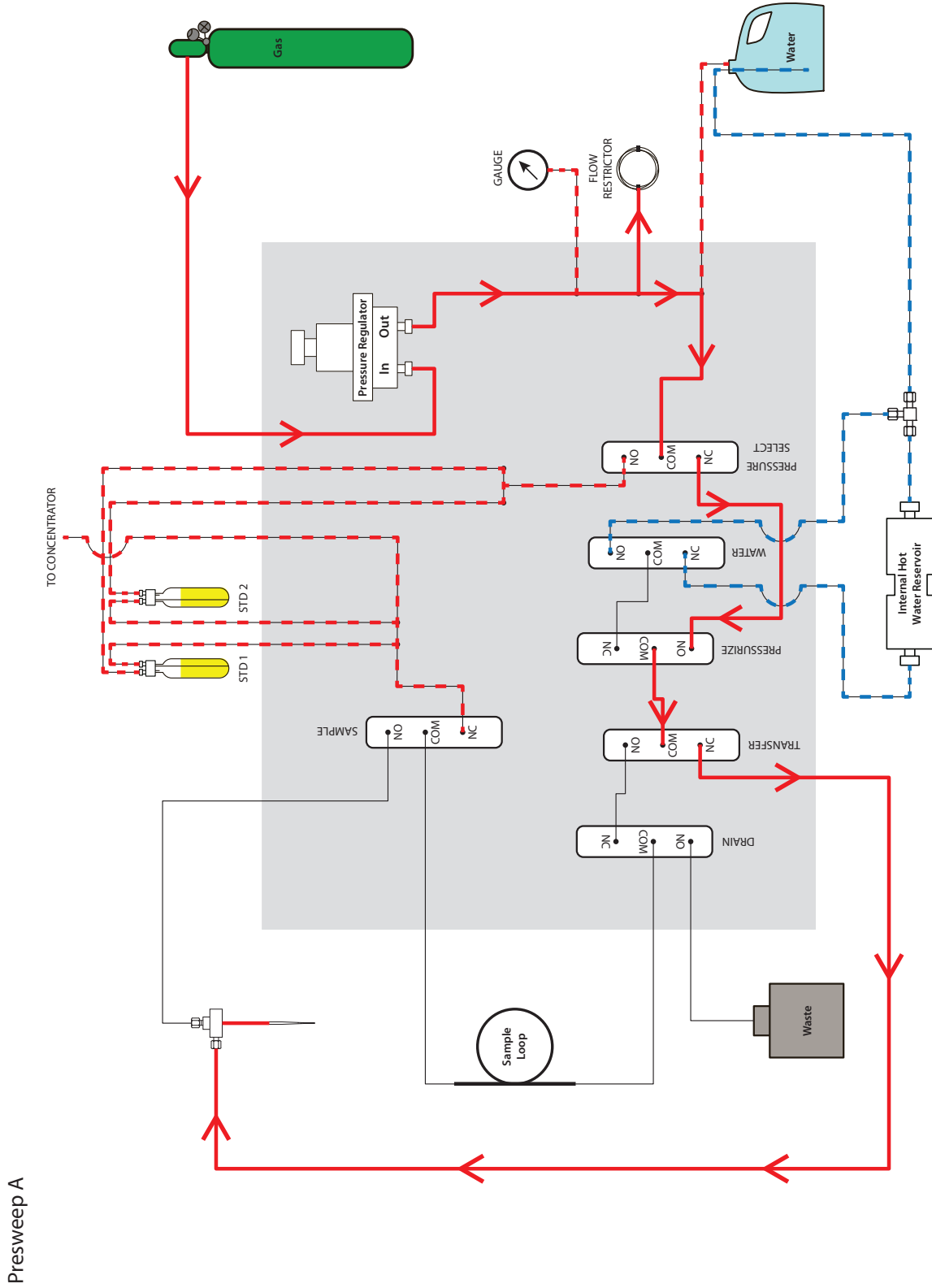
A.3.1 AQUATek LVA - Basic Flow Diagram



A.3.2 AQUATek LVA - Standby/Purge Ready

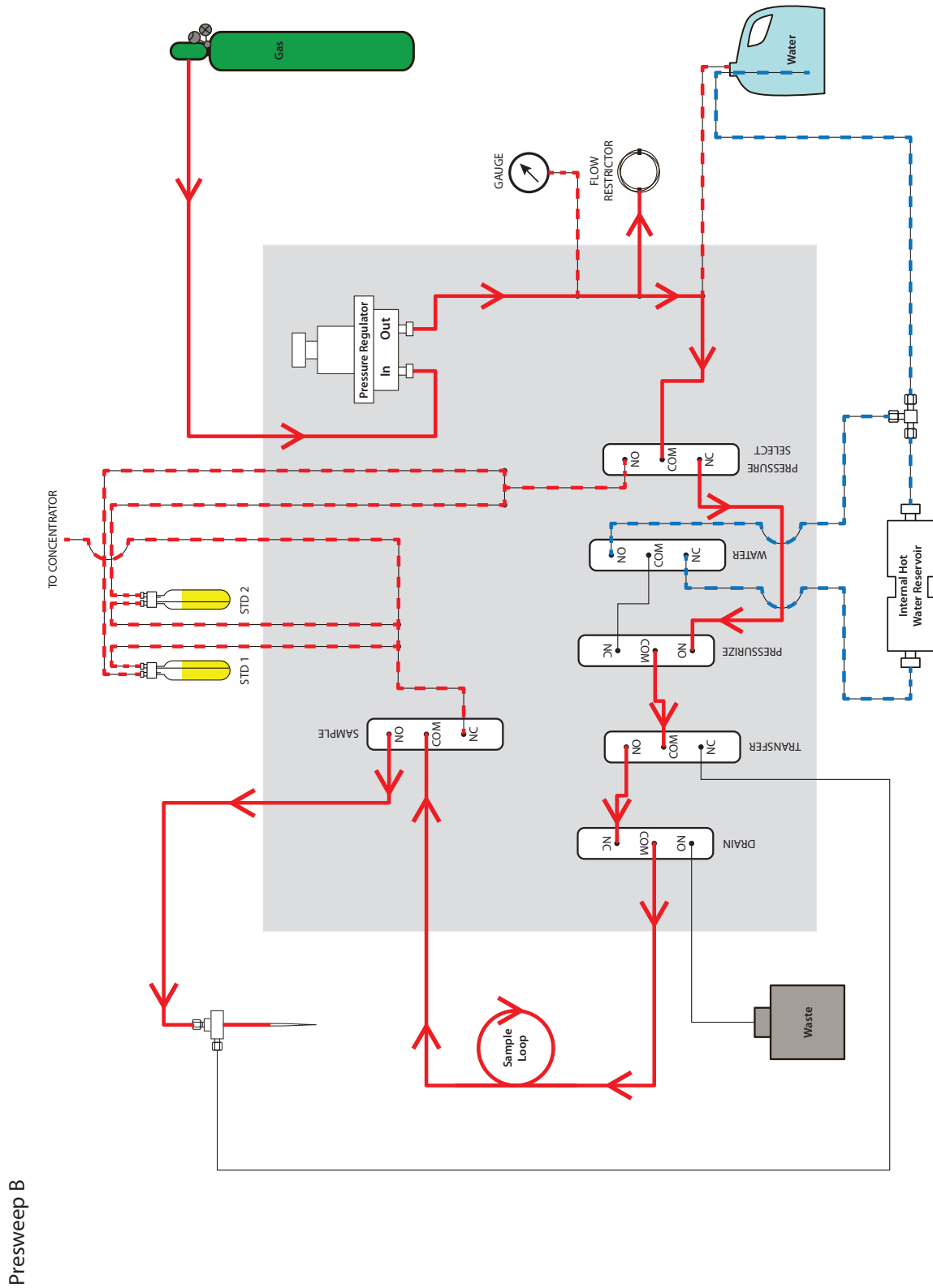


A.3.3 AQUATek LVA - Presweep A

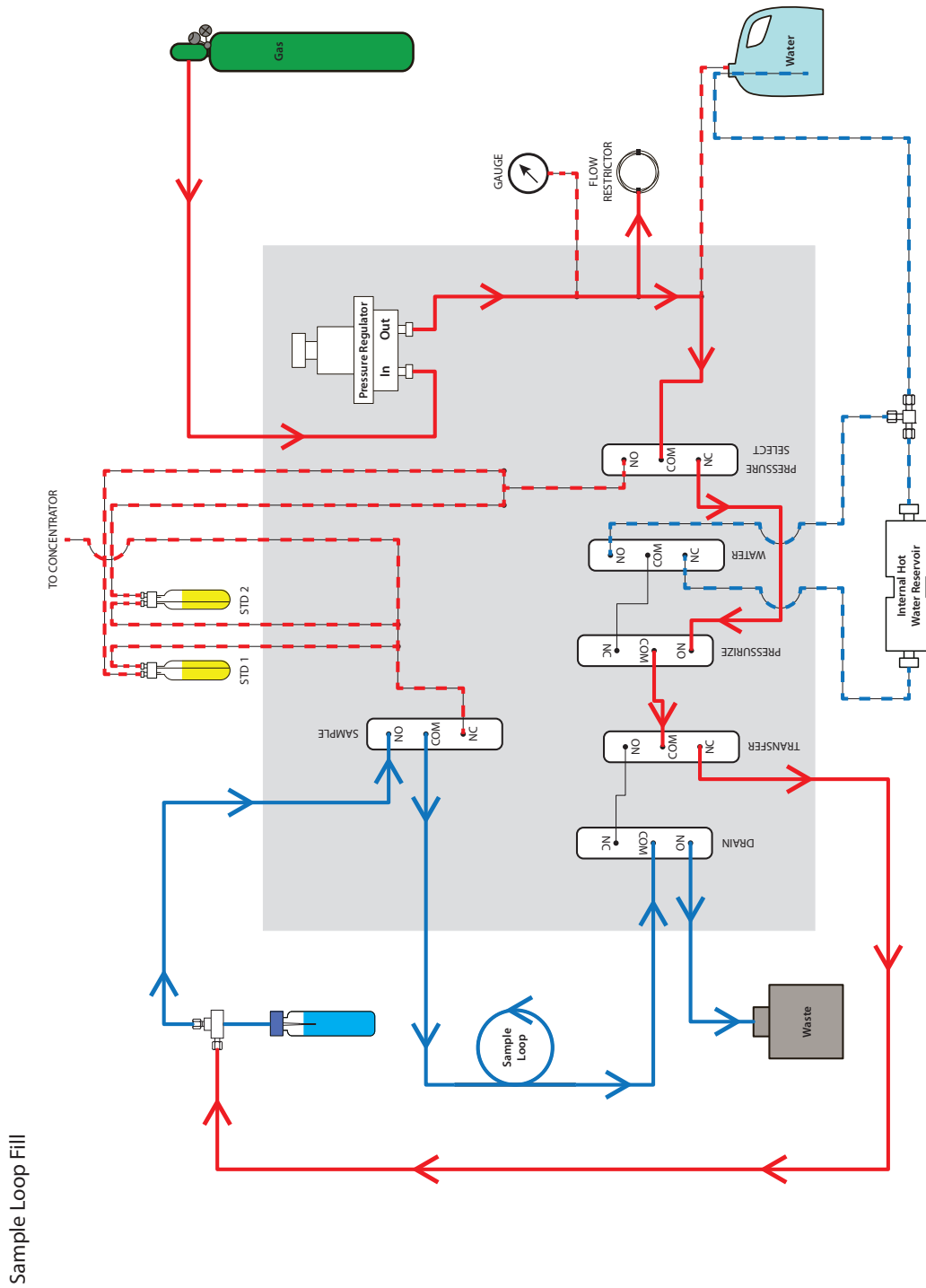


Presweep A

A.3.4 AQUATek LVA - Presweep B

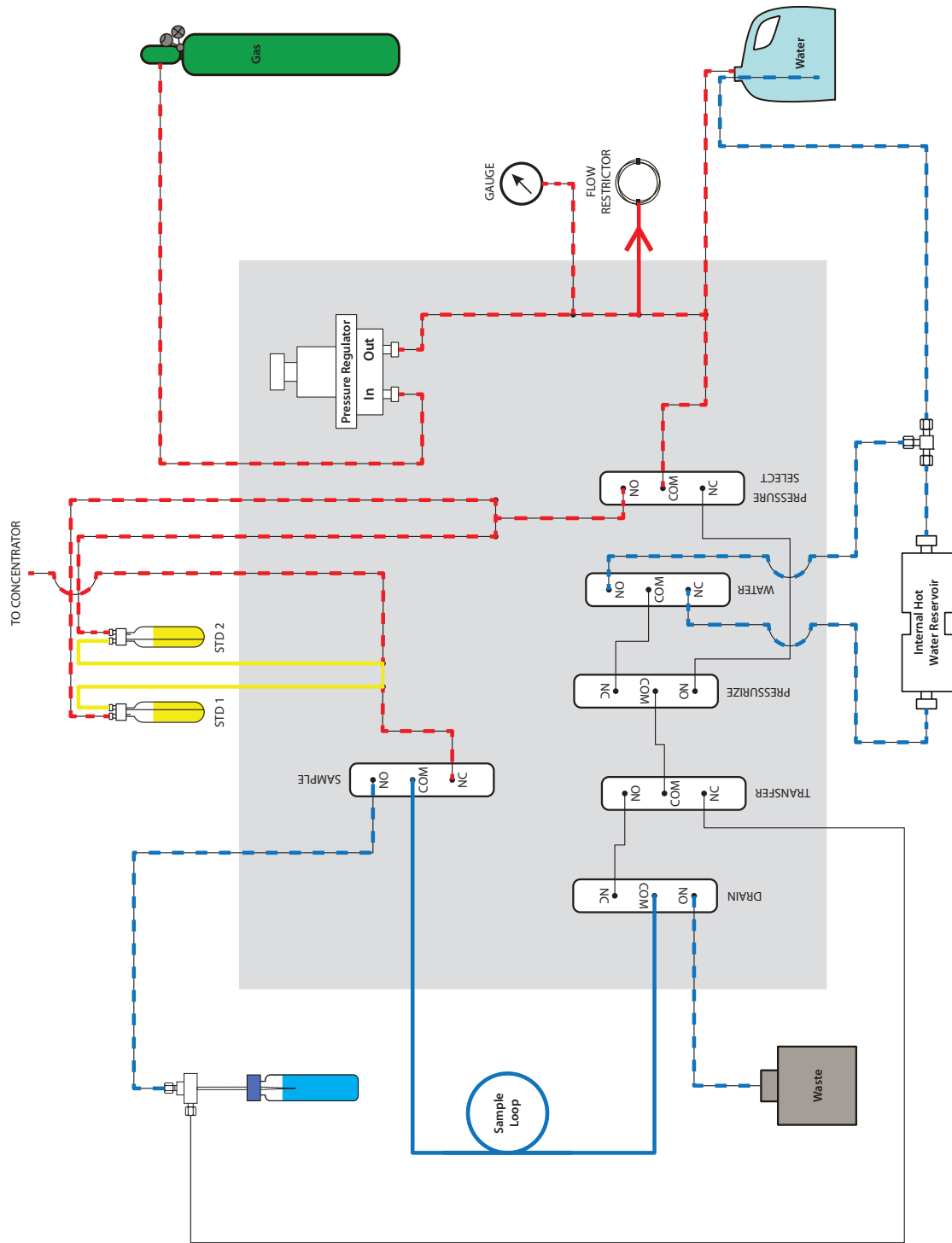


A.3.5 AQUATek LVA - Sample Loop Fill

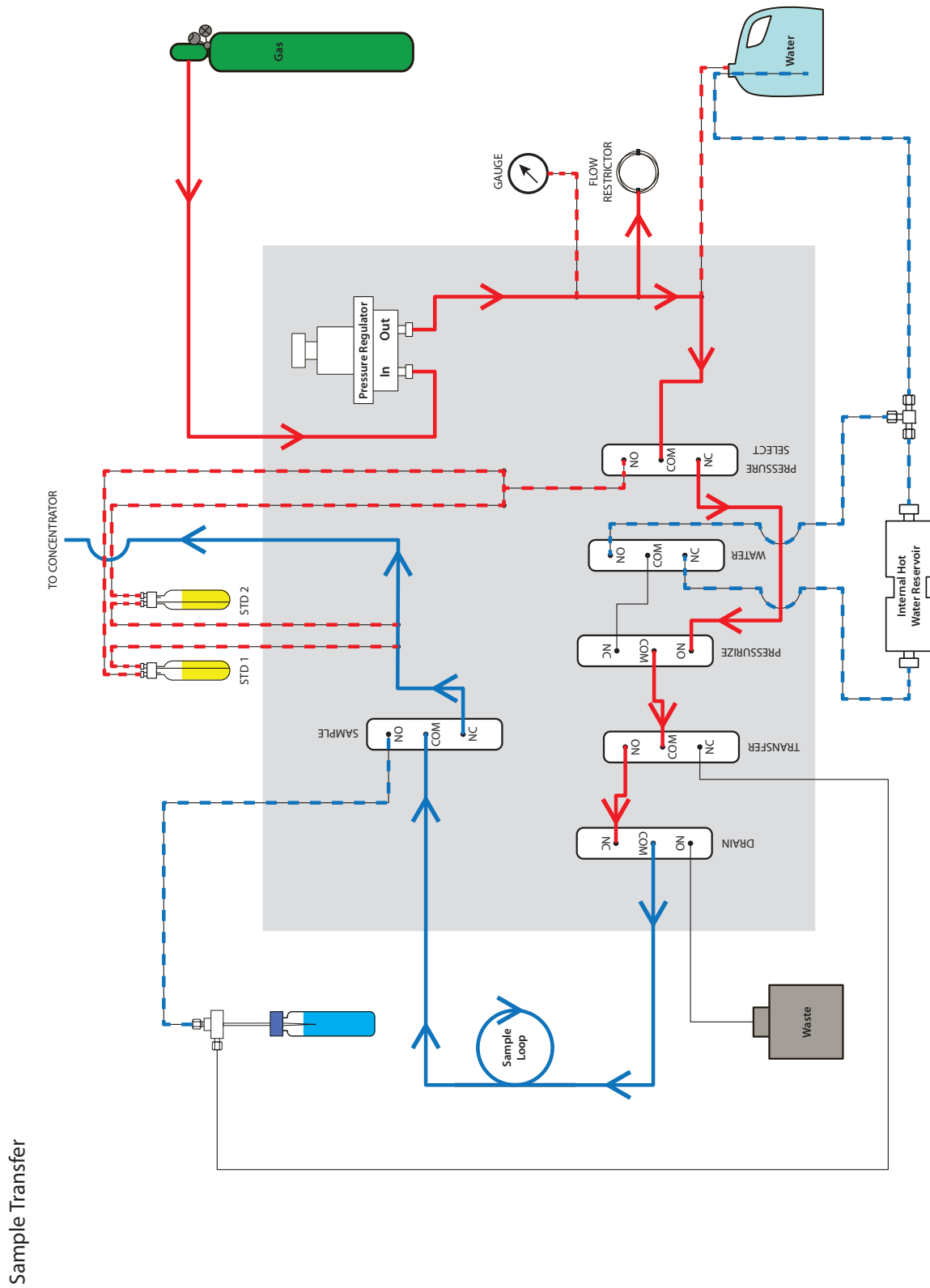


A.3.6 AQUATek LVA - Standard Dispense

Standard Dispense

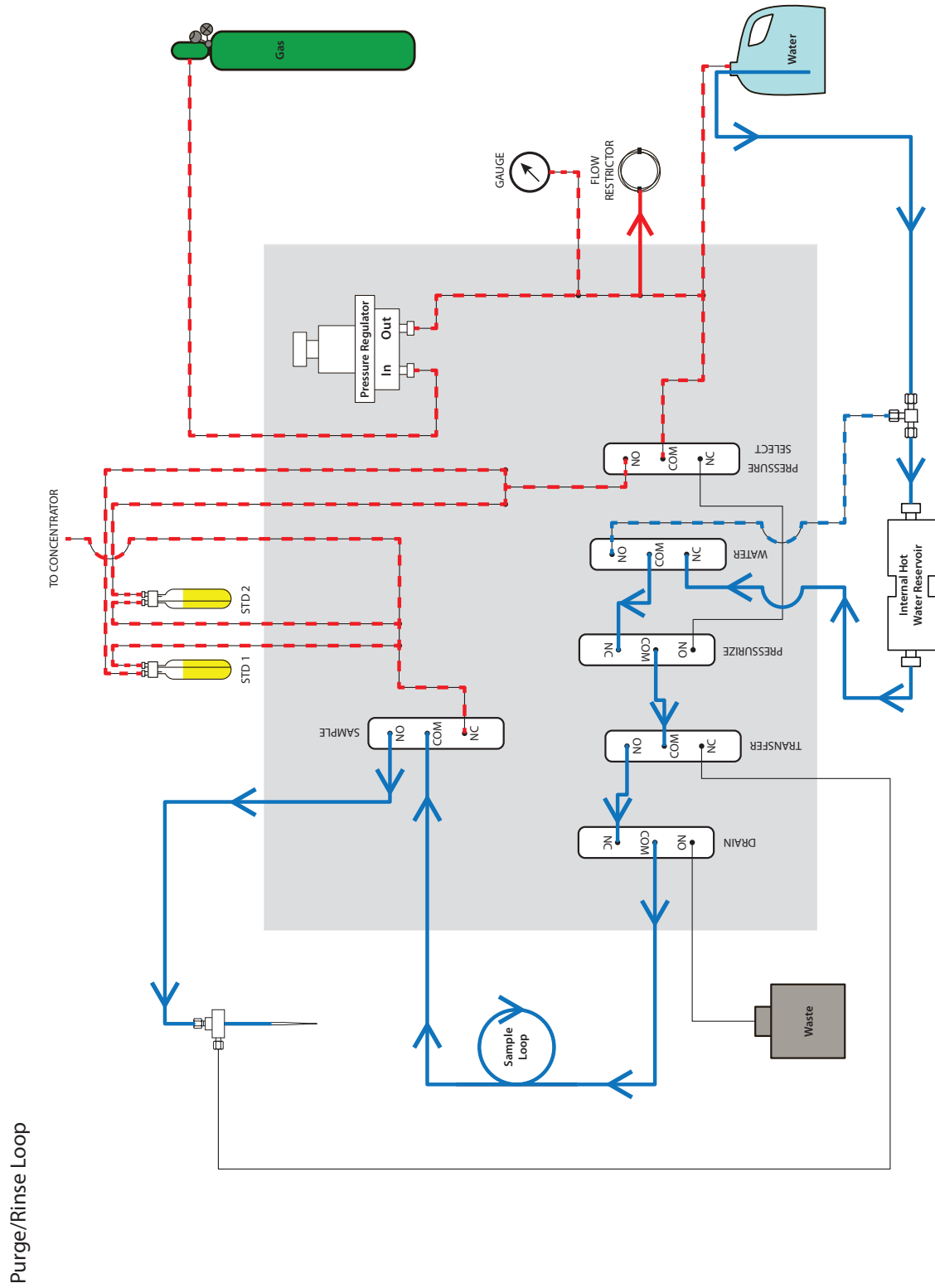


A.3.7 AQUATek LVA - Sample Transfer

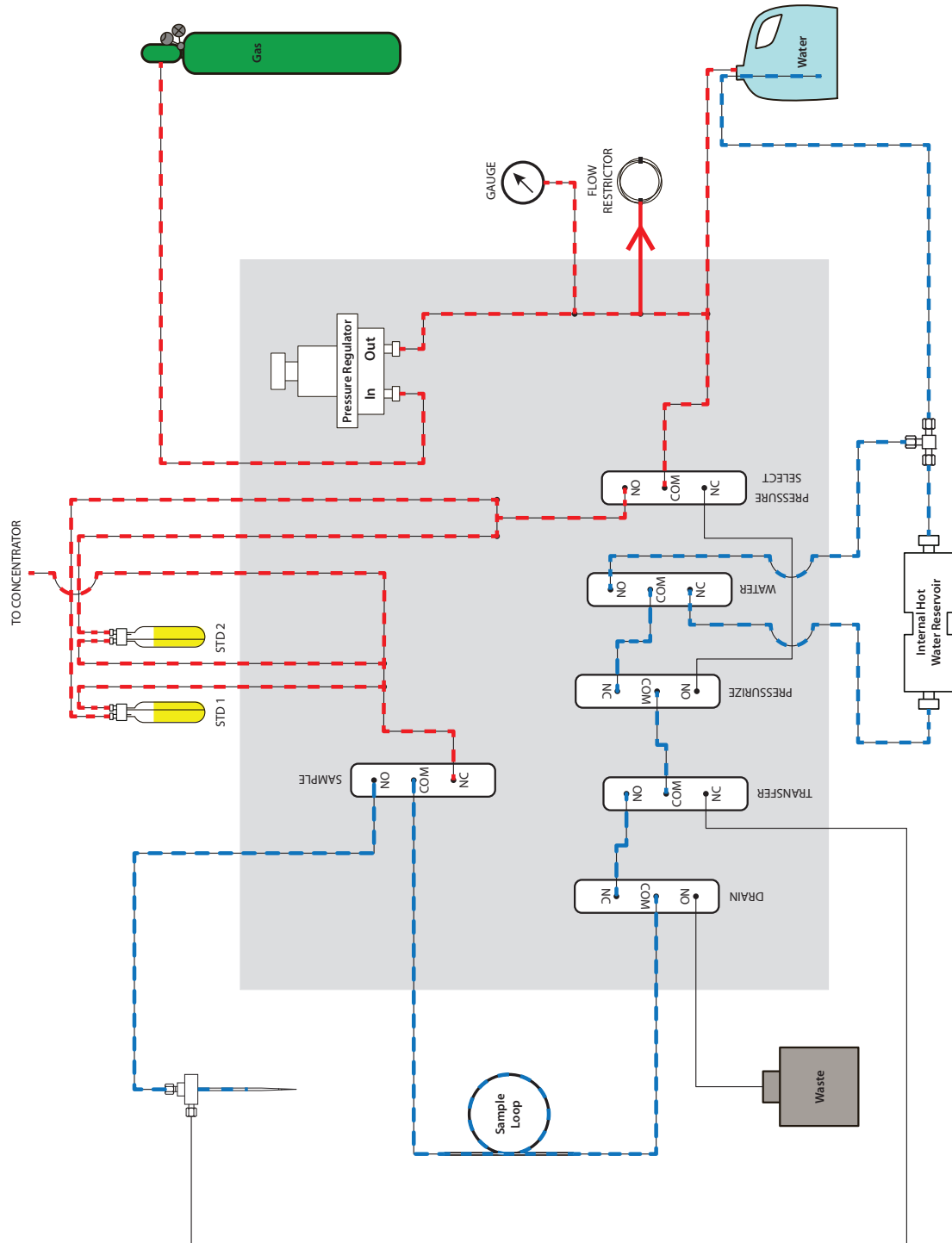


Sample Transfer

A.3.8 AQUATek LVA - Purge/Rinse Loop

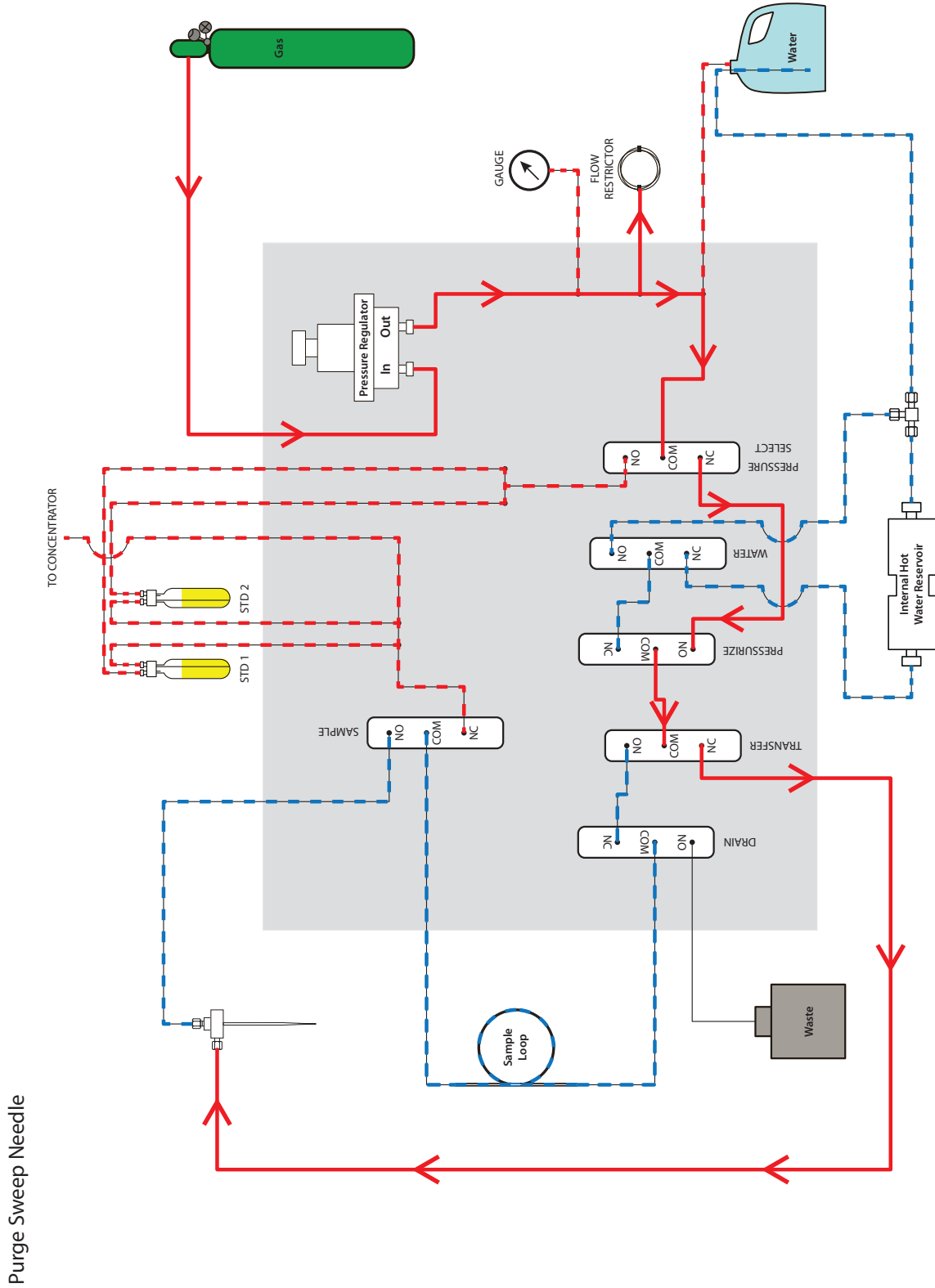


A.3.9 AQUATek LVA - Purge



Purge

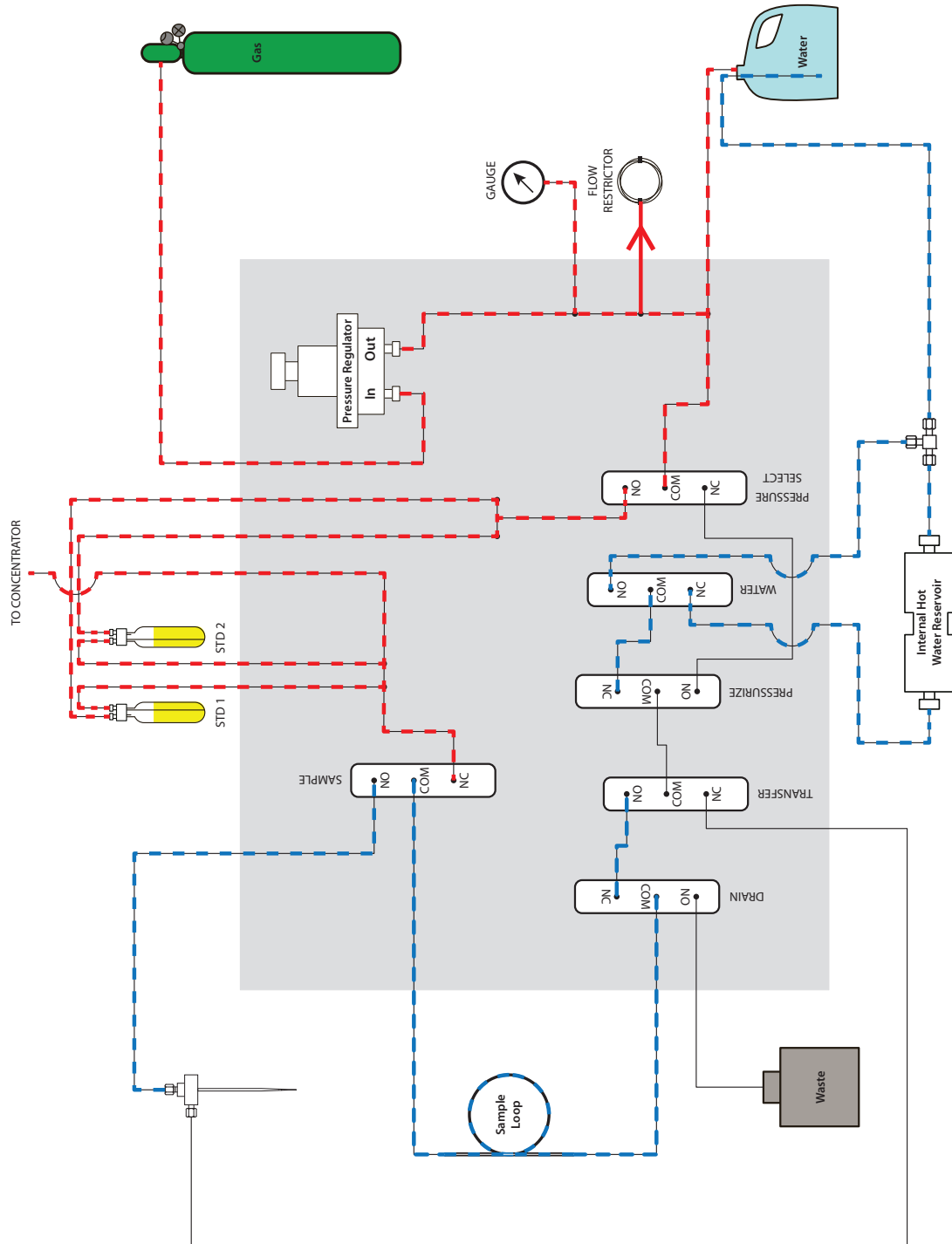
A.3.10 AQUATek LVA - Purge Sweep Needle



Purge Sweep Needle

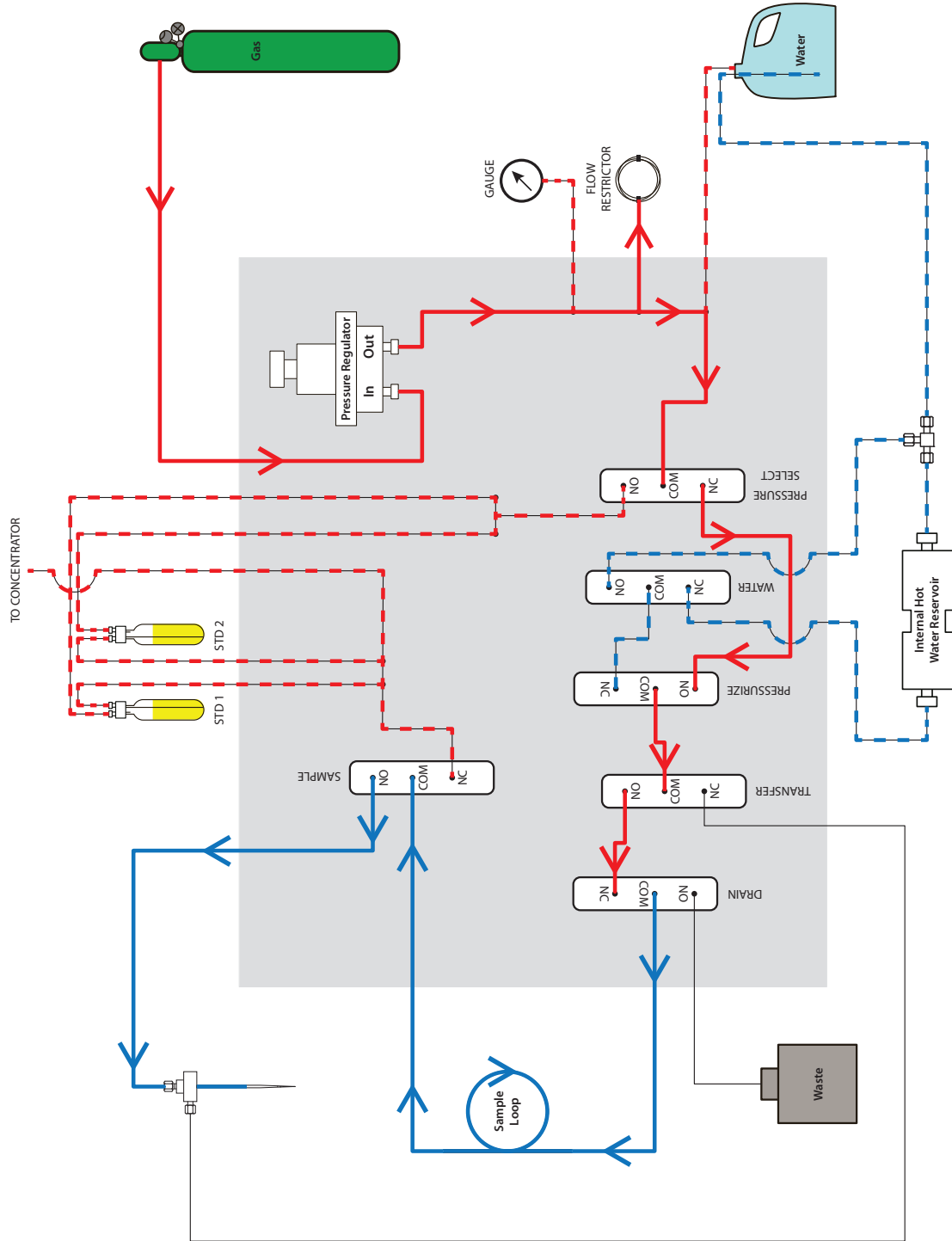
A.3.11 AQUATek LVA - Dry Purge, Desorb Ready, Desorb Preheat

Dry Purge, Desorb Ready, Desorb Preheat

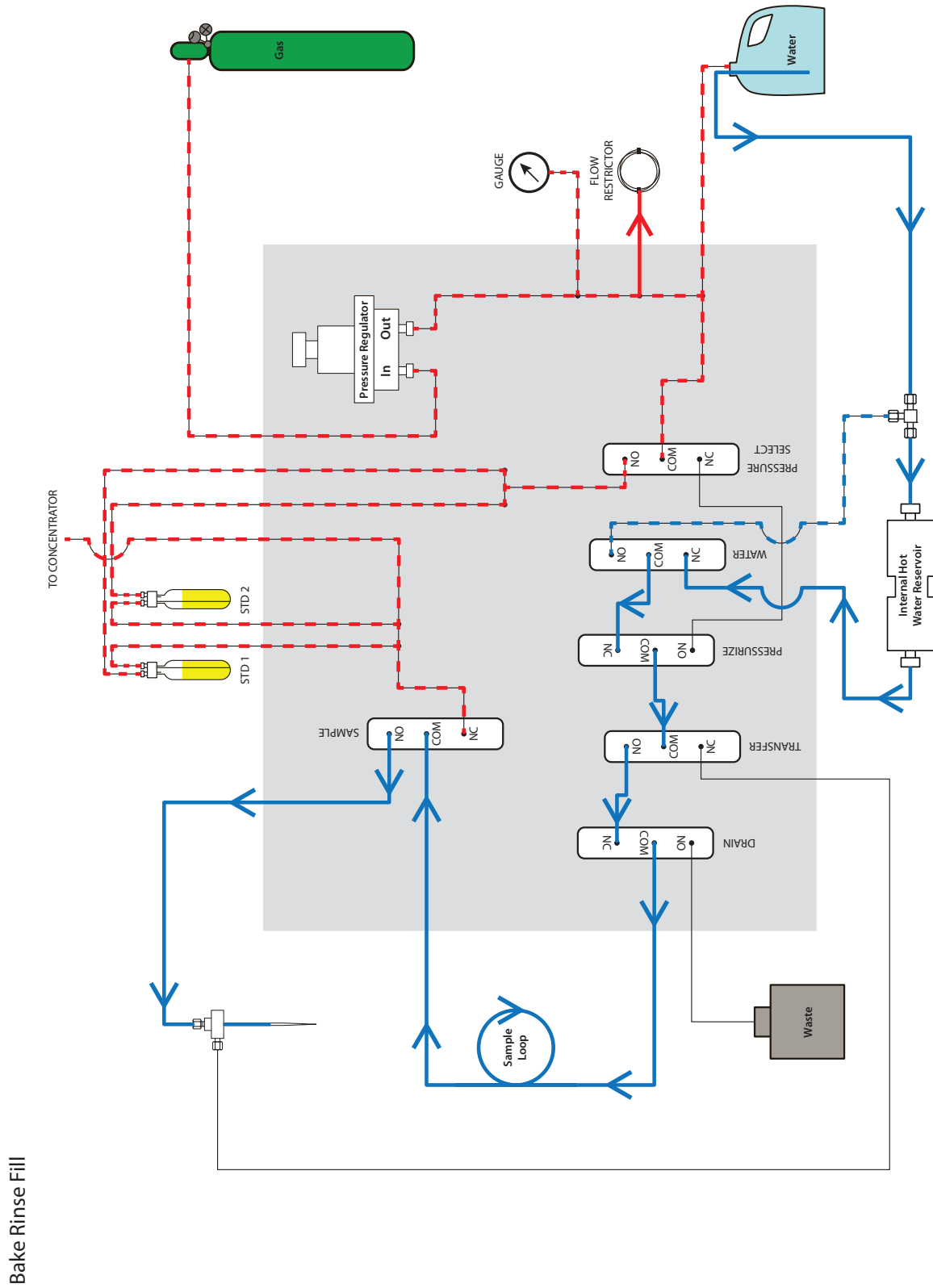


A.3.12 AQUATek LVA - Desorb

Desorb

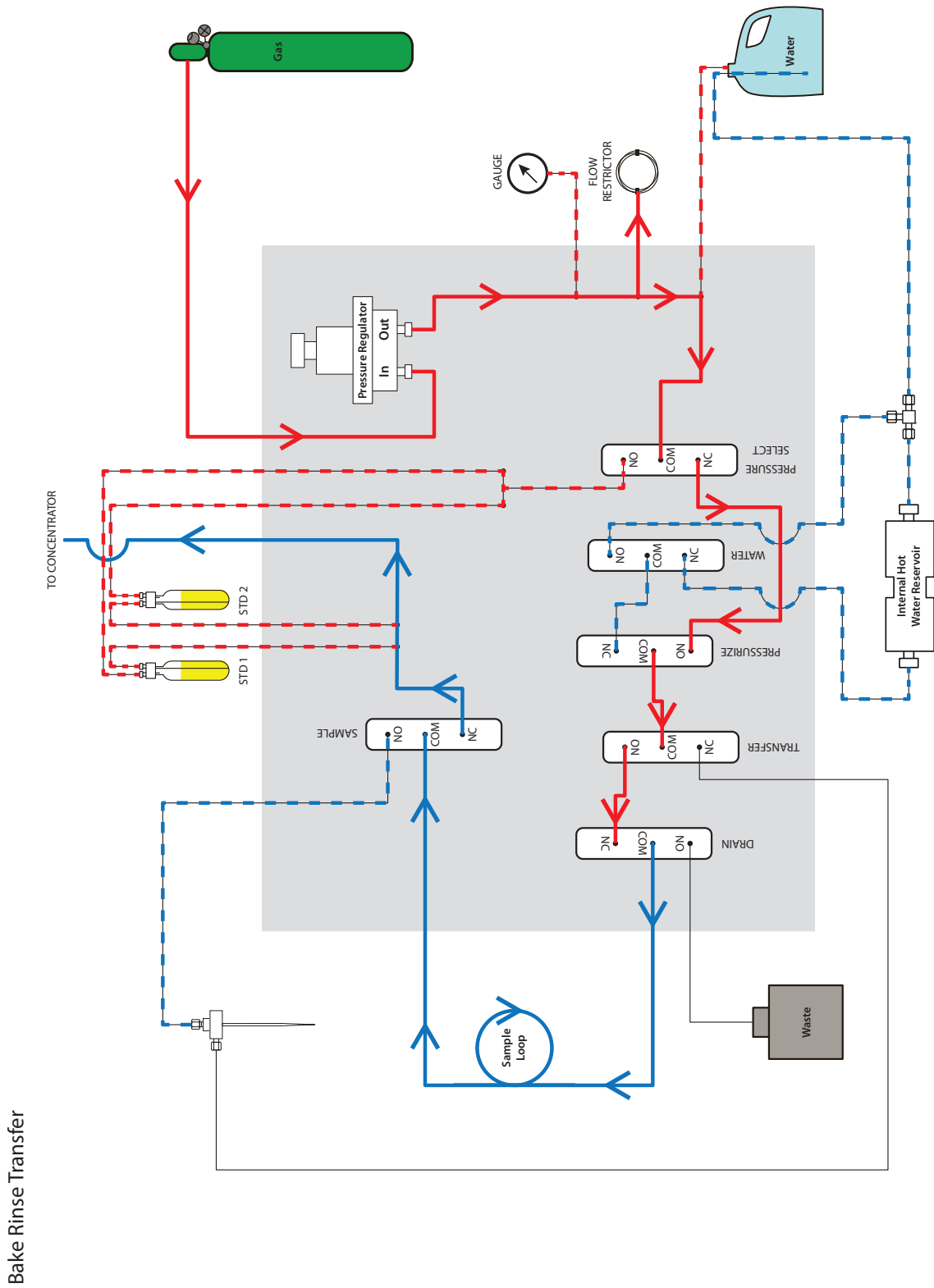


A.3.13 AQUATek LVA - Bake Rinse Fill

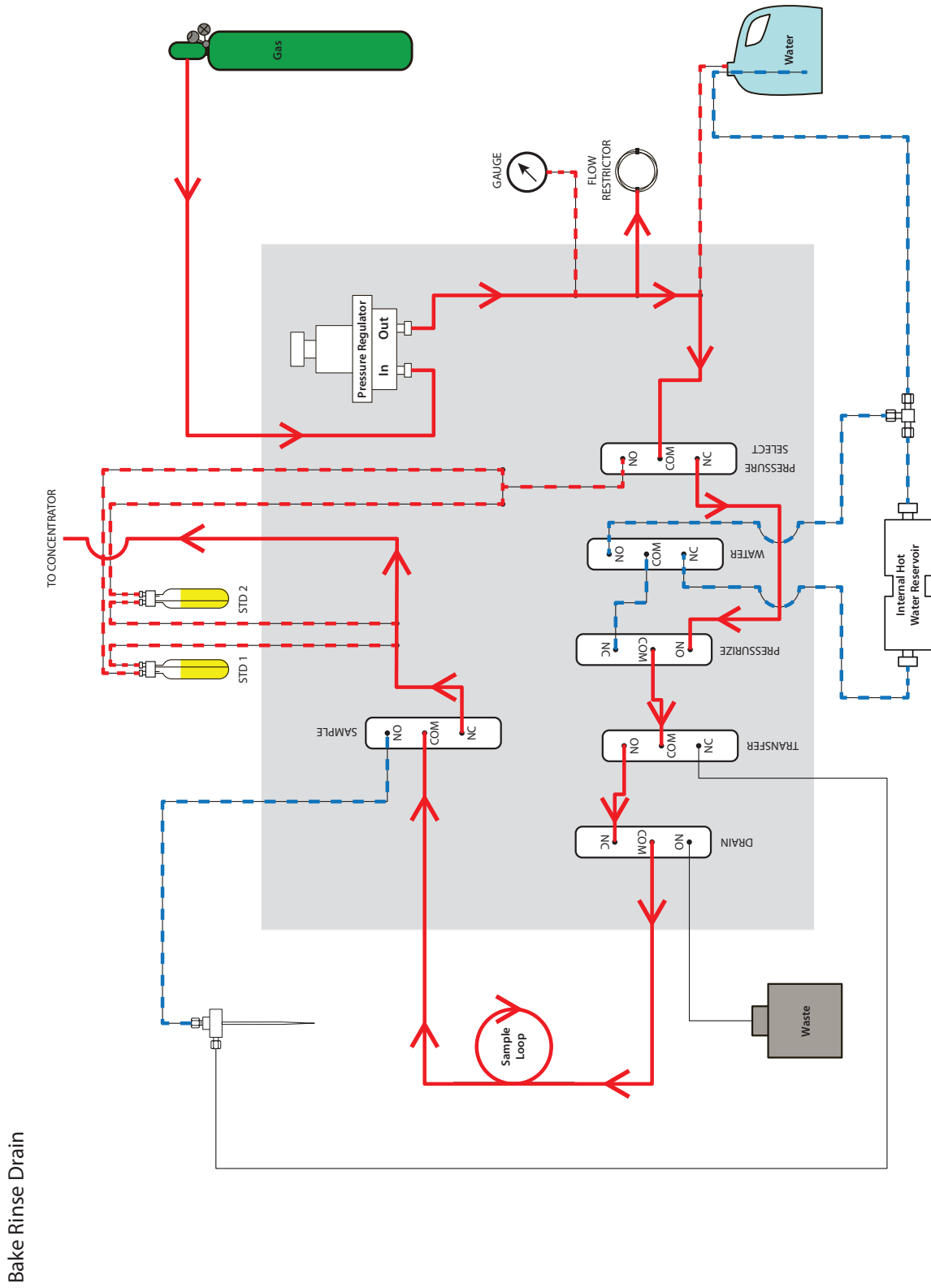


Bake Rinse Fill

A.3.14 AQUATek LVA - Bake Rinse Transfer

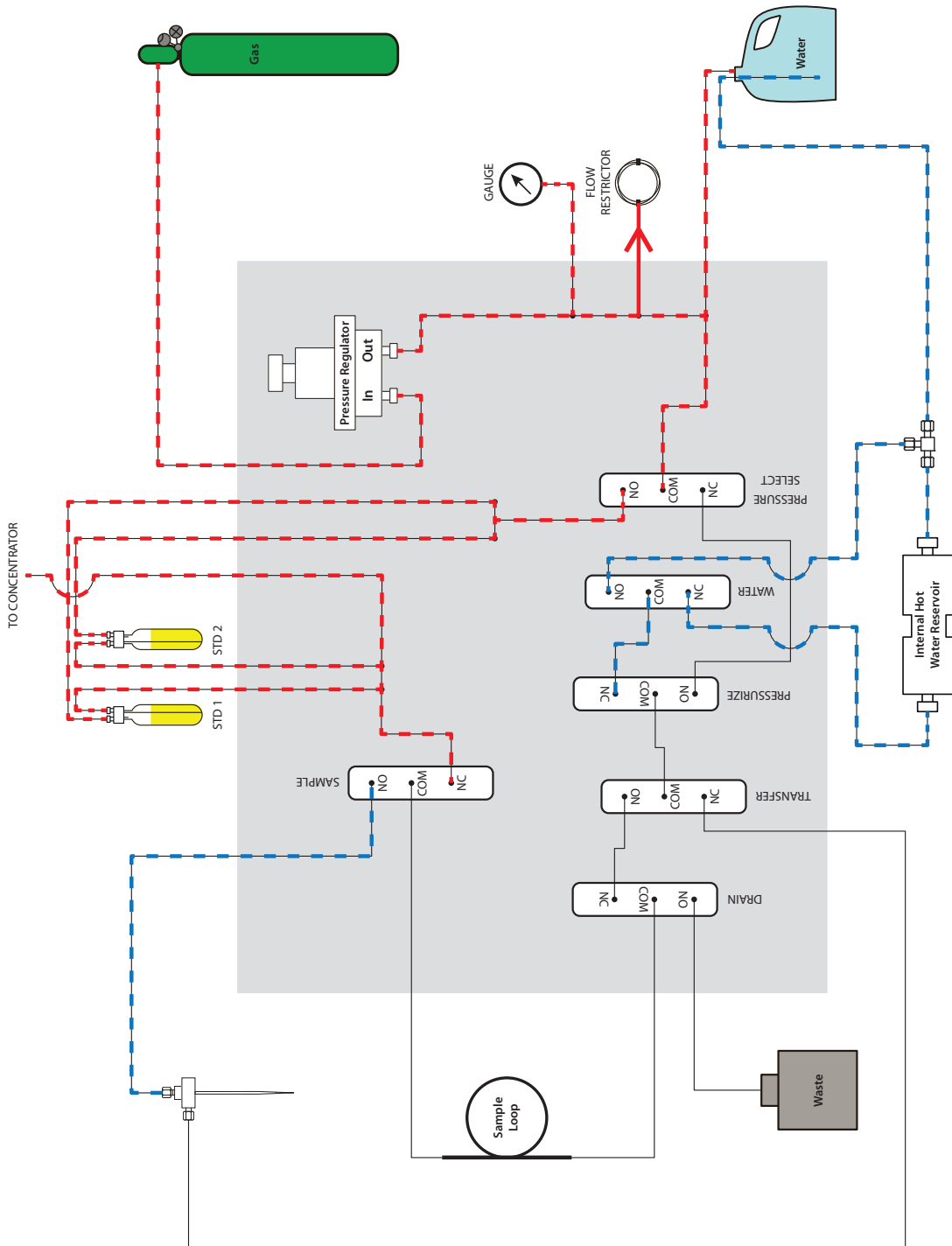


A.3.15 AQUATek LVA - Bake Rinse Drain



A.3.16 AQUATek LVA - Bake

Bake



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