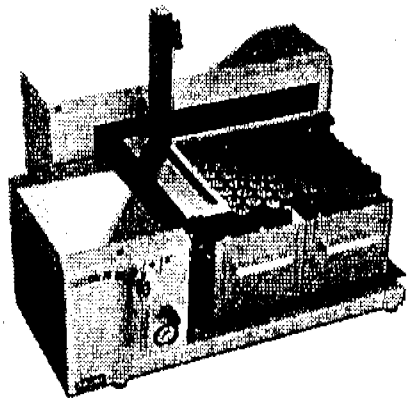
AQUATek 70

Liquid Vial Autosampler

User Manual



AQUATek 70

USER MANUAL

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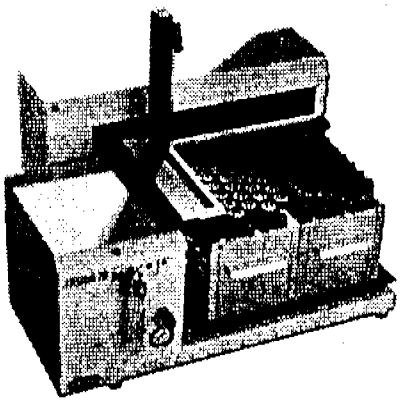

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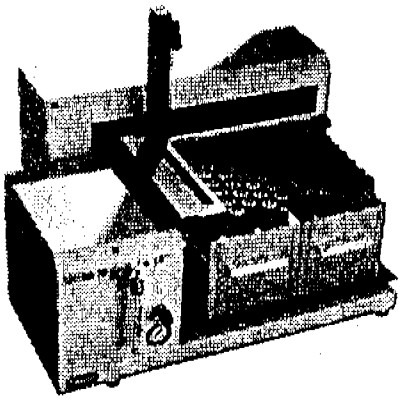


#1

INTRODUCTION

1.1 System Description

AQUATek 70 processes water and wastewater samples of all types—including particulate-laden samples. The autosampler (❶, Figure 1.1) automatically removes a measured amount of sample from each vial and the sample module (❷) adds a standard solution (❸) automatically to the sample and then transfers it to the concentrator.

AQUATek 70 uses a vial transport system. The sample vial is not moved because the sample needle (❹) is brought to the vial. This eliminates problems of traditional vial autosamplers such as vial jamming and dropping caused by vial cap incompatibility and vial labels and also prevents the particulate layers of ground water samples from being disturbed. Large bore tubing and large valve orifices eliminate clogging of lines and valves. The sample pathway uses large bore Teflon® tubing which is inert, corrosion resistant and easy to work with.

After the sample is purged, AQUATek 70 rinses the sample path including the sample needle, transfer line and glassware with 90°C water. Water, not water vapor, rinses the system and a dual chamber heating system keeps the water temperature high while rinsing the sample pathway efficiently, decreases blank runs and improves quality data.

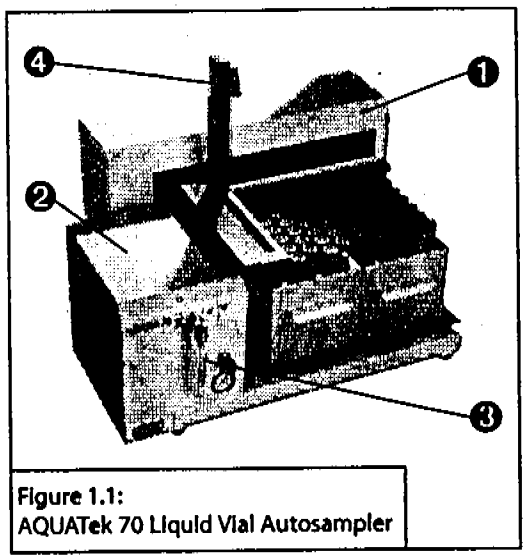


Figure 1.1:
AQUATek 70 Liquid Vial Autosampler

AQUATek 70 accepts rinse water directly from a tap water source using an optional tap kit. The tap kit simplifies set up because it eliminates the need to periodically check the water level of an external reservoir. The tap kit also includes a blank water generator eliminating the need to make large volumes of VOC-free water. A rinse reservoir kit is also available for labs without a nearby water source.

TekLink software integrates total method control of AQUATek 70 through the Windows® environment. It integrates control of AQUATek 70, a 3000 Series concentrator and a Windows-based data system.

1.2 Specifications

Sample Vials:
Nominal 40ml capacity, single hole cap with Teflon-faced silicone septum, per EPA specifications. 3-3/4" (9.5cm) high, 1-1/16" O.D., 24 mm ID cap for water sampling.

Trays:
Accepts either two 35-position trays or one optional 70-position vial cooling tray

Vial Cooling:
Optional vial cooling tray to cool vials to 4°C as per EPA specifications. (Requires an external recirculating cooling bath)

Bath Connection:
Inlet and outlet hose connections require 1/4" I.D. tubing. Bath must have a minimum cooling capacity of 300 watts.

Liquid Samples:
Drinking water and wastewater (water samples containing sediment levels of up to 15mm when measured from the bottom of an upright 40mL vial).

Sample Loop:
Interchangeable loops; 5, 20 or 25ml volume, 1/8" O.D., coiled.

Standard Injection System:
4-way valve, 2 µL volume delivery.

Internal Standard Accuracy:
2µL +/- 10%.

Internal Standard Consumption:
11µL at 0.02min Fill IS.
16µL at 0.04min Fill IS.

Electronic Control:
Concentrator control of optically isolated I/O.

Instrument Control:
AQUATek 70 is controllable with a PC running TekLink software in the Windows environment (Windows 3.1/95/98/NT). TekLink integrates control of the 3000 Series Purge & Trap Concentrator with AQUATek 70.

Method Storage:
Up to 16 methods including pre-programmed methods.

Vial Sampling Device:
XYZ robot with stationary vial rack design capable of an accuracy of +/- 1mm in XYZ dimensions and repeatability of +/- 0.25 mm in XYZ dimensions.

High Temperature OptiRinse™:
AQUATek 70 uses dual internal reservoirs which heat the water to 90° C to clean the entire sample pathway. (Includes sample loop, sample transfer pathway, and glassware on the concentrator).

Rinse Kits:
AQUATek 70 requires either a tap rinse kit or a reservoir kit. These do not add additional width so bench space used is not increased.

Sample Path:
1/8" O.D. Teflon tubing.

Valving:
Four 12VDC, 3-port solenoid valves. One 115/230 VAC motor actuated 4-port valve.

Continued...

Size:

Sample Module:
11" (27.9 cm)W x 10.5" (26.7 cm)D x
10" (25.4 cm)H
Autosampler:
21.1" (53.5 cm)W x 17.2" (43.7 cm)D
x 14.6" (37.1 cm)H*
(* without vertical arm installed)

Weight:

Sample Module:
15lbs (6.8kg) shipping weight.
Autosampler:
120lbs (54.4kg) shipping weight.

Warranty:

One year full warranty.

Certifications:

CETL, CE

Power Requirements:

100/115/230 VAC (+/- 10%) factory
configured.
50/60 HZ, 100VA.

Environment Requirements:

Operating temperature:
10° C to 30° C.
Storage temperature:
-20° C to 60° C.
Relative humidity:
10 to 90% with no condensation.

Gas Requirements:

Ultra-high purity (99.999% pure)
helium, 25 - 60 psi.

1.3 Safety

Please be aware that if the AQUATek 70, its components, and/or accessories are used in a manner not specified by Teledyne Tekmar, protection provided by the equipment may be impaired.

Safety Warnings

Warnings in this document or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument.

WARNING

A warning calls attention to a condition or possible situation that could cause injury to the user.

CAUTION

A caution call attention to a condition or possible situation that could damage or destroy the product or the user's work.

Caution. Refer to accompanying documents.

Indicates a hot surface.

Indicates hazardous voltage.

Indicates explosion hazard.

Indicates potential fire hazard.

WARNING

NEVER use hydrogen or other flammable gas with the AQUATek 70 and its peripherals.

Follow the manufacturers' directions for safe handling of gas and chemicals. Also refer to Material Safety Data Sheets for information on specific chemicals.

For continued fire protection, replace with same type and rating of fuse.

Do not exceed 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).

An extension cord may overheat and cause a fire. Do not plug AQUATek 70 or its peripherals into an extension cord.

WARNING

Samples and sample waste may contain hazardous and toxic substances. Follow proper safety and health practices. Also know regulatory limitations before using or disposing of chemicals.

Do not use in a confined space as nitrogen can cause suffocation if accumulated to high levels.

WARNING

To avoid electrical shock:

Turn off and unplug AQUATek 70 and any other peripherals before servicing.

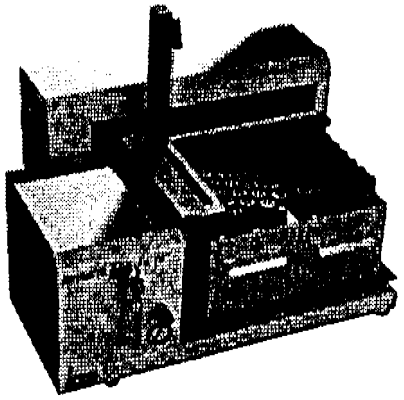
Do not process samples without the panels installed.

Plug the power cord into a properly grounded outlet.

CAUTION

Some parts inside AQUATek 70 get hot. To prevent burn injury, allow AQUATek 70 to cool before you remove the exterior panels.

NOTES:



#2

SYSTEM SETUP

2.1 Overview

This section describes the steps necessary to prepare your site for installation, unpack the sample module and autosampler, and set up the AQUATek 70 system.

Perform the system setup and installation in the sequence presented in this section.

Start-up assistance is available through Teledyne Tekmar or an authorized representative.

After meeting all utility and facility requirements, contact Teledyne Tekmar or an authorized representative to schedule onsite installation and start-up assistance. Please provide adequate advance notice to avoid undue delay in processing your request.

The sample module (❶, Figure 2.1) and the autosampler (❷) compose the AQUATek 70 Liquid Autosampler system and ship together. Each component is referred to as sample module and autosampler, respectively, throughout the remainder of this user manual and supporting documentation.

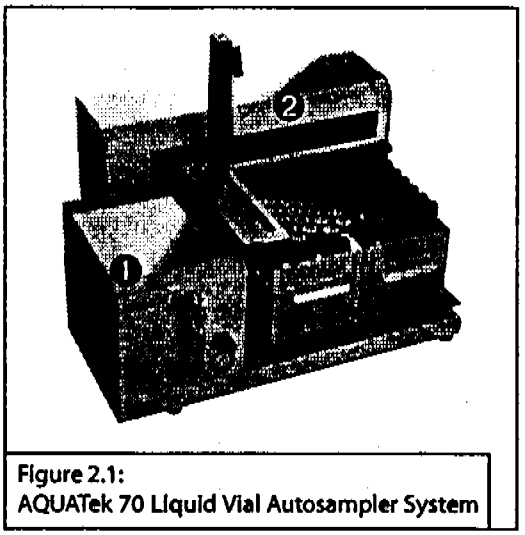


Figure 2.1:
AQUATek 70 Liquid Vial Autosampler System

2.2 Safety

Use of the AQUATek 70 Liquid Autosampler system and/or its accessories in a manner not specified by Teledyne Tekmar could impair the safety features of the instrument, result in serious injury, and/or void the warranty.

CAUTION
The sample module ships with the internal standard (IS) glassware installed. Use caution when removing the sample module from the shipping carton and when placing it on your workbench to avoid glass breakage and possible personal injury.

CAUTION
Two people are necessary to lift the autosampler out of the shipping carton and onto the bench. Arrange to have someone assist you with unpacking and bench placement of the autosampler.

To avoid electrical shock:
- Turn off and unplug the sample module and autosampler before servicing or routine maintenance.
- Do not process samples without the panels installed.
- Plug the power cord into a properly grounded outlet.

Some parts inside the sample module get hot. To prevent burn injury, allow the sample module to cool before you remove the exterior panels.

To prevent explosion and fire:
- Never use hydrogen or other flammable gas with AQUATek 70.
- Follow the manufacturers' directions for safe handling of gas and chemicals. Also, refer to Material Safety Data Sheets for information on specific chemicals.
- Do not plug the sample module or autosampler into an extension cord. An extension cord may overheat and cause a fire.
- For continued fire protection, replace with same type and rating of fuse.

To avoid injury to yourself or damage to the concentrator and the AQUATek 70 :
- Do not exceed recommended pressure settings.
- Observe safety regulations when handling pressurized gas.
- Wear safety glasses when operating, maintaining and servicing AQUATek 70.

CAUTION
Samples and sample waste may contain hazardous and toxic substances. Follow proper safety and health practices. Also, know regulatory limitations before using or disposing of chemicals. Do not use in a confined space as nitrogen can cause suffocation if accumulated to high levels.

2.3 Dimension and Weight Specifications

Dimensions:

Sample Module:

11" (27.9 cm)W x 10.5" (26.7 cm)D x 10" (25.4 cm)H

Autosampler:

21.1" (53.5 cm)W x 17.2" (43.7 cm)D x 14.6" (37.1 cm)H*

(* without vertical arm installed)

Weight:

Sample Module:

15lbs (6.8kg) shipping weight.

Autosampler:

120lbs (54.4kg) shipping weight.

2.4 Utility Requirements

Environment

Operating temperature:

10°C to 30°C

Storage temperature:

-20°C to 60°C

Relative humidity:

10 to 90% with no condensation.

Gas

99.999% He or N_2 gas at 20 psig

Power

Sample Module

Voltage:.

100/115/230 VAC (+/- 10%) factory configured; 50/60 Hz, 5.0/2.5 amps, 575 watts.

100/115V:

50 or 60 Hz single-phase power source at 100/115V +/- 10%; Maximum current draw is 0.86 amps and maximum power consumption is 100 watts; 1.0A 250V fuse, factory configured; Power cord is terminated with a 3-prong straight blade plug (safety feature) and requires a matching receptacle.

230V:

50 or 60 Hz single-phase power source at 230V +/-10%; Maximum current draw is 0.43 amps and maximum power consumption is 100 watts.

Autosampler:

Voltage:

100/120/230 VAC (+/- 10%)

100/120V:

50/60 Hz; 2.0 A fuse

220/240V:

50/60 Hz; 1.0 A fuse

2.5 Tools Needed for Setup and Installation

- Utility knife or scissors
- Large Phillips head screwdriver
- Small Phillips head screwdriver
- Medium slotted screwdriver
- 7/16" open end wrench
- 5/16" open end wrench

2.6 Unpack and Inspect AQUATek 70

Note:

Retain all shipping materials.

1. Open the top of the AQUATek 70 shipping carton.
2. Remove the two kit boxes located on the top layer of the carton.
3. Inspect each kit box to make sure that all parts listed on the packing list are present. If you believe you are missing any parts, please call the TeledyneTekmar Customer Support Center immediately at (800) 874-2004.
4. Remove the foam insert above the sample module and set aside.
5. Carefully slide your hands underneath the sample module (not near the glass IS vessel), lift out from the carton, and set on the bench.
6. Remove the plastic wrap from the sample module.
7. Remove the foam insert that was underneath the sample module from the carton and set aside.
8. Remove the autosampler vial tray box from the carton.
9. Remove the trays from the box, remove the plastic wrap, and set the trays on the bench.
10. Remove the two cardboard inserts from the shipping carton and set aside.

Continued...

11. With help from another person, carefully tilt the shipping carton on its side so that the autosampler box is sitting upright. The words "Top Freight Only" should not be upside-down when looking in the carton.
12. With one person holding the shipping carton still, the other person should carefully slide the autosampler box out from the shipping carton. The autosampler box fits snugly inside the carton and may be difficult to remove.
13. Carefully tilt the autosampler box to its upright position and open. The words "Top Freight Only" should now be on top of the box.
14. With the other person, carefully remove the autosampler from the box by lifting it out by its base.

Important!
Never lift or move the autosampler by its horizontal arm.

15. Set the autosampler on the bench.

Note:
If you do not have adequate access to the autosampler rear panel, you may want to set the autosampler on the bench at an angle so that you can access the rear connections during setup.

16. Carefully peel off the tape that secures the autosampler kit contents and discard.
17. Remove the plastic wrap from the autosampler kit contents and set aside.
18. Check the autosampler kit contents against the packing list. If you believe you are missing any parts, please call the Teledyne Tekmar Customer Support Center immediately at (800) 874-2004.

2.7 System Setup

Please install the AQUATek 70 system in the order described in this section.

If you have any questions or need technical assistance, please call the Teledyne Tekmar Customer Support Center at (800) 874-2004.

2.7.1 Autosampler Setup

Remove and Store the Arm Locking Screw

1. Remove the plastic arm locking screw cap (❶, Figure 2.7.1.1) from the right side of the autosampler and retain.
2. With a large Phillips head screw-driver, remove the arm locking screw (❷).

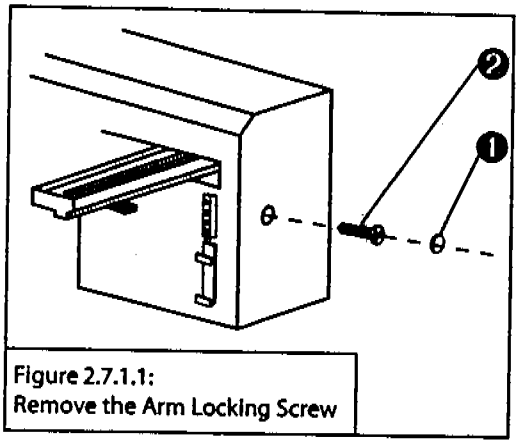


Figure 2.7.1.1:
Remove the Arm Locking Screw

3. Replace the plastic arm locking screw cap (❸, Figure 2.7.1.2) to the right side of the autosampler.
4. Insert the arm locking screw into its storage location (❹) located on the rear panel of the autosampler.

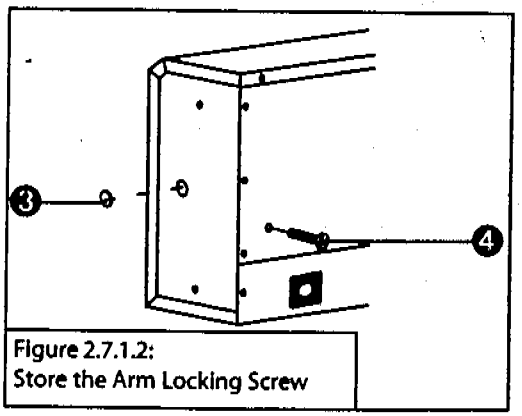


Figure 2.7.1.2:
Store the Arm Locking Screw

Install the Fuse(s)

You receive the autosampler without any fuses installed.

1. Locate the accessory package containing the fuse drawer appropriate for your line voltage. Discard the other fuse drawer.
2. Locate the accessory package containing the 2.0A fuses.
3. Install the fuse(s) into the fuse drawer.
   a) The fuse drawer for 115V accepts one fuse (Figure 2.7.1.3).
   b) The fuse drawer for 230V accepts two fuses (Figure 2.7.1.4).
4. Insert the fuse drawer into its receptacle in rear panel of the autosampler.

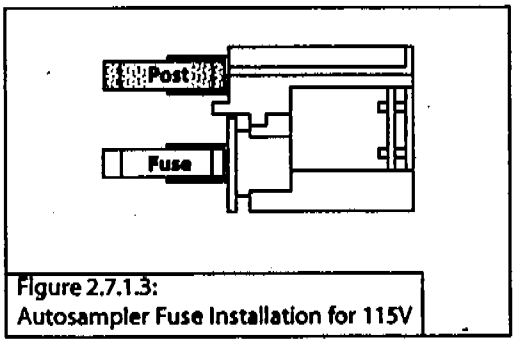


Figure 2.7.1.3:
Autosampler Fuse Installation for 115V

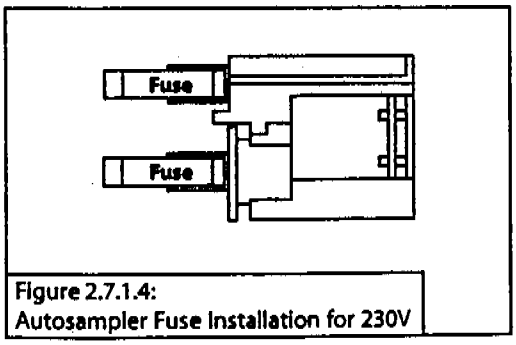


Figure 2.7.1.4:
Autosampler Fuse Installation for 230V

Set the Unit ID and Baud Rate

1. With a small Phillips screwdriver, set the Unit ID (SW1) selector on the rear of the autosampler to 0 (Figure 2.7.1.5).
2. Set the baud rate/mode (SW2) selector to 4 (Figure 2.7.1.5).

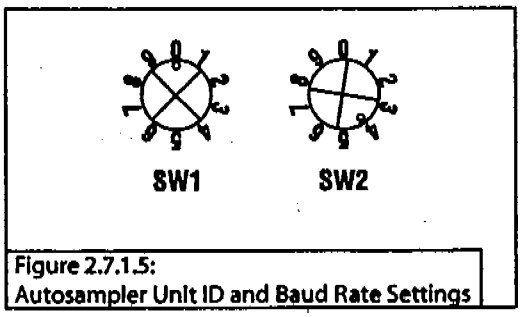


Figure 2.7.1.5:
Autosampler Unit ID and Baud Rate Settings

Install the Vertical Arm

Note:
Before installing or changing the vertical arm, ensure that horizontal arm moves freely.

1. Remove the three small screws (❶, Figure 2.7.16) from the front cover plate (❷) of the horizontal arm (❸) with a small Phillips screwdriver and set the screws and cover plate aside.

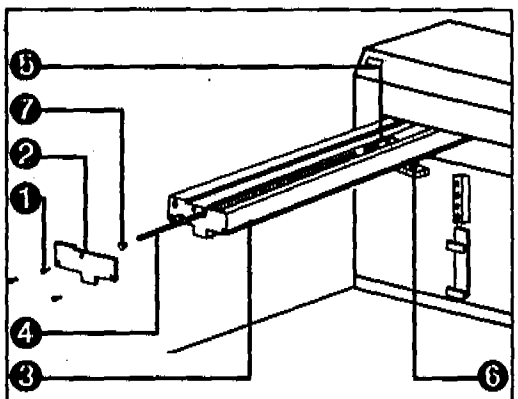


Figure 2.7.1.6:
Vertical Arm Installation; Remove Control Rod

2. Locate the hexagonal-shaped control rod (❹) and horizontal slider (❺) by looking down into the horizontal arm.
3. Using your finger, press on the control rod where it passes through the horizontal slider. At the same time, pull the probe foot (❻) towards the front of the horizontal arm. This causes the white plastic plug (❼) and control rod to move forward slightly. When the white plastic plug is no longer flush with the front of the horizontal arm, remove it and remove the control rod from the horizontal arm.
4. Pull the probe foot towards the front of the horizontal arm as far as it will go.
5. Position the vertical arm (❶, Figure 2.7.1.7) onto the horizontal slider (❹). When viewed from the front of autosampler, the needle holder bracket (❷) of the vertical arm is on the right.

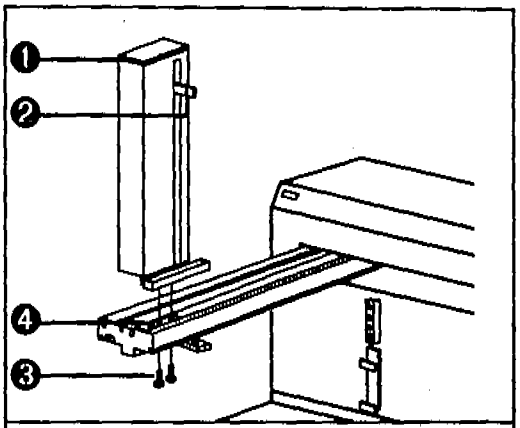


Figure 2.7.1.7:
Vertical Arm Installation; Attach the Vertical Arm

6. Use the supplied screws to secure the vertical arm to the horizontal slider. Insert the screws up through the bottom of the mounting holes (❸) of the horizontal slider. You may need to move the vertical arm back and forth slightly to align its mounting holes with those in the horizontal slider.
7. Re-insert the control rod as far as it will go. While inserting the control rod, you may need to rotate it back and forth slightly to get it to pass through the gearing and motor drive socket in the horizontal slider.

Continued...

8. Apply pressure at the base of the vertical arm and push the vertical arm to the back of the horizontal arm.
9. While slightly moving the probe holder bracket up and down, push the control rod until it clicks into position.
10. Replace the white plastic plug.
11. Replace the cover plate to the front of the horizontal arm with the three screws.

Install the Needle Holder Assembly

1. Thread the plastic needle guide nut (❶, Figure 2.7.1.8) up through the probe foot (❷) until finger-tight.

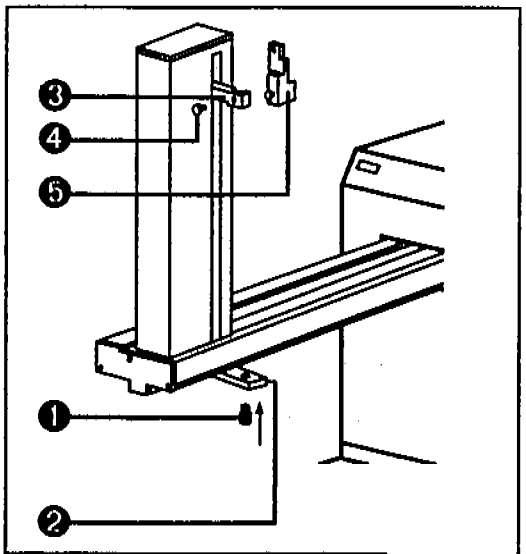


Figure 2.7.1.8:
Install the Needle Holder Assembly

2. Slide the needle holder bracket (❸) up to the top position of the vertical arm.
3. Remove the needle thumbscrew (❹) from the front of the needle holder assembly (❺).
4. Snap the needle holder into the back of the bracket making sure the thumbscrew holes align.
5. Re-insert the thumbscrew into the bracket, but do not tighten fully.

Install the Sample Needle Assembly

1. Slide the needle assembly (❶, Figure 2.7.1.9) down through the needle holder (❷) and needle guide nut (❸) making sure that the side pressure port (❹) faces out and that the sample needle is centered and just barely within the the needle guide.

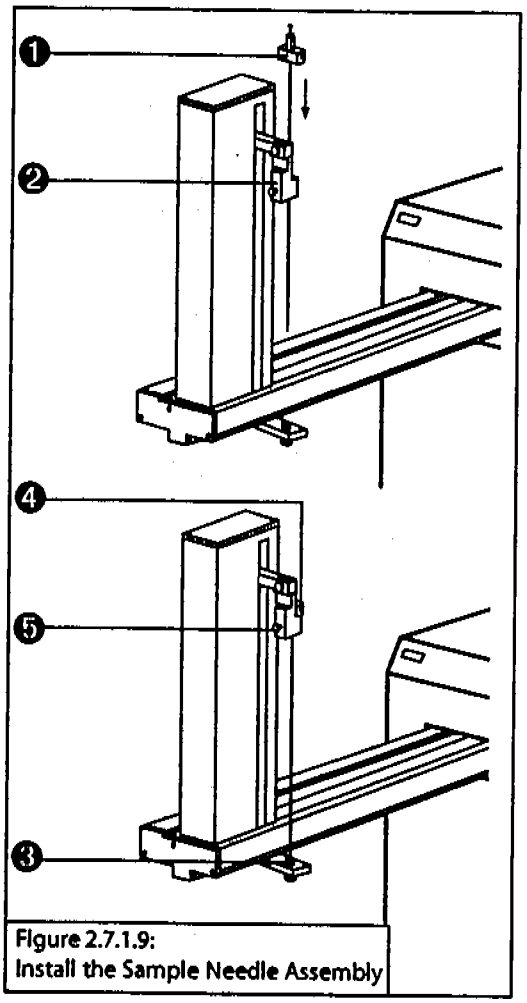


Figure 2.7.1.9:
Install the Sample Needle Assembly

2. Secure the needle by tightening the needle thumbscrew (❺).

Note:
Do not over-tighten the needle thumbscrew; doing so may damage the sample needle.

Install the Autosampler Tray

The tray positions the vial racks that fit onto the bed of the autosampler and contains liquid spills that may occur.

1. Install the tray in the lower position on the tray mounting brackets (❶, Figure 2.7.1.10).

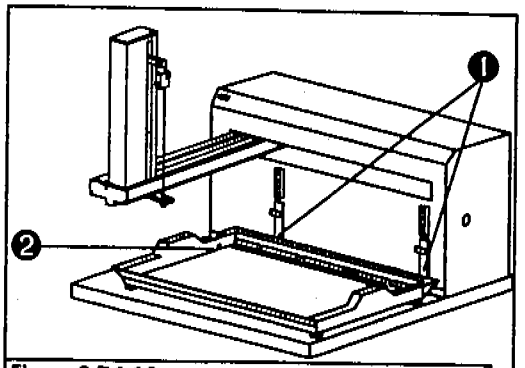


Figure 2.7.1.10:
Install the Autosampler Tray

2. Make sure that the tray fits securely and that the drain outlet (❷) is located at the left rear of the tray.

Install the Rinse Station, Drain Tube, and Support Bar

1. Make sure that the rinse station body is positioned the correct way(❶, Figure 2.7.1.11).

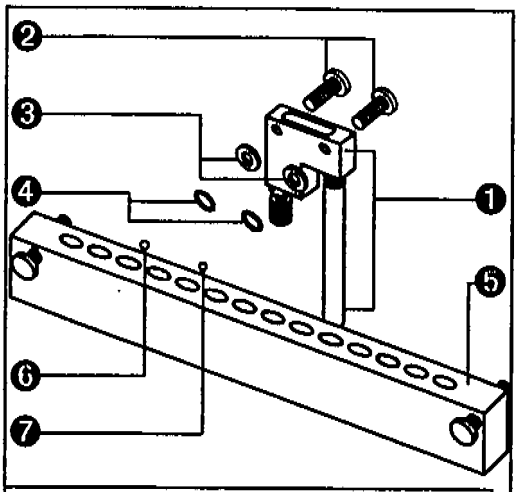


Figure 2.7.1.11:
Assemble Rinse Station; Attach to Support Bar

2. Pre-assemble the rinse station in this order: thumbscrews (❷), rinse station body, washers (❸), and o-rings (❹).

3. Secure the rinse station assembly to the back of the support bar (❺) between positions 3 & 4 (❻) and 4 & 5 (❼) and tighten the thumbscrews (❷).

4. Feed one end of the drain tubing (❶, Figure 2.7.1.12) over the drain outlet (❷) of the rinse station and place the other end in a drain receptacle, located lower than the tray.

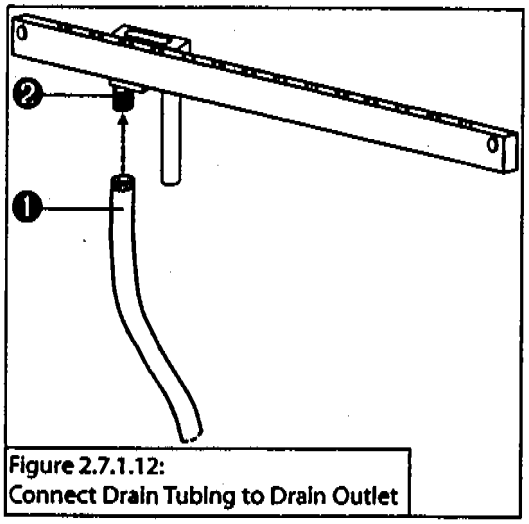


Figure 2.7.1.12:
Connect Drain Tubing to Drain Outlet

5. Secure the support bar to the top holes of the two front standoffs (❶, Figure 2.7.1.13) and tighten the two front support bar thumbscrews (❷).

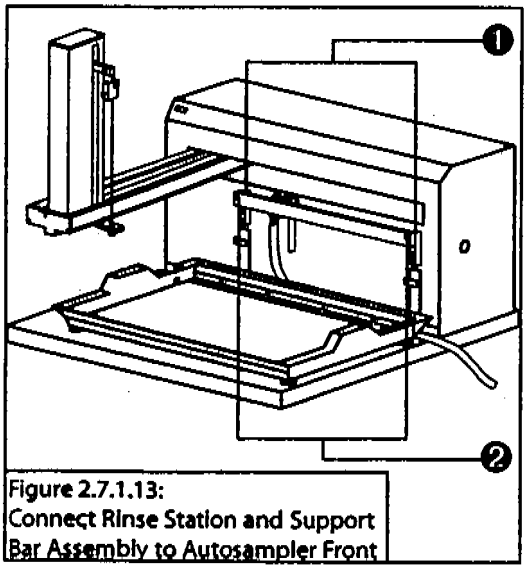


Figure 2.7.1.13:
Connect Rinse Station and Support Bar Assembly to Autosampler Front

Install the Autosampler Tubing Support Rod

1. Place the magnetic base of the tubing support rod on the top of the autosampler.
2. Route the sampler tubing around the support rod to keep tubing out of your workspace and so that the tubing does not interfere with the movement of the horizontal arm.

2.7.2 Sample Module Setup

Position the Sample Module onto the Autosampler

1. Turn the autosampler around so that you can place the sample module onto the autosampler base.
2. Locate the Velcro® strip at the bottom of the sample module.
3. Remove the adhesive backing from the Velcro strip and discard.
4. Place the sample module (IS glassware facing toward you) on the autosampler (left of the vial tray).
5. Apply slight pressure to the top of the sample module to ensure the Velcro adhesive sticks to the autosampler base.

2.7.3 Install the AQUATek 70 Logic Card in the Concentrator

You must install the AQUATek 70 logic card in the concentrator so that the concentrator can communicate with the sample module and autosampler.

CAUTION
Static discharge can damage the logic card.
- Before handling the logic card or touching any internal components, discharge your body's static electric charge by touching a grounded surface.
- If available, wear a grounding strap. When handling the logic card, hold it by the edge and metal mounting bracket only.
- Avoid touching components on the card and the edge extenders that plug into the microcontroller expansion slot.

1. Make sure that the concentrator, computer (if connected), and any other peripherals are powered off and unplugged from their power source(s).
2. To loosen the right corner (trap) panel of the concentrator, loosen the two 1/4-turn screws on the front of the trap cover panel of the autosampler.
3. Slide the panel forward and then to the right to remove it.
4. To remove the top panel of the concentrator, pull it forward until it stops and then lift it up.
5. Remove the thumbscrew holding the top of the right side panel.
6. Lift the right side panel away from the concentrator to expose the logic card slots.
7. Locate an unused card slot (❶, Figure 2.7.3.1) on the back of the concentrator, remove its screw (❷), and cover plate (❸).
8. Carefully slide the AQUATek 70 logic card straight into the concentrator microcontroller board (❹). Make sure that none of the card pins bend or break off. Make sure the logic card is well seated in the microcontroller board.
9. Secure the logic board to the case with the cover plate screw.
10. Reverse steps 2-6 to replace the concentrator panel.

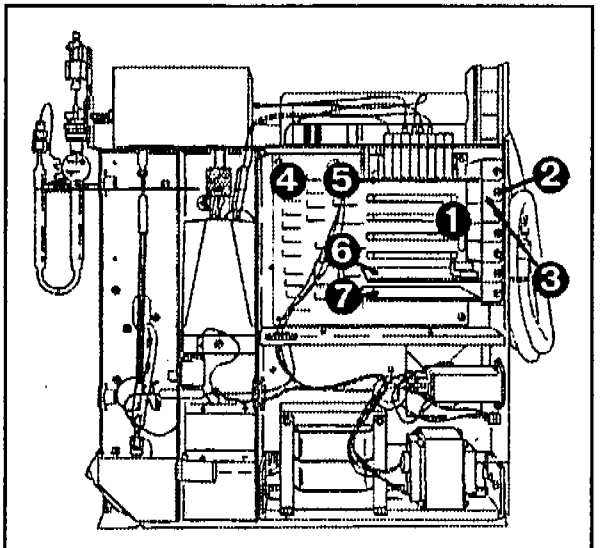


Figure 2.7.3.1: Concentrator I/O Card Locations

1. Open card slots
2. Screw
3. Cover plate
4. Microcontroller card
5. Thermocouple Conditioner card
6. GC Interface card
7. Memory card

2.7.4 Make Electronic Connections

Connect the Sample Module and Autosampler I/O Cables

1. Connect the 25-pin male end of the 25 to 9-pin I/O cable to the port labeled RS232 (❶, Figure 2.7.4.1) on the rear panel of the autosampler.
2. Connect the 9-pin female end of the 25 to 9-pin I/O cable to the port labeled Autosampler (❷) on the rear panel of the sample module.
3. Plug the appropriate power cords into the sample module and the autosampler.

Note:

Do not plug the unit power cords into the power source at this time.

Connect the Sample Module and Concentrator I/O Cable

1. Remove the two standoffs from the female end of the 25 to 25-pin I/O cable.
2. Connect the 25-pin female end of the I/O cable to the AQUATek 70 logic card port (❸) on the rear panel of the concentrator.
3. Connect the 25-pin male end of the I/O cable to the port labeled Concentrator (❹)on the rear panel of the sample module.

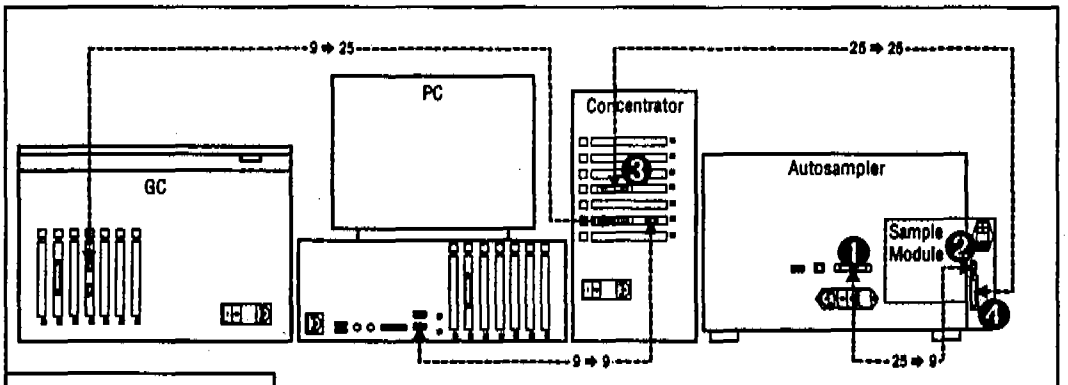


Figure 2.7.4.1:
I/O Cable Connections

2.7.5 Make Pneumatic Connections

Connect Pressurized Gas Line

If you are using the optional Rinse Reservoir:

- Connect the 1/8" line from the port on the rear panel of the sample module labeled Gas Out (❶, Figure 2.7.5.1) to the rinse reservoir port labeled Gas In.

If you are not using the optional Rinse Reservoir:

- Route the 1/8" line from the port on the rear panel of the sample module labeled Gas Out (❶) to vent.

Connect Sample Lines from Sample Module to Autosampler Needle

Two sample lines (1/16" and 1/8") exit the sample module (A/S Needle) and connect to the autosampler needle.

1. Connect the 1/8" line from the port on the rear panel of the sample module labeled A/S Needle (❷) to the top of the autosampler needle assembly (❻).
2. Pull up the standoff on the top of the needle assembly and tighten the plastic nut and ferrule fitting to the standoff finger-tight.
3. Connect the 1/16" line from the A/S Needle port (❹) to the side port (❺) of the autosampler needle assemby. Secure the nut finger-tight.

Connect Gas to Sample Module

1. Make sure the supply gas is turned off before continuing.
2. Remove the brass cap from the port labeled Gas In on the rear panel of the sample module.
3. Swage the 1/8" brass Swagelok® nut and ferrule to end of the copper 1/8" carrier gas tubing.
4. Using a 7/16" wrench, connect the Swagelok fitting to the port labeled Gas In (❸) on the rear panel of the sample module 1/4 turn past finger-tight.

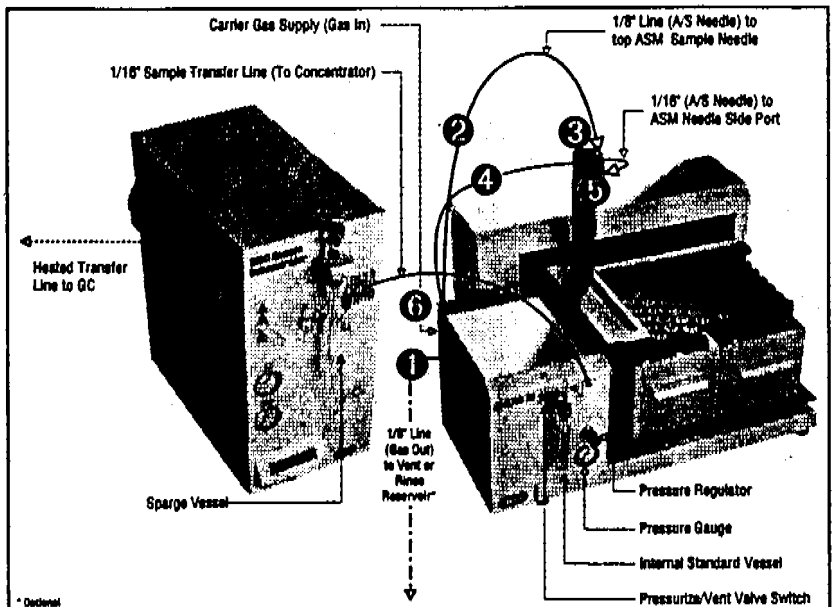


Figure 2.7.5.1: Pneumatic Connections

2.7.6 Connect Water Supply and Drain Line to Sample Module

Note:

If you are installing either the AQUATek 70 External Tap Kit or the AQUATek 70 Rinse Reservoir Kit, please refer to the instructions that came with the kit for setup details.

Important!

If you are not using an external reservoir kit, make sure that the toggle valve on the rear of the sample module (❶, Figure 2.7.6.1) is set to VENT.

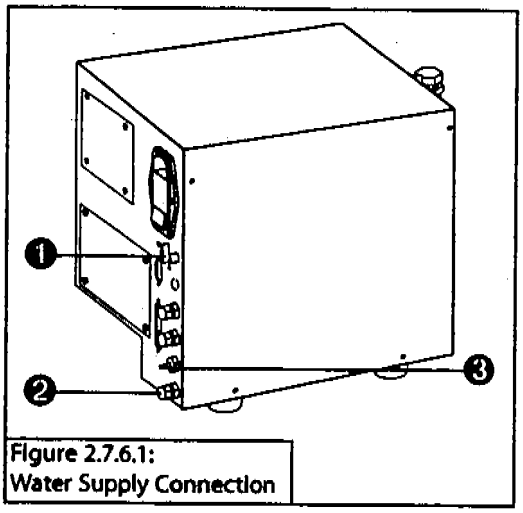


Figure 2.7.6.1:
Water Supply Connection

Connect Water Supply to Sample Module

1. Remove the brass cap from the port labeled Water In (❷, Figure 2.7.6.1) on the rear of the sample module.
2. Swage the 1/8" brass Swagelok nut and ferrule to end of the water 1/8" supply tubing.
3. Using a 7/16" wrench, connect the Swagelok fitting to the port labeled Water In on the rear panel of the sample module 1/4 turn past finger-tight.

Connect the Sample Module Drain Line

1. Slip one end of the 1/4"OD 1/8"ID Tygon® tubing over the port labeled Drain (❸) on the rear panel of the sample module.
2. Run the other end of the drain line into the waste container. Make sure that the drain tubing will not fall below the level of the waste liquid.

2.7.7 Install the Concentrator Sparger, Needle, and Connect Sample Line

Depending on the AQUATek 70 system you ordered, you received either the 5mL or 25 mL sparger (with side arm) sample glassware for your concentrator. AQUATek 70 requires the sparger (with side arm) for operation.

If you ordered a 25mL system, you will also have to replace the 5 mL concentrator sample needle with the the 25mL needle you received.

Remove Existing Sparger

1. Disconnect the drain line from the female luer connector of the sample inlet valve (❶, Figure 2.7.7.1).
2. Loosen the 1/4" nut (❷) on the sparger end of the purge line and remove the purge line.
3. Loosen and remove the 1/16" nut and ferrule from the top of the sample mount fitting (❸).
4. Loosen the #6-32 thumbnut that secures the sample valve/needle assembly (❹) and remove the assembly by sliding upward and out of the sample mount fitting.
5. Loosen the 1/2" nut (❺) on the bottom of the sample mount fitting. Remove the sparger by gently pulling downward.

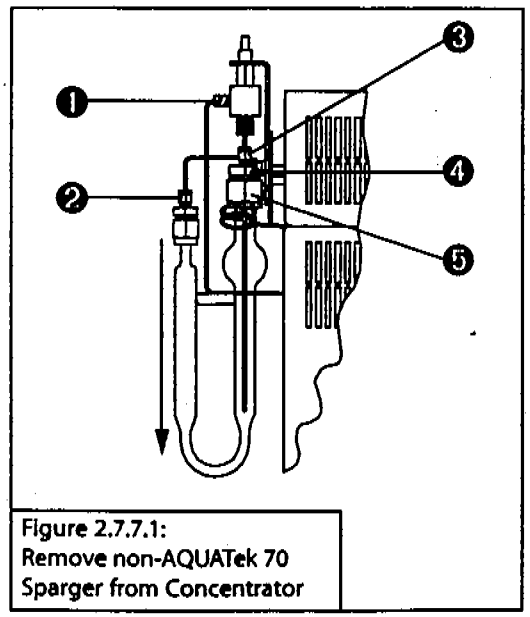


Figure 2.7.7.1:
Remove non-AQUATek 70 Sparger from Concentrator

Install Sparger (with Side Arm)

1. Insert the sparger (with side arm) up into the sample mount fitting (❶, Figure 2.7.7.2).
2. Tighten the 1/2" nut finger-tight (❷). The sparger must be "seated" correctly in the sample mount fitting to ensure a leak-tight connection.

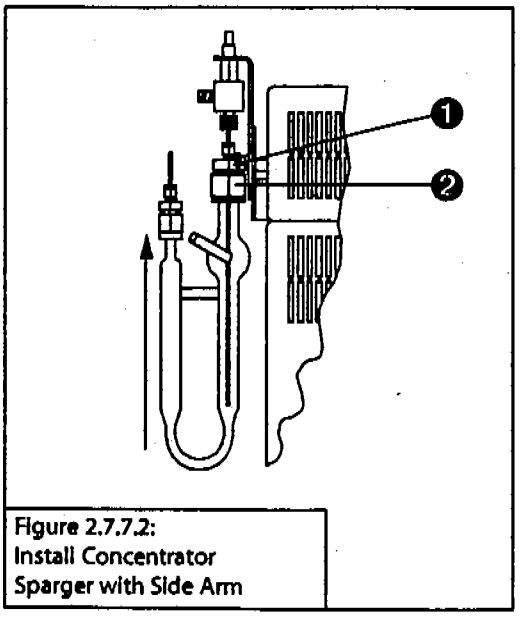


Figure 2.7.7.2:
Install Concentrator Sparger with Side Arm

Replace Sparger Needle

1. Loosen the black thumbnut (❶, Figure 2.7.7.3) on the bottom of the sample inlet valve/needle assembly (❷).

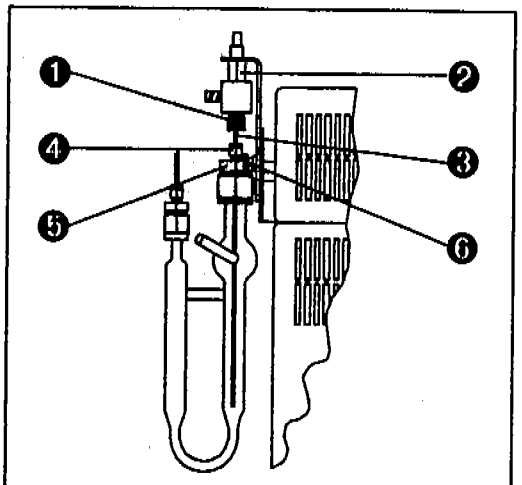


Figure 2.7.7.3:
Replace Sparger Needle

2. Gently pull the old needle (❸) and ferrule out of the sample inlet valve. Check the orientation of the needle ferrule so that you install the new one in the same way.
3. Holding the new ETEF (blue) ferrule in the proper orientation, slide it onto one end of the new needle and insert the needle into the bottom port of the sample inlet valve.
4. Slide the black thumbnut onto the needle and secure it finger-tight into the sample inlet valve.
5. Slide the 1/16" nut and the 1/16" one-piece ferrule (white) (❹) onto the needle.
6. Insert the needle through the top of the sample mount fitting (❺) and secure the assembly in place with the #6-32 thumbnut (❻). Make sure that the sample needle is far enough down into the sparger.
7. Seal the needle to the sample mount fitting by tightening the 1/16" top sample fitting nut (❹) finger-tight plus 1/4-turn with a 5/16" wrench to ensure adequate draining.

Reconnect Drain and Purge Lines

1. Re-attach the 1/4" nut end of the purge line to the sparger and tighten finger-tight.
2. Re-attach the drain line to the sample inlet valve finger-tight.

Important:
Make sure that the sample inlet valve atop the concentrator sparger assembly is open to Drain.

Connect Sample Line from Sample Module to Concentrator

1. Attach the reducing fitting, (❶, Figure 2.7.7.4) onto the end of the tubing that exits the port labeled To Concentrator on the front panel of the sample module.
2. Place the fitting over the sparger side arm (❷).
3. Feed the tubing through the fitting and into the arm until the tubing just enters the sparge bulge (❸) beneath the knurled nut (approximately 1/2" into bulge).
4. Tighten the reducing fitting finger-tight.

Note:
Do not use a wrench to tighten the fitting further; doing do may damage the sparge arm and cause injury.

5. Make sure the sample inlet valve (❹) is set open to Drain.
6. If you are not using an external reservoir kit, make sure that the toggle valve on the rear of the sample module is set to VENT.

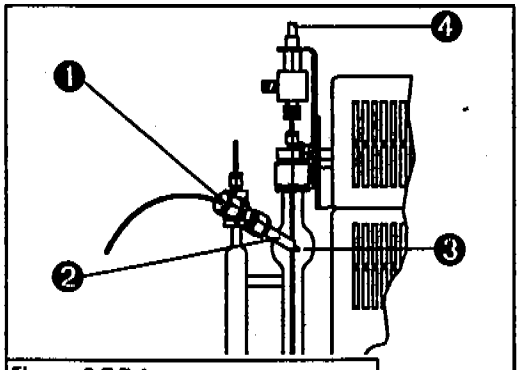


Figure 2.7.7.4:
Connect Sample Line from Sample Module to Concentrator Sparger

2.7.8 Power Up and Set System Pressure

1. Power up the system in the following order:
   a) Autosampler—the sample needle will move to the home position and the LED on the top left of the autosampler will glow.
   b) Sample Module—the power status LED on the front of the AQUATek 70 will glow.
   c) Concentrator—the concentrator will run through its self-test.
2. Turn the carrier gas and water supplies on.
3. Using the pressure regulator on the front of the sample module, adjust the pressure until the system pressure gauge reads 20psi.

Note:
Teledyne Tekmar recommends that the system pressure for all AQUATek 70 applications be set at 20psi; higher pressures can result in the failure of some valves.

2.7.9 Prepare Sample Module Internal Standard

The sample module IS valve dispenses an aliquot of internal standard (IS) when the IS parameter is activated in the TekLink Method Editor screen.

1. Create the standard as prescribed by its method.
2. Add IS mixture to the 20mL sample module IS vessel.
3. Carefully slide the IS vessel up onto the standard fitting on the front of the sample module until the top lip of the glass IS vessel makes contact with the internal mount.
4. Tighten the sample mount fitting finger-tight.
5. Turn the knob on the front of the sample module to Pressurize. The small line etched into the knob indicates direction.
6. Make sure that the 5/16" nut at the top of the IS mount is leak-tight by tightening it 1/4 turn with a wrench.

Note:
The IS is under constant pressure when the gas supply remains on and the front toggle switch is set to **PRESSURIZE.**

Important!
When replacing or servicing IS, make sure switch is set to VENT.

2.7.10 Leak Check AQUATek 70

Note:
Please refer to the procedures in Section 4.12 and check point diagrams in Section 5.3 for more comprehensive leak checking instructions.

Allow the concentratror, sample module, and autosampler to warm up for at least thirty minutes before you leak-check the system. If you leak-check the system before the fittings have had time to reach operating temperature and expand, you will find leaks. A useful leak checking tool is an electronic helium leak checker.

Important!
If you tighten fittings before the system has pressurized and warmed to operating temperature, you can severely damage the ferrules inside the nuts. You could also strip the threads on the nuts and not be able to remove them.

Use an electronic thermal conductivity detector and helium as the pressurizing gas. If an electronic leak detector is not available, use a 1:1 solution of isopropanol and water. Apply a drop or two of the solution to the suspect fitting. If the solution bubbles, there is a leak. Use the solution sparingly to prevent contaminating the fittings.

Important!
Do not use any type of soap solution (for example, Snoop®) to check for leaks. If soap gets in the lines, it will cause increased background, adsorption, and other analytical problems.

If you are unable to determine and/or solve a leak problem, please contact the Customer Support Center at (800) 874-2004.

2.7.11 Check Gas Flow Rates

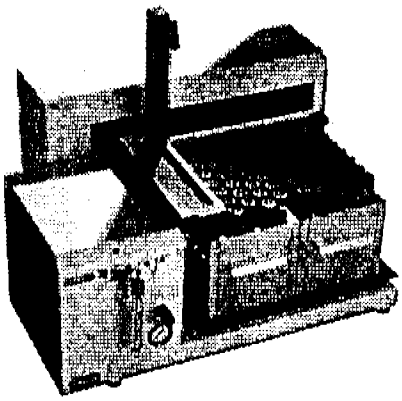
Note:
Please refer to the procedures in Section 4.13 and check point diagrams in Section 5.4 for more comprehensive leak checking instructions.

Gas flow rate problems can be caused by tubing restrictions, bad valves, loose or bad fittings, and other conditions.

Allow the concentrator, sample module, and autosampler to warm up for at least thirty minutes before you check gas flow rates. If you check system gas flow rates before the fittings have had time to reach operating temperature and expand, you might obtain false flow rate readings. Use a gas flow meter to measure gas flow rates.

If you are unable to determine and/or solve a gas flow rate problem, please contact the Customer Support Center at (800) 874-2004.

NOTES:



#3

USING TEKLINK AND PROCESSING SAMPLES

3.1 Install TekLink

This section offers information and instructions on system requirements, making a backup copy of the program disk, and installing TekLink onto your hard drive.

3.1.1 System Requirements

To install and use TekLink, you need an 80386 or higher computer with Microsoft Windows 3.1 or greater installed. Your system should have a hard drive that has at least two megabytes (MB) of free space and a floppy disk drive that reads 1.44MB (3 1/2") diskettes.

3.1.2 Make Backup Copy of Installation Disk

Before you install TekLink onto your hard drive, make a backup copy of the diskette(s) and use the backup for installation. Write-protect your backup copy to protect it from accidentally being copied over. Store the original in a secure place.

Note:
Microsoft Windows version 3.1 (or greater) or Windows 95 must be installed on your computer before you can install TekLink.

3.1.3 Install TekLink

1. Insert the backup copy of TekLink into the appropriate floppy drive.
2. Begin the TekLink installation:

   Windows 3.x:

   - Select File > Run in Program Manager.

   Windows 95/98/NT:

   - Select Start > Run...
3. Type A:\SETUP or B:\SETUP (depending on the drive you are using) in the Run dialog box and click OK.
4. Follow the installation screen prompts.

TekLink installsonto the drive and directory you specify. When successfully installed, the TekLink icon will appear in its own program group in the Program Manager (Windows 3.x) or in Start > Programs > TekLink (Windows 95/98/NT).

3.1.4 Start TekLink

Windows 3.x:

- In Program Manager, double-click on the TekLink program folder and then double-click on the TekLink icon.

Windows 95/98/NT:

- Choose Start > Programs > TekLink. Select the TekLink program file.

3.2 Configure TekLink

Tekmar 3000/3100 Series concentrators process liquid or soil samples for analysis by gas chromatography and operate automatically, under microprocessor control, to process a single front-panel sample or multiple samples loaded from AQUATek 70. When programmed with custom methods, this system can operate at different time and temperature parameters and run different analytical sequences on specified samples.

You can program custom operating sequences for up to four concentrators by using a personal computer running TekLink. TekLink makes it possible for you to use a personal computer running Microsoft Windows to monitor, schedule, and control the operation of one, two, three, or four concentrators.

Before you begin setting up methods and running samples, please familiarize yourself with the TekLink software as described in this section. TekLink must recognize the concentrator and be configured correctly for the AQUATek 70 system to run properly.

3.2.1 Important Information for 3000 Customers

TekLink 3000/3100 is designed to run AQUATek 70 with all 3000/3100 concentrators. The 3000/3100 memory board ROM must be flash upgraded in order to recognize and run the AQUATek 70.

If you purchased a 3100 at the same time as AQUATek 70, the 3100 memory board ROM (Version 5.17) is current and does not need to be flash upgraded. To determine the current version of the 3000/3100 ROM, launch TekLink and select Help > About TekLink. The ROM version is listed after "3000/3100 Firmware Version". If the version is earlier than 5.16 (3000 units) or 5.17 (3100 units), then you must flash upgrade the ROM.

Flash upgrading the 3000/3100 memory board ROM is easy with the Flash software program included in TekLink and the separate 3000/3100-AQUATek 70 Flash Upgrade 5.16 (3000) or 5.17 (3100) file:

3000: 30_516.bin

3100: 31_517.bin

3.2.1.1 Perform the Flash Upgrade

Note:
Make sure that TekLink is not running before you perform the Flash upgrade.

1. Open the Flash program:

Windows 3.x:

- In Program Manager, double-click on the TekLink program folder and then double-click on the Flash program icon (Figure 3.2.1.1.1).

Figure 3.2.1.1.1:
Flash Program Icon

Windows 95/98/NT:

- Choose Start > Programs > TekLink. Select the Flash program icon (Figure 3.2.1.1.1).

2. Select File > Configure Ports (Figure 3.2.1.1.2).

Figure 3.2.1.1.2:
File > Configure Ports

3. In the Com Port Setup screen (Figure 3.2.1.1.3), type the Com Port number the concentrator is connected to.

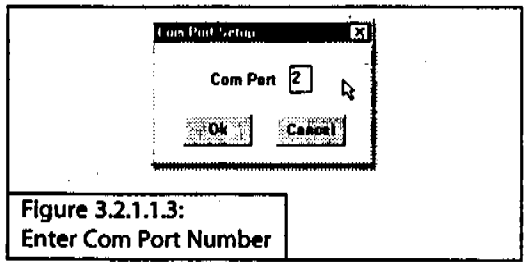


Figure 3.2.1.1.3:
Enter Com Port Number

4. Click OK.
5. Select File > Send Flash Image to Instrument (Figure 3.2.1.1.4).

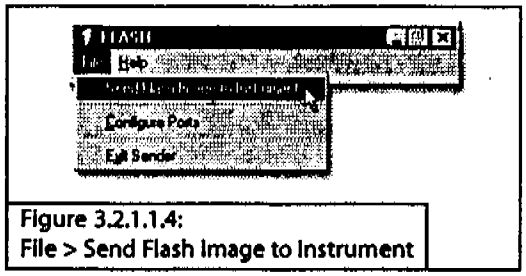


Figure 3.2.1.1.4:
File > Send Flash Image to Instrument

6. Select the ROM Image File furnished to you by Teledyne Tekmar. The file will have the version name followed by the .bin extension (Figure 3.2.1.1.5).

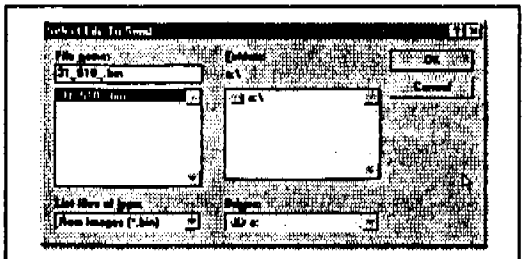


Figure 3.2.1.1.5:
Select File to Send

7. Click OK.

[Continued...]

8. You will see the Flash Burning Process in a new window (Figure 3.2.1.1.6).

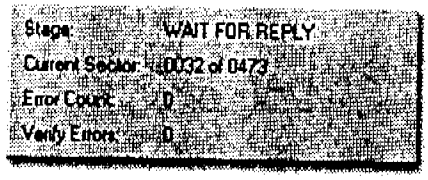


Figure 3.2.1.1.6:
Flash Burning Process

- Stage reflects the current state for each sector.
- Current Sector is a progress indicator.
- Error Count indicates the number of errors encountered while trying to communicate with the concentrator. After 3 errors, the Flash program will abort.
- Verify Errors indicates the number of errors encountered while trying to verify a sector on the concentrator. After 3 errors, the Flash program will abort.

9. If the Flash programs aborts, one of three messages will appear:

   a) Connect Error

   b) Lost Communication with Instrument

   c) Can't Program Current Sector

Check the TekLink port configuration to verify the correct COM Port setup. If you continue to encounter errors, please call the Teledyne Tekmar Customer Support Center (1.800.874.2004; outside the US/Canada: 1.513.247.7000).

10. When Flash programming is successful, a status window will appear (Figure 3.2.1.1.7).

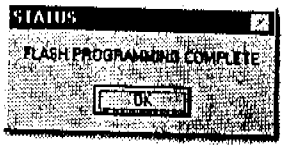


Figure 3.2.1.1.7:
Flash Programming Complete

11. If Flash programming is complete, with no errors, exit out of the Flash program, power down the concentrator, then power up the concentrator. Your concentrator should now be updated with the new ROM version.

12. To verify the programming of your ROM upgrade:

    a) Start TekLink.

    b) Select Help > About TekLink.

The concentrator firmware version should correspond with the ROM version of the Flash upgrade (Figure 3.2.1.1.8).

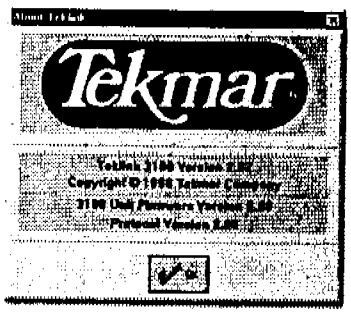


Figure 3.2.1.1.8:
TekLink Help > About

3.2.2 TekLink Control Screen

When you first run TekLink, the TekLink Control Screen (Figure 3.2.2) appears. The Control Screen is the primary interface between the computer and concentrator/AQUATek 70 configuration, instrument, setup, status, and operation capabilities.

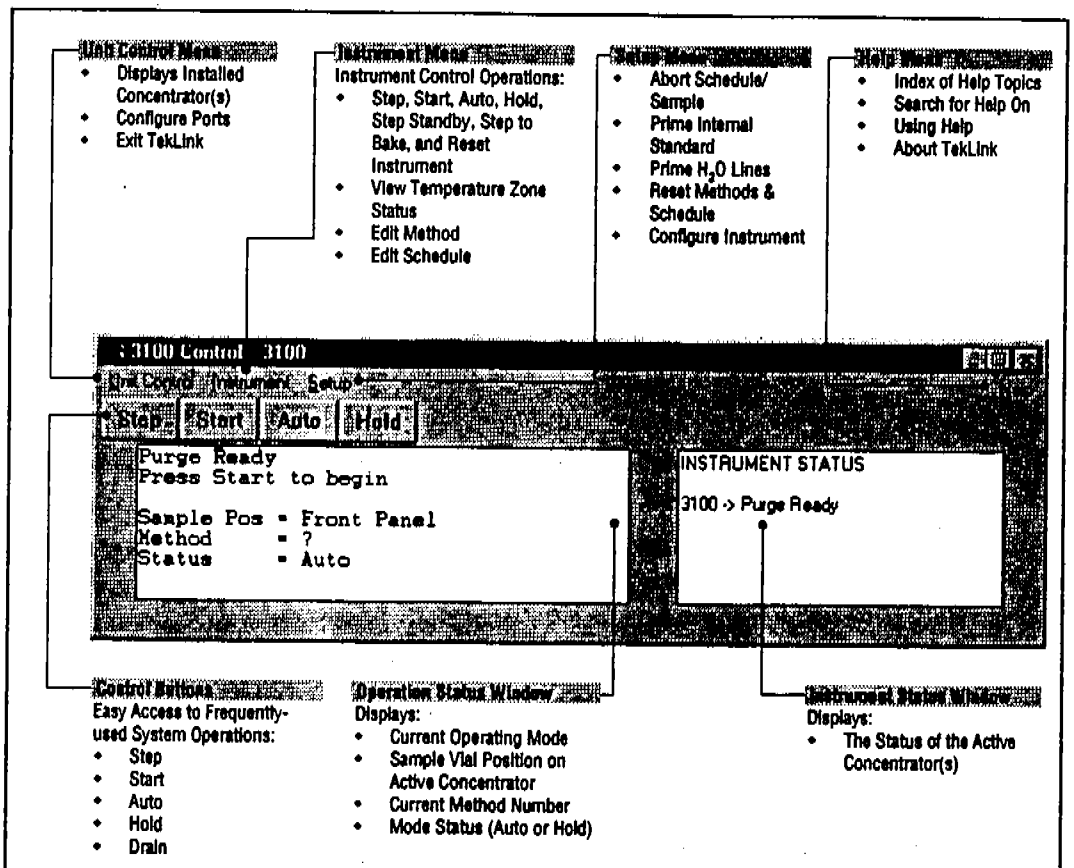


Figure 3.2.2:
TekLink Control Screen

* The Drain control button is only active when an AQUATek 70 method is running and is not shown here.

3.2.3 Configure COM Ports

TekLink must be configured to identify each connected concentrator with its appropriate COM (communication) port and must also designate a single concentrator as active before further analysis settings can be made.

1. From the Control Screen, choose Unit Control > Configure Ports (Figure 3.2.3.1).

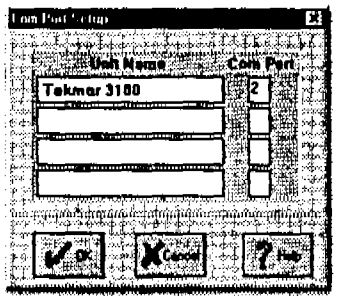


Figure 3.2.3.1:
Com Port Setup

2. Type the name of the concentrator you are installing in the Unit Name field (this can be any name).
3. Type the number (1-4) of the COM port that the concentrator is connected to in the Com Port field.
4. Repeat steps 2-3 for each additional concentrator that is connected to your PC.
5. Click OK to return to the Control Screen.

If one of the COM ports is not responding or is unavailable, TekLink displays an RS232 Error Message Screen.

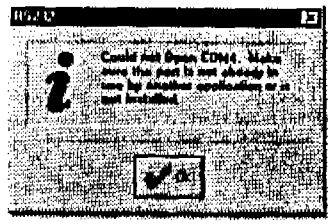


Figure Figure 3.2.3.2:
RS232 Error Message

6. Click OK to close the RS232 Error screen.
7. Make sure all COM port and instrument connections are secure.
8. Check the COM port number of your computer.
9. Repeat steps 1-5. If the error message appears again, please call the Teledyne Tekmar Customer Support Center at (800) 874-2004 for further assistance.

Note:
A possible error may occur if the flash.exe program (or any other program that may be using the same com port) is running while configuring the com ports in TekLink. If this occurs, close the conflicting program and continue with setup.

3.2.4 Designate Active Concentrator

After you have assigned a name and have configured each connected concentrator to a COM port on your PC, you must specify one of them as the active unit.

You must specify an active unit in order to send, receive, and/or schedule methods. However, you can edit methods without tying them to a selected active unit.

1. From the Control Screen, select the Unit Control menu.

The top portion of the Unit Control menu lists each concentrator that is connected to the PC and configured in TekLink.

2. Click on the name of the concentrator you want to run.
3. After you select the active unit, click outside of the TekLink screen to close the Unit Control menu.
4. To verify the name and status of the designated active unit, observe the Instrument Status window of the Control Screen (Figure 3.2.4.1); so that the name of the selected unit appears in the Control Screen title bar (❶), a check mark appears next to the selected name in the Unit Control menu (❷), and that the Instrument Status window displays status information for the active concentrator (❸).

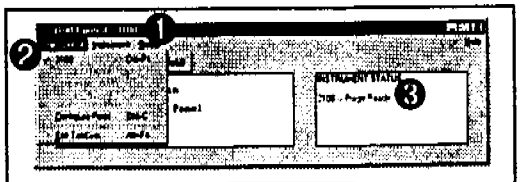


Figure 3.2.4.1:
Active Concentrator Indicators

3.2.5 Specify Configuration

TekLink allows you to specify the instrument configuration of any active concentrator.

To access the Instrument Configurations screen:

1. From the Control Screen, select Setup > Configure Instrument.
2. Configure the concentrator by selecting options specific to your system configuration.
3. Click OK to return to the Control Screen when you are finished.

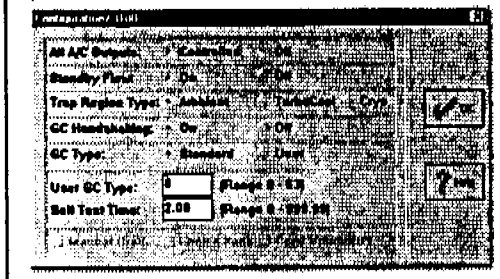


Figure 3.2.5:
Configure Instrument

Configuration Descriptions:

All A/C Outputs

Use this option to specify whether the A/C Outputs are controlled or off.

Standby Flow

The Standby Flow option indicates whether or not the concentrator's sample pathway is swept with gas during the Standby step.

[Continued...]

Trap Region Type

The Trap Region option has three valid values:

- Ambient—the concentrator uses the standard internal trap at ambient temperature.
- TurboCool—the concentrator operates at cryogenic temperatures when the TurboCool unit (optional) is installed.
- Cryofocusing Trap—the concentrator operates at cryogenic temperatures when the Cryofocusing Trap (optional) is installed.This option is only available when running a 6000 (with internal cryo trap) method.

GC Handshaking

The GC Handshaking option specifies GC handshaking characteristics.

- On—normally operates the GC's port.
- Off—operates the GC with no input or output signals between the concentrator and the GC.

GC Type

You can configure the concentrator for either a Standard or User type GC Port. The GC type classification is based on the input-output characteristics of the GC as it interacts with the concentrator. Please refer to your concentrator user manual or I/O cable diagram for detailed information on GC configuration.

User GC Type

If you have ordered an interface cable, the User GC Type is provided with the cable. If you have not ordered a cable, you must know the characteristics of the input and output signals traveling to and from the GC to determine the GC User Type.

Self Test Time

The Self Test Time option allows you to specify a Self Test Time other than the default.

Manual Drain Mode*

The drain valve allows the sample glassware to be emptied. When it is open, liquid and gas can be forced out of the sample glassware into the drain system and out the back panel drain.

Leak Check Mode*

The Leak Check Mode option is only accessible during Purge mode.

Feed Pressurize Mode*

The vent allows sample gas to exit the sample pathway through a front panel vent. When it is closed, pressure builds up in the sample pathway. This is used to set the feed pressure (it eliminates Trap Pressure Control [TPC] effects).

* *These modes are not available with the AQUATek 70 configuration.*

3.3 Method Development

After you have installed and configured TekLink, you can create customized methods (operating sequences) for sample processing that meet your analytical requirements.

After you connect the required concentrator(s) and configure the computer COM ports to recognize the connected units, you can use the Method Editor to review and edit methods.

3.3.1 Method Editor

To access the Method Editor (Figure 3.3.1), select Instrument > Edit Method from the Control Screen.

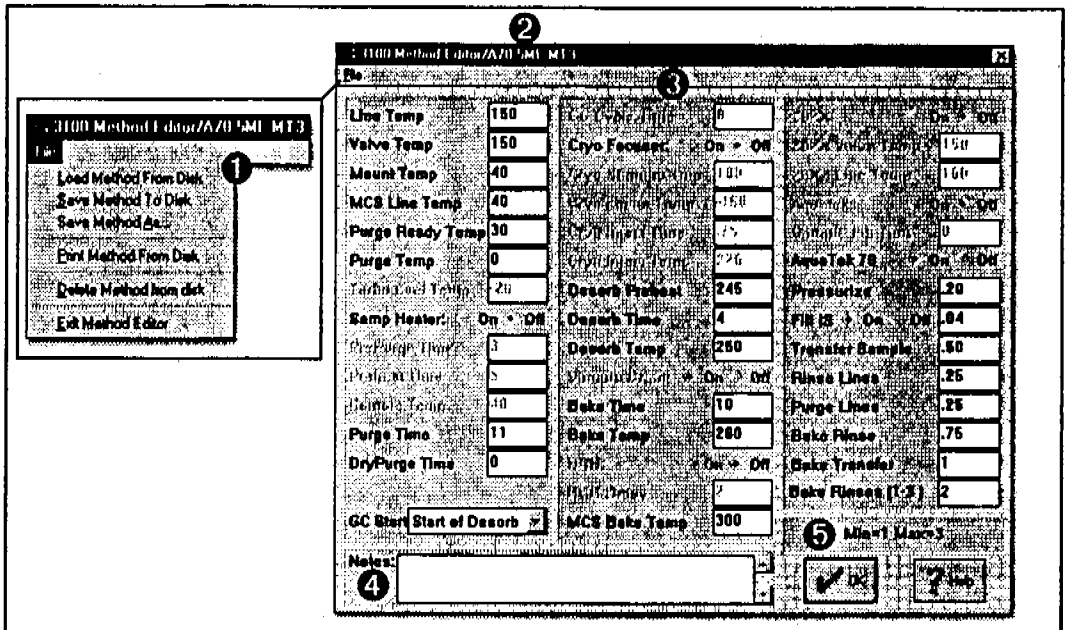


Figure 3.3.1:
Method Editor

Method Editor File Menu

The File menu (❶, Figure 3.3.1) of the Method Editor screen contains options for loading, saving, printing, and deleting method files.

Load Method From Disk

TekLink contains two default method files for the concentrator with AQUATek 70. Select one to view and edit. All method file names end with .mt3.

To load a method from the disk:

1. From the Method Editor screen, select File > Load Method From Disk. Please not that you cannot load method files from previous versions of TekLink.
2. Select the method file you want to load.
3. Click OK to return to the Method Editor screen. All parameters will reflect the values of the loaded method. The current method file name should now be visible in the Method Editor title bar (❷).

Save Method to Disk

Select File > Save Method to Disk to save the current method file.

Save Method As...

Select File > Save Method As... to save the current method configuration under a new filename.

Print Method From Disk

Select File > Print Method From Disk to print out the parameter listing of a method file.

Delete Method From Disk

Select File > Delete Method From Disk to permanently remove a saved method file from your hard drive.

Exit Method Editor

Select File > Exit Method Editor to exit out of the Method Editor screen and return to the Control screen.

Method Parameter Values

Three columns (❸, Figure 3.3.1) display values that define time, temperature, and other operational parameters for the current method. If a parameter and its value are uneditable (grayed out or not turned on), then the option required is not installed on your system or is not accounted for in the Configure Instrument screen.

If you have system accessories (e.g., Cryo Focuser, 20XX, or AQUATek 50) connected to the concentrator, be sure to turn them On in the Method Editor.

Notes Text Box

The Notes text box (❹) permits you to store up to 200 characters of text. TekLink stores the Notes with the Method File when saved.

Min/Max Field

The Min/Max field (❺) displays the minimum and maximum value setting for each parameter when the cursor is placed within a parameter field. If the value you enter in the Method Editor is greater than the maximum or smaller than the minimum values shown in the Min/Max readout, TekLink displays an error message.

To clear the error message:

1. Click OK. The parameter value defaults to its previous entry.
2. Enter a parameter value that is within the acceptable min/max range.

Default Parameter Values

At first power up, the concentrator is scheduled to run DEFAULT.MT3 which is an invalid 3000/3100 ROM default method. DEFAULT.MT3 does not really exist, but appears in the Operation Status window until a valid method is loaded and sent from the Schedule Control. The concentrator automatically performs self tests and remains in Standby until all heaters and coolers have reached their default temperature setpoints. When temperature setpoints are reached, the concentrator goes into Purge Ready mode. At this point, you can either create, change, or select a method schedule.

A concentrator front panel default method is included with TekLink and is named CONCENTR.MT3.

The methods named A70-5ml.mt3 and A70-25ml.mt3 are the default methods specifically configured for the 3000/3100 with AQUATek 70. The default parameters are listed in Tables 3.3.1.1 and 3.3.1.2.

The defaults listed in the following tables are guidelines; you may need to edit certain values depending on your analysis requirements.

Method Parameter	Value
Line Temp	150°C
Valve Temp	150°C
Mount Temp	40°C
MCS Line Temp	40°C
Purge Ready Temp	30°C
Purge Temp	0°C
Turbo Cool Temp	-20°C
Sample Heater	Off
PrePurge Time	3 Min.
Sample Preheat Time	5 Min.
Sample Preheat Temp	40°C
Purge Time	11.0 Min.
DryPurge Time	0.0 Min.
GC Start Option	Start of Desorb
GC Cycle Time	0.0 Min.
Cryo Focuser	Off
Desorb Preheat Temp	245°C
Desorb Time	4.0 Min.
Desorb Temp	250°C
Sample Drain	On
Bake Time	10.0 Min.
Bake Temp	260°C
Bake Gas Bypass	Off
MCS Bake Temp	300°C
Pressurize Time	0.20 Min.
Fill IS	On
Fill IS Time	0.04 Min.
Prime IS	0.1 Min.
Transfer Sample Time	0.50 Min.
Rinse Lines Time	0.25 Min.
Purge Lines Time	0.25 Min.
Bake Rinse Time	0.75 Min.
Bake Transfer Time	1.0 Min.
Bake Rinses	2 Rinses

Table 3.3.1.1:
Default Method Parameter Values for A70_5ml.mt3
(AQUATek 70 using 5mL Sample Loop)

Method Parameter	Value
Line Temp	150°C
Valve Temp	150°C
Mount Temp	40°C
MCS Line Temp	40°C
Purge Ready Temp	30°C
Purge Temp	0°C
Turbo Cool Temp	-20°C
Sample Heater	Off
PrePurge Time	3 Min.
Sample Preheat Time	5 Min.
Sample Preheat Temp	40°C
Purge Time	11.0 Min.
DryPurge Time	0.0 Min.
GC Start Option	Start of Desorb
GC Cycle Time	0.0 Min.
Cryo Focuser	Off
Desorb Preheat Temp	245°C
Desorb Time	4.0 Min.
Desorb Temp	250°C
Sample Drain	On
Bake Time	10.0 Min.
Bake Temp	260°C
Bake Gas Bypass	Off
MCS Bake Temp	300°C
Pressurize Time	1.05 Min.
Fill IS	On
Fill IS Time	0.04 Min.
Prime IS	0.1 Min.
Transfer Sample Time	0.75 Min.
Rinse Lines Time	0.75 Min.
Purge Lines Time	1.25 Min.
Bake Rinse Time	0.75 Min.
Bake Transfer Time	1.0 Min.
Bake Rinses	2 Rinses

Table 3.3.1.2:
Default Method Parameter Values for A70_25ml.mt3
(AQUATek 70 using 25mL Sample Loop)

AQUATek 70 Mode Descriptions

AQUATek 70 steps through several modes during a sample run.

Standby

Standby is the main preparatory step for each run and establishes initial conditions on power up, restart, or after a run. When the concentrator powers up or returns to its starting conditions after a run, this step is active. Press Start to begin a run.

Purge Ready

The concentrator waits for a start signal from the user (via the Start button in TekLink) or from an accessory before proceeding to the next step. The Purge Ready screen displays the message "Press start to begin" and the number of the current method.

Pressurize

The sample vial is pressurized and the sample loop is filled with sample from the sample vial.

Fill I/S

The internal standard valve rotor is filled with internal standard.

Transfer Sample

The internal standard and sample are transferred from the sample loop to the concentrator frit sparger.

Rinse Lines

The sample loop, line to the sample needle, and the sample needle are rinsed with hot water.

Purge Lines

The sample loop, line to the sample needle, and the sample needle are flushed with clean helium or nitrogen gas.

Purge

The sample is flushed with purge gas for a specified length of time.

Dry Purge

Dry gas sweeps through the concentrator trap to remove moisture.

Desorb Ready

During this step, the concentrator waits for the GC Ready signal.

Desorb

The contents of the trap are flushed onto the GC column; sample loop, line to the concentrator, and the concentrator glassware are rinsed with hot water.

Bake Rinse

The sample loop and the line to the concentrator are rinsed with hot water; the concentrator glassware is then rinsed and filled with hot water.

Bake Transfer

The sample loop, line to the concentrator, and the concentrator are flushed with clean helium or nitrogen gas.

Bake Sweep

Clean gas is sent through the lines and trap to remove residual moisture and organic contaminants.

Bake

The MCS and the concentrator trap heaters heat up to Bake temperatures. The concentrator Sample Bypass and Drain Valves are ON. The Concentrator Vent Valve is OFF. Clean gas is sent through the system to sweep residual moisture and organic contaminants from the lines. To check the concentrator system flow during Bake mode while running an AQUATek method, place the flowmeter outside the Drain port of the concentrator.

3.4 Create Method Schedule

After you create customized methods, you can define a method schedule that specifies samples, operating sequences, and the order in which they will run.

To access the Schedule Control screen (Figure 3.4.1), select Instrument > Edit Schedule from the Control Screen.

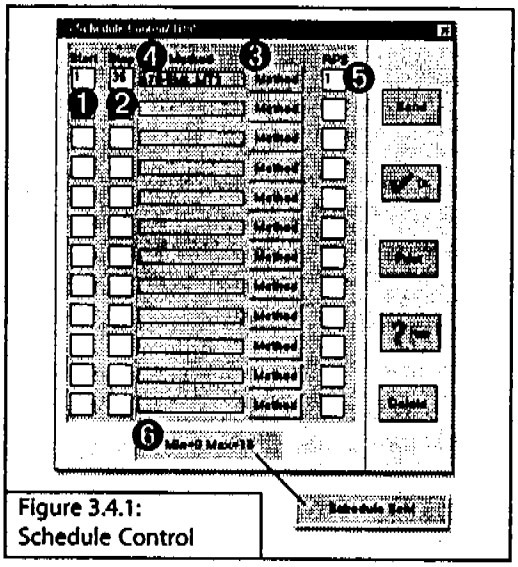


Figure 3.4.1:
Schedule Control

The Schedule Control screen has four columns and 12 rows for creating up to 12 method schedules.

You can use the Schedule Control screen to set up a method schedule, or processing timetable, for running samples. When you use the concentrator without an autosampler, you specify the number and sequence of methods to be run on a single sample.

When you use the concentrator with one or more autosamplers, you set up a method schedule that defines:

- The method(s) to be run.
- Start and stop positions for each method.
- A sequential order for each sample to be run.

You must use the Schedule Control screen to set up a schedule, even if you are running a front-panel sample position with the concentrator.

You can enter any desired method schedule and send it to the selected concentrator within the Schedule Control screen.

Start and Stop

Enter the vial position number of the first sample in the Start field (❶, Figure 3.4.1) and the vial position number of the last sample in the Stop field (❷) to be run according to the specified method. The default sample start and stop positions are both 0, the number assigned to the front-panel sample on the concentrator unit.

Method Display and Method Selection

Click the Method selection button (❸) to select the filename of the method you want to schedule. The filename of the method you select will then appear in the method display field (❹).

RPS (Runs Per Sample)

This value (❺) is unalterable when scheduling an AQUATek 70 method and remains at 1 RPS. You may increase the RPS value when scheduling concentrator only methods.

Min/Max

The Min/Max status field (❻) at the bottom of the Schedule Control screen displays the minimum and maximum autosampler vial positions for the selected method. When a schedule is sent and the concentrator acknowledges receipt of the schedule, this field diplays the words Schedule Sent.

Send Schedule

The Send button (❼) sends the current displayed schedule to the active concentrator.

OK Schedule

The OK button exits the Schedule Control screen and returns to the Control Screen. You will not be prompted to send the current schedule if it has changed or if you have not already sent it to the concentrator.

Print Schedule

Press the Print button in the Schedule Control window to send the current schedule information to the default printer.

Schedule Control Help

The Help button accesses online help information about the Schedule Control screen.

Delete Schedule Line

Press the Delete button in the Schedule Control window to delete the line in the current schedule. Make sure that you place the cursor somewhere in the line to be deleted.

3.4.1. Schedule a Sample Run

1. Click the Method button in the Schedule Control screen (see Figure 3.4.1).
2. Load the file of the method you want to run.
3. Click OK to return to the Schedule Control screen. If the method file you loaded is incorrect, click the Method button again in the Schedule Control screen and select the correct file.
4. Position the cursor on the Start field.
5. Type the position number of the first sample vial to be run according to its method.
6. Position the cursor on the Stop field.
7. Type the position number of the last sample vial to be run according to its method. If you enter an out-of-range sample vial position value, an error messagewill appear. It is important that you first select the method and then enter the start and stop positions. If you enter a position number that is out-of-range, the error will occur when TekLink begins to run the scheduled method with the out-of-range position.
8. Verify that the RPS (runs per sample) value is 1.
9. Click the Send button to transmit the current method schedule and required files to the active concentrator.

Note:

Selecting the OK button will not send your schedule to the concentrator and will not save the schedule you have edited. You must select the Send button in the Schedule Control to run the schedule. The schedule has been successfully sent to the concentrator when the bottom of the Schedule Control screen reads "Schedule Sent".

10. Click Print to print the current schedule, or OK to return to the Control Screen.

After sending a method schedule to the active concentrator, the Operation Status window of the Control Screen displays the current status information for the active concentrator: current mode, sample position, and method filename.

The active concentrator will remain in Standby until the concentrator reaches temperature setpoints. When setpoints are reached, the active concentrator will step to Purge Ready. You may begin running samples at this time by clicking the Start button in the Control Screen.

If you want to check on the status of the temperature zones (Figure 3.4.1.1), select Instrument > Temp Zone Status from the Control Screen.

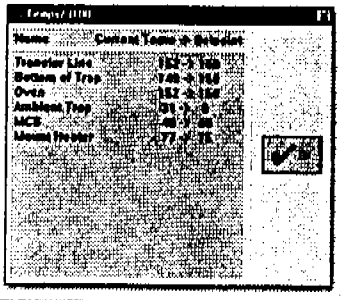


Figure 3.4.1.1:
Temperature Zone Status

3.5 Sample Setup

Before you begin to run samples with AQUATek 70, you need to: load sample vials in the autosampler rack(s), prime the internal standard (IS), and prime the water (H_2O) lines.

Prime IS and H_2O

An AQUATek 70 method must be active (active in TekLink and sent to the concentrator) in order to prime the IS and H_2O lines.

If you have AQUATek 70 connected to your concentrator, you may prime the IS and/or the H_2O lines before running samples. These procedures should be performed each time either the IS or H_2O is changed.

1. In TekLink, select Setup > Prime Internal Standard from the Control Screen.
2. Click OK at the screen prompt to initialize the Prime IS request.
3. Select Setup > Prime H_2O Lines from the Control Screen.
4. Click OK at the screen prompt to initialize the Prime H_2O Lines request.

The system steps through four operating modes during Prime IS before returning to Standby: Prime IS, Prime IS Rinse, Prime IS Transfer, and Abort Bake

The system steps through two operating modes during Prime H_2O Lines before returning to Standby: Prime H_2O Rinse and Prime H_2O Purge.

3.6 Run Samples

Control Buttons

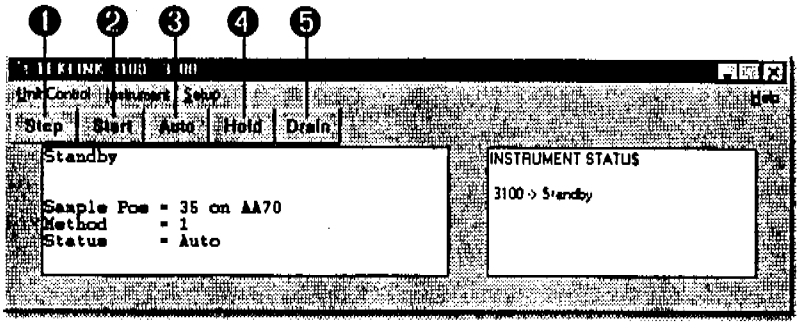


Figure 3.6.1: Control Buttons

Step

Click (❶, Figure 3.6.1) to move the concentrator to the next operating step during the sample run.

Start

Click (❷)to initiate the sample run.

Auto

Click (❸) to resume the normal operation after the concentrator has been in Hold.

Hold

Click (❹) to pause. the concentrator. To resume operation, click Auto.

Drain

Click (❺) to empty the contents of the concentrator sparge vessel.

3.6.1 Initiate Sample Run

Click the Start button or select Instrument > Start to begin the sample run.

The concentrator will proceed to the first operating step in the scheduled method.

3.6.2 Sample Run Alteration

At times, you may find it necessary to interrupt, change, and/or abort the normal operating sequence of a sample run in progress.

Step

Click the Step button to advance through the operation steps (or modes) of an operating sequence.

Step ends the current operating step and moves the concentrator to the next operating step of the current method.

Hold

Click the Hold button to stop the concentrator from advancing to the next operating step.

While the system is in Hold:

- The Operation Status window of the Control Screen shows that the status of the active concentrator is in Hold.
- The dynamic timer continues to progress, allowing you to monitor the duration of a specific operating step.
- If the timer times out, the concentrator will remain in the current operating step until the Auto button is selected.

Auto

Click the Auto button to take the active concentrator out of Hold and to resume the normal step progression.

Step to Standby

From the Control Screen, select Instrument > Step Standby.

A warning screen will ask you whether or not you want to step the concentrator to Standby. If you select Yes, the current sample and schedule will be aborted.

Step to Bake

From the Control Screen, select Instrument > Step to Bake.

A warning screen will ask you whether or not you want to step the concentrator to Bake. If you select Yes, the current sample and schedule will be aborted.

Reset the Concentrator

From the Control Screen, select Instrument > Reset Instrument.

A warning screen will ask you whether or not you want to reset the instrument. If you select Yes, the concentrator will:

- abort the current run and schedule
- perform its self tests
- hold in Standby

Drain

The Drain control button is active only when an AQUATek 70 method is running.

Click the Drain control button to empty the concentrator sparge vessel during an AQUATek 70 method run.

Abort Schedule and/or Sample

To abort a schedule and/or sample run that is in progress, select Setup > Abort Schedule/Sample from the Control Screen (Figure 3.6.2.1).

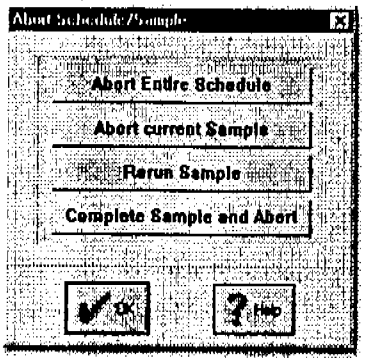


Figure 3.6.2.1:
Abort Schedule/Sample Screen

Abort Entire Schedule

Select Abort Entire Schedule to abort the entire schedule/sample in progress. The active concentrator will return to Standby for the first scheduled method.

Selecting Abort Entire Schedule will step the concentrator to Bake for 9.5 minutes and will drain the contents of the concentrator sparge vessel.

Abort Current Sample

Select Abort Current Sample to abort the sample in progress. The active concentrator will then proceed to the next scheduled sample.

Selecting Abort Current Sample will step the concentrator to Bake for 9.5 minutes and will drain the contents of the concentrator sparge vessel.

Rerun Sample

Select Rerun Sample to abort and rerun the current sample.

Complete Sample and Abort

Select Complete Sample and Abort to finish running the current sample and to abort the rest of the schedule. The active concentrator will finish the sample that is running and return to beginning of the schedule, and go to Standby.

3.7 Sample Run Checklist

Please refer to this checklist before starting sample runs until you feel confident operating AQUATek 70.

1. Start TekLink (§ 3.1.4).
2. Load or create new Method file(s) in the TekLink Method Editor (Instrument > Edit Method). Save Method file and exit Method Editor (§ 3.3).
3. Use the schedule worksheet (§3.7.1) to help you to define your schedule, create a Method Schedule (§ 3.4), and Send the Schedule to the concentrator
4. Prepare and load the samples onto the autosampler vial rack using your schedule worksheet as a guide.
5. Prime the Sample Module IS (§3.5).
6. Prime the Sample Module H_2O (§3.5).
7. Click the Start button (§3.6.1) to initiate the sample run.

You can monitor the process of your sample run by looking at the Operation Status window (§3.2.2) of the TekLink Control Screen.

If you encounter any difficulties during operation, please refer to the Troubleshooting sections in Chapter 4.

3.7.1 Method Schedule Worksheet

Make copies of this schedule worksheet to keep handy when you create new method schedules. More worksheets are available on the following pages.

For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

NOTES: _____ _____

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For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

NOTES: _____ _____

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For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

NOTES: _____ _____

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For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

NOTES: _____ _____

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For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

NOTES: _____ _____

_____ _____

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_____ _____

_____ _____

_____ _____

For Sample Set	Use this METHOD (Smith)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

NOTES: _____

For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
8				
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10				
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12				

NOTES: _____ _____

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For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
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7				
8				
9				
10				
11				
12				

NOTES: _____ _____

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For Sample Set	Use this METHOD (*.mth)	START with Sample Position	STOP with Sample Position	# Times to Run Sample (RPS)
1				
2				
3				
4				
5				
6				
7				
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10				
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12				

NOTES: _____ _____

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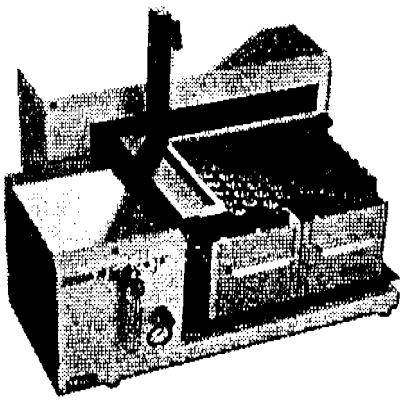
NOTES:



#4

MAINTENANCE AND TROUBLESHOOTING

4.1 Before you Begin

4.1.1 Recommended Tools

- Safety glasses
- Tubing cutters
- Grounding strap
- Small, Large Phillips head screwdrivers
- Small, Medium, Large slotted screwdrivers
- 5/16" nut driver
- 1/4", 7/16", 9/16", 3/4" open-end wrenches
- Allen wrench set

4.1.2 Safety Considerations

Switch off electrical supplies before working on instruments.

Wear safety glasses.

To avoid electrical shock, turn off and unplug the sample module, autosampler, and concentrator before removing any exterior panels.

Do not place liquids near the area where you are servicing the unit. Liquids can conduct electricity if they come in contact with circuits.

Do not redesign or modify the equipment in any way. Do not remove equipment grounds. Never replace a fuse with one of a higher rating. Always use the correct replacement parts. Failure to follow these guidelines will void your warranty.

Internal parts (especially heaters and electronic components) can get extremely hot. When maintaining or troubleshooting, be careful not to touch these parts. Allow parts to cool before replacing them.

Do not exceed the maximum pressure ratings.

4.1.3 Sample Module Cover Removal

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

1. Power down the sample module, autosampler, and concentrator.
2. Unplug the power cord from the sample module.
3. Remove the two thumbscrews from the right side panel (❶, Figure 4.2.1) of the sample module and set aside.

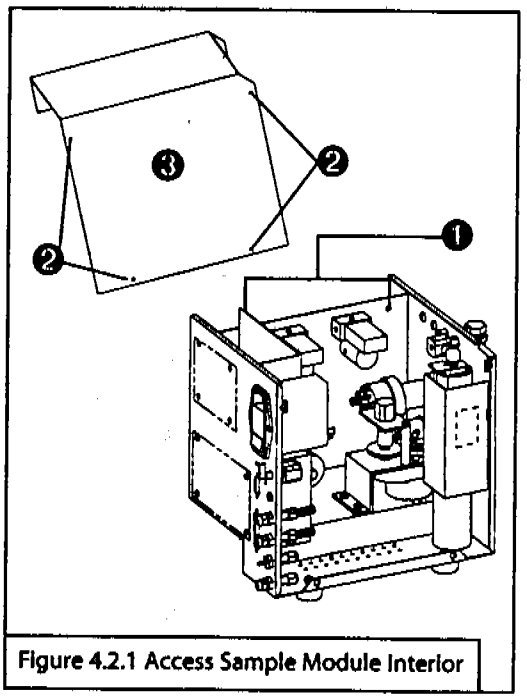


Figure 4.2.1 Access Sample Module Interior

4. Remove the four Phillips screws from the left side panel (❷) of the sample module and set aside.
5. Shift the sample module slightly to the left so that the autosampler arm is not above it.
6. Remove the sample module cover (❸) by lifting it straight up.
7. Set the cover aside.
8. Perform maintenance or troubleshooting procedure and then reverse steps 1-6 to replace the cover.

4.2 Refill and Replace Internal Standard

See Section 2.7.9 in Chapter 2.

4.3 Valve Control Board Replacement

Teledyne Tekmar advises that you wear a grounding strap to discharge static when accessing the electronics area of any instrumentation.

1. Power down the sample module, autosampler, and concentrator.
2. Unplug the power cord from the sample module.
3. Remove the sample module chassis cover.
4. Remove the clear, plastic electronics/plumbing divider (❶, Figure 4.3.1):

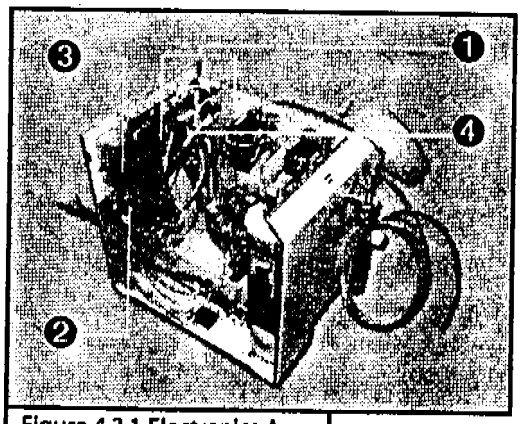


Figure 4.3.1 Electronics Area

5. Use a 5/16" nut wrench to remove the nut and lockwasher (❷) that attach the electronics/ plumbingdivider to the rear panel. The nut and lockwasher are located directly beneath the power entry module (❸).
6. Lift the electronics/plumbing divider out by sliding the left side of the cover forward (past the power entry module and its connectors.
7. When there is enough clearance, lift the electronics/plumbing divider straight out of the unit.
8. Unsnap the valve control board (❹) from the 4 Pem studs located in each corner.
9. Raise the valve control board just enough to access and disconnect all connectors. All connection wires are marked with a shrink-wrapped label. You may also refer to the wiring diagram in the Diagrams section for more details.
10. While holding the valve wires out of the way with one hand, snap the new valve control board onto the 4 Pem studs.
11. Place the valve wires back into the corner of the electronics area.
12. Guide the electronics/plumbing divider back in and over the electronics area being careful to enclose all wires within it the cover being careful not to pinch any of the valve wires with the edges of the electronics/plumbing divider.
13. Screw the nut and lockwasher back on to secure the cover. Be careful not to pinch any of the valve wires or tubing with the edges of the electronics/plumbing divider.

4.4 Fuse Replacement

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

Replace Power Entry Module Fuse

1. Insert a small slotted screwdriver up and through the bottom opening (❶, Figure 4.4.1) of the power entry module (this was exposed when the power cord was removed).
2. Gently push the fuse holder out from the module.
3. Remove the affected (1A 250V) fuse and discard.
4. Replace with the same rating (1A 250V) fuse.
5. Snap the fuse holder back into the power entry module. The triangles on the module should fit together.

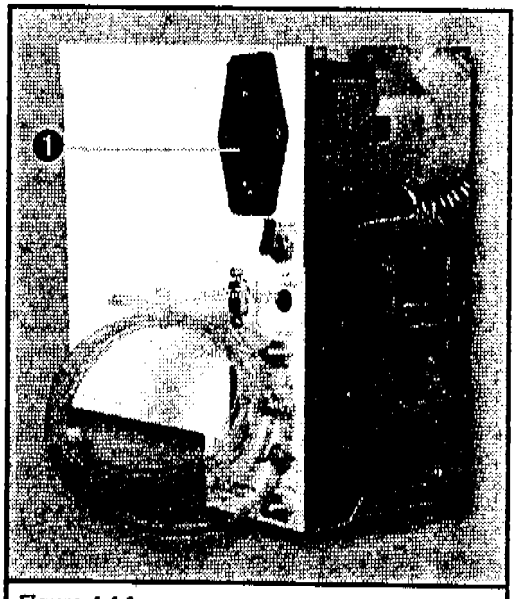


Figure 4.4.1
Location of Power Entry Module Fuse Drawer

Replace Power Supply Fuse

1. Power down the sample module, autosampler, and concentrator.
2. Unplug the power cord from the sample module.
3. Remove the electronics/plumbing divider.
4. Carefully remove the 1A 250V standard fuse (❶, Figure 4.4.2) from the power supply (❷) located at location FS1.

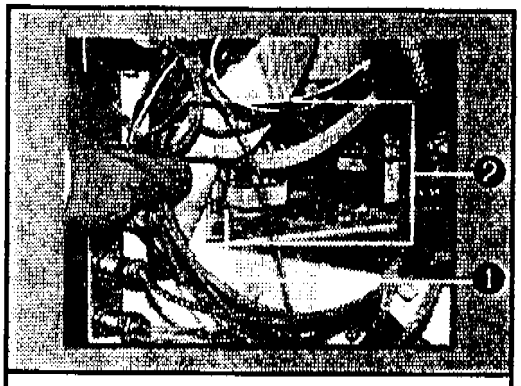


Figure 4.4.2
Location of Power Supply Fuse

5. Discard the affected fuse.
6. Replace with same rating fuse.
7. Replace the electronics/plumbing divider and chassis cover,

4.5 Power Supply Replacement

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

1. Power down the sample module, autosampler, and concentrator.
2. Unplug the power cord from the sample module.
3. Turn water and gas supplies off.
4. Remove the sample module chassis cover. You must access the back of the sample module to replace the power supply. If necessary, disconnect the water and gas lines from the unit for better access.
5. Remove the electronics/plumbing divider.
6. Disconnect the cables from the bottom of the valve control board (❶, Figure 4.5.1).
7. Use a small, slotted screwdriver to remove the two #4x32 1/2" pan head screws from the left side of the power supply (❷) and set aside.
8. Unsnap the right side of the power supply from the two Pem studs.
9. Disconnect the electrical connections from the power supply.
10. Carefully lift the power supply out and discard.
11. Place the left side of the new power supply over the standoffs and snap the right side of the power supply onto the two Pem studs.
12. Insert the two screws through the holes on the left side of the power supply and screw into the standoffs.
13. Reconnect the all connectors to the power supply.
14. Reconnect all cables to the valve control board.
15. Replace the electronics/plumbing divider and chassis cover.

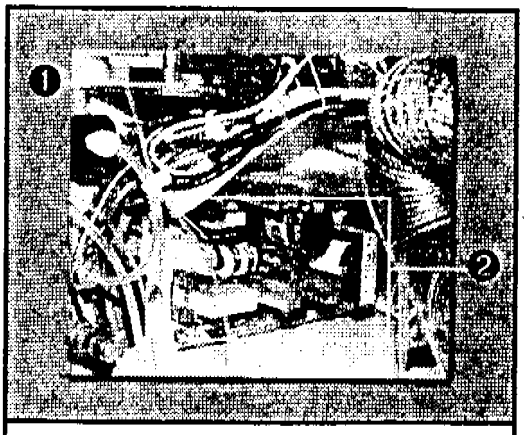


Figure 4.5.1 Power Supply Location

4.5 Solenoid Valve Replacement

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

1. Turn water and gas supplies off.
2. Power down the sample module, autosampler, and concentrator.
3. Unplug the power cord from the sample module.
4. Remove the sample module chassis cover.
5. Disconnect all tubing connections (❶, Figure 4.5.1) from the affected valve and place the tubing out of your way.
6. Disconnect the electrical connections (❷) from the affected valve.
7. Remove the two #4 flathead screws from the right exterior panel of the sample module that secure the valve and set aside.
8. Remove and discard the affected valve.
9. Reverse steps 1-8 to install the new valve.

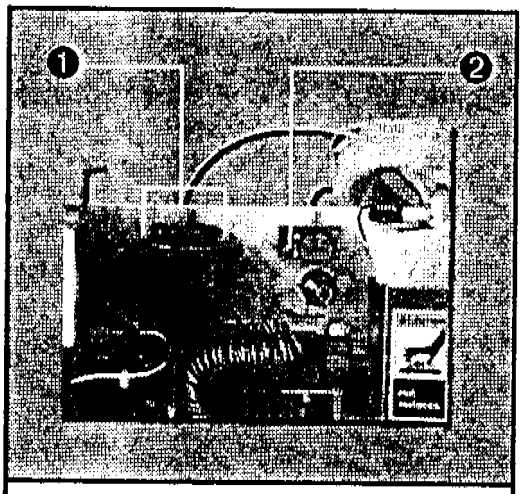


Figure 4.5.1 Solenoid Valves

4.6 Pressure Switch Replacement

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

1. Turn water and gas supplies off.
2. Disconnect the water supply.
3. Power down the sample module, autosampler, and concentrator.
4. Unplug the power cord from the sample module.
5. Remove the sample module chassis cover.
6. Locate the pressure switch assembly (❶, Figure 4.6.1).

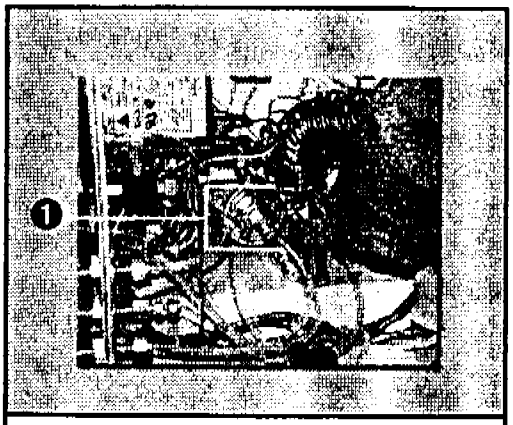


Figure 4.6.1 Pressure Sensor Switch Location

7. Disconnect the 1/8" water pressure line fitting (❶, Figure 4.6.2) with a 7/16" wrench.

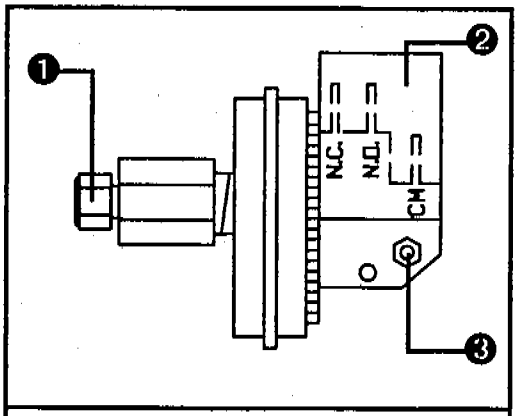


Figure 4.6.2 Pressure Sensor Switch Assembly

8. Disconnect all electrical connectors (❷).
9. Remove the #6-32 hex nut (❸, top of pressure switch plate and 1" nut standoff) with a 5/16" nut driver and set the nut and lock washer aside.
10. Remove and discard the pressure switch assembly.
11. Reverse steps 1-10 to install the new pressure switch assembly.

Note:
The pressure switch is factory-set to 60psi. Do not alter this setting.

4.7 Sample Loop Replacement

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

1. Turn water and gas supplies off.
2. Power down the sample module, autosampler, and concentrator.
3. Unplug the power cord from the sample module.
4. Remove the sample module chassis cover.
5. Disconnect the 1/8" tubing fitting that connects the one end of the sample loop (❶, Figure 4.7.1) to the sample valve (❷).
6. Disconnect the 1/8" tubing fitting that connects the other end of the sample loop to the drain valve (❸).
7. Remove sample loop and discard.
8. Connect the fitting on each end of the sample loop to the sample and drain valves.

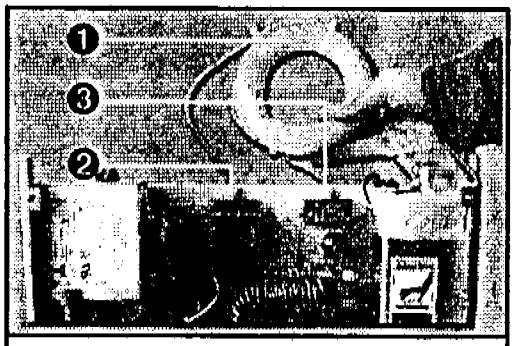


Figure 4.7.1 Sample Loop

4.8 Hot Water Tank Replacement

Electrical hazard. Use extreme caution when performing this procedure. Turn off and unplug power cords from all electric components.

Water supply must be turned off.

Water in tank may be very hot. Allow time for tank to cool before replacing the tank.

1. Power down the sample module, autosampler, and concentrator.
2. Unplug the power cord from the sample module. All power must be disconnected.
3. Turn water and gas supplies off.
4. Remove the sample module chassis cover.
5. Disconnect the 4-wire connector (❶, Figure 4.8.1) from the top of the temperature sensor board located on top of the hot water tank.

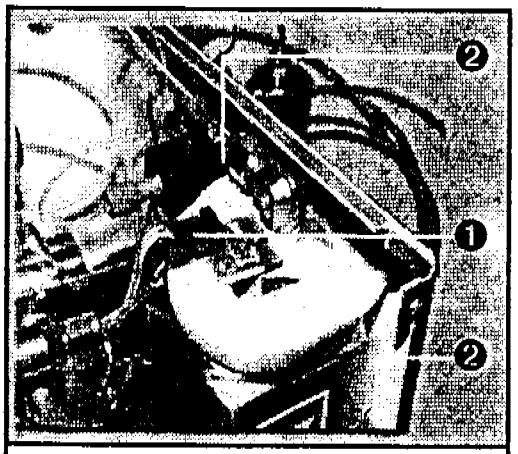


Figure 4.8.1 Hot Water Tank Assembly, Top

6. Remove the two 5/16" nuts and lockwashers (❷, not shown) from each side of the metal bracket with a 5/16" nut driver.
7. The tank may be full of water and must be emptied. Disconnect the water line (❸) that leads to the rear of the unit and place into a drain container (large enough to hold at least 70mL).
8. Disconnect the 1/8" brass nut (❹) from the brass elbow fitting on top of the heater. The contents of the tank will drain into the drain container.
9. After the tank drains entirely of water, disconnect the 1/8" brass nut from the bottom of the tank (❶, Figure 4.8.2).

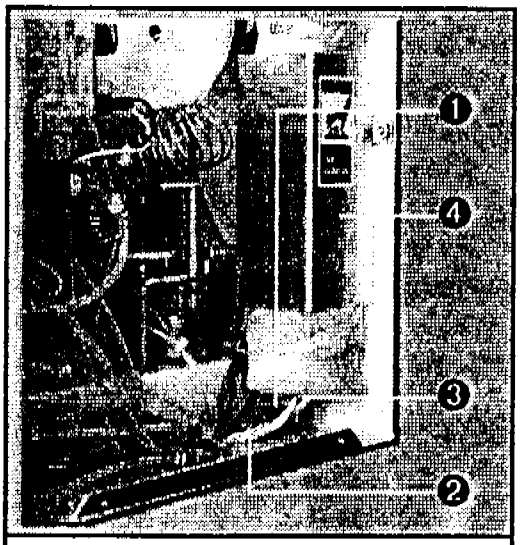


Figure 4.8.2 Hot Water Tank Assembly, Bottom

10. Disconnect the connectors from the pressure sensor switch (❷).
11. Disconnect the J11 connector from the valve control board.
12. Disconnect the grounding wire from the bottom of the tank (❸) by removing the one #4 screw.
13. Detach the metal bracket (❹) from the hot water tank.
14. Remove and discard the affected hot water tank.
15. Reverse steps 1-14 to install the new hot water tank assembly.

4.9 Pressure Regulator Assembly Replacement

Turn off the power supply to all units before performing any type of maintenance or troubleshooting procedure.

1. Power down the sample module, autosampler, and concentrator.
2. Unplug the power cord from the sample module.
3. Turn water and gas supplies off.
4. Remove the sample module chassis cover.
5. Using a 1/16" Allen wrench, loosen the set screw on the knurled pressure regulator control knob (❶, Figure 4.9.1) on the front of the sample module. Remove the knob and set aside.
6. Detach the three 5/16" brass nuts from the back of the pressure regulator (❶, Figure 4.9.2).
7. Using a 3/4" wrench, remove the nut on the front of the pressure regulator (❷, Figure 4.9.1) and set aside.
8. Remove the pressure regulator assembly (❷, Figure 4.9.2) from the sample module.
9. Reverse steps 1-8 to install the new pressure regulator assembly.

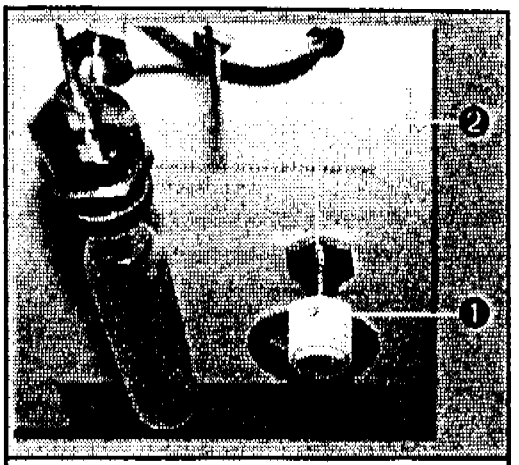


Figure 4.9.1 Pressure Regulator Control Knob

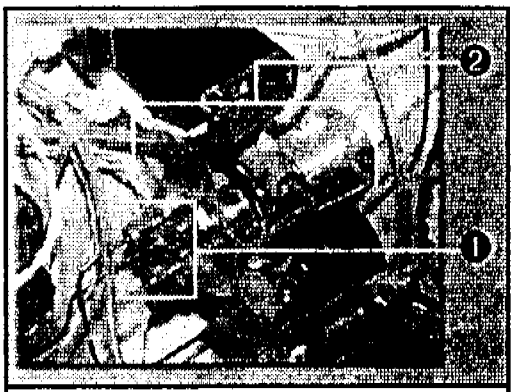


Figure 4.9.2 Pressure Regulator Assembly

4.10 Error Messages

The following tables describe error messages you may encounter when operating the AQUATek 70 system and the action you should take if you encounter them.

User Interface Errors

User interface errors flag discrepancies between what the operator has configured the concentrator to do and what the system is capable of doing.

Error Message	Meaning	Recommended Action
Entry Out of Range	This user interface error indicates that a value you have entered for a particular parameter is out of its allowable range. The Method Editor screen shows the minimum and maximum values for that parameter in the Min/Max field.	• Click OK to close the error screen. The Method parameter values return to their defaults.
Sample/Method Mismatch	This user interface error indicates that your method Schedule is incorrect for the particular unit configuration you are running. For example, the error will appear fi you are trying to run an AQUATek 70 sample on position 0 or a front-panel concentrator sample on position 10 . This is because 0 indicates a single-position, front-panel unit and a number higher that 0 indicates a multiposition unit, such as the AQUATek 70 system. Think of this error as sample type mismatch .	• Check that the Method and Schedule are appropriate for the type of system configuration you are running. • Confirm units are properly connected. • Confirm that TekLink recognizes the configuration. • AQUATek 70 is ON (or OFF if running a single-position method) in the Method Editor screen. • Save Method. • Verify or edit the Schedule and send to the concentrator.
Schedule Empty	One or more of the lines in the Schedule sent have an invalid Start or Stop vial position value.	• Check that all Start and Stop vial positions entered are correct in the Schedule for the methods you are running. • Re-send the Schedule to the concentrator.

Table 4.10.1 User Interface Error Codes

Operation Errors

Operation errors indicate problems with a mechanical or electronic system within the concentrator, sample module, or autosampler.

Please call the Teledyne Tekmar Customer Support Center at (800) 874-2004 or (513) 247-7000 if troubleshooting efforts fail or if you need further technical assistance.

Error Message	Meaning	Recommended Action
A70 Arm Error	The autosampler met interference and did not perform a command or function.	▪ Reset the concentrator, autosampler, and sample module. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
A70 ASM Not Responding	The autosampler is not responding to a TekLink command or function. An AQUATek method may be loaded in TekLink when running the concentrator without the AQUATek system installed or configured properly.	▪ Check that the sample module and autosampler both have power. ▪ Both are properly connected. ▪ TekLink recognizes them. ▪ AQUATek 70 is ON in the Method Editor screen. ▪ Save the Method. ▪ Verify or edit the Schedule and send to the concentrator.
A70 Heater Error	The secondary temperature of the hot water tank inside the sample module does not reach its setpoint after 20 minutes. The temperature sensor board screw on top of the hot water tank may be loose, the sensor board may need replacement, or the hot water tank assembly may need replacement.	▪ Tighten the sensor board screw. If error persists, then ▪ Replace temperature sensor board. If error persists, then ▪ Replace hot water tank. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
A70 Sensor Error	The base temperature of the hot water tank inside the sample module does not reach temperature. The sensor board screw on top of the hot water tank may be loose or the temperature sensor board may need replacement.	▪ Tighten the sensor board screw. If error persists, then ▪ Replace temperature sensor board. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
Maximum Failsafe Exceeded on Heater [Name]	This error signals a runaway situation, where a region in the concentrator has exceeded its maximum safe temperature (such as the transfer line or trap region). This type of error will shut down the system.	▪ Check physical condition of heater in the concentrator (blown triac on the power supply/output board, electrical short, open or bad thermocouples, confirm all wiring is intact). ▪ Repair as necessary. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.

Table 4.10.2 Operation Error Codes [*continued...*]

Error Message	Meaning	Recommended Action
Minimum Failsafe Exceeded on Heater [Name]	This error indicates that a region (such as the trap region) of the concentrator is nearing a temperature setpoint below that which is allowed. It could also occur if the concentrator electronics sends back a temperature setpoint that is far below the allowable range.	▪ Check physical condition of heater and electronics in the concentrator (thermocouple and heater connections, solid state relay, and fuses). ▪ Confirm all wiring is intact. ▪ Repair as necessary. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
No Reponse from Unit	TekLink is unable to communicate with the concentrator.	▪ Make sure that the COM port configuration is set up correctly in TekLink. ▪ Re-send the Schedule to the concentrator.
Open Thermocouple on Heater [Name]	This error indicates that a thermocouple is not properly connected or is bad.	▪ Reconnect the thermocouple to the board in the concentrator. If error persists, then ▪ Install an extension to make the proper connections. If error persists, then ▪ Replace the thermocouple if it is bad. ▪ Repair as necessary. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
Power Fail	This error indicates that the concentrator either lost power or that its power supply/output board is bad.	▪ Check that the concentrator power cord is properly connected and that the power source is good. If error persists, then ▪ Replace the concentrator power supply/output board. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
Self-Test Failure on Heater [Name]	The displayed heater did not pass self-test.	▪ Check physical condition of electronics, heater connections and resistance, fuses in both the concentrator and sample module, and thermocouple voltage in the concentrator. ▪ Repair as necessary. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
Setpoint Not Reached on Heater [Name]	This error appears anytime that the concentrator does not reach a particular setpoint in the appropriate time.	▪ Check physical condition of electronics, heater connections and resistance, and thermocouple voltage in the concentrator. ▪ Repair as necessary. ▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.
System Reset	This error appears anytime that you hit Reset, on the concentrator, after a fatal error.	▪ Reset the concentrator. ▪ Watch progress of system initialization and self-tests. ▪ Resume operations.

Table 4.10.2 Operation Error Codes

Programming Errors

Programming errors indicate problems with TekLink.

If you encounter a programming error, please call the Teledyne Tekmar Customer Support Center at (800) 874-2004 or (513) 247-7000. If possible, jot down exactly what you were doing when the error occurred, and report that information.

Error Message	Meaning	Recommended Action
Entry Out of Range	This user interface error indicates that a value you have entered for a particular parameter is out of its allowable range. The Method Editor screen shows the minimum and maximum values for that parameter in the Min/Max field.	• Click OK to close the error screen. The Method parameter values return to their defaults.
Sample/Method Mismatch	This user interface error indicates that your method Schedule is incorrect for the particular unit configuration you are running. For example, the error will appear fi you are trying to run an AQUATek 70 sample on position 0 or a front-panel concentrator sample on position 10 . This is because 0 indicates a single-position, front-panel unit and a number higher that 0 indicates a multiposition unit, such as the AQUATek 70 system. Think of this error as sample type mismatch .	• Check that the Method and Schedule are appropriate for the type of system configuration you are running. • Confirm units are properly connected. • Confirm that TekLink recognizes the configuration. • AQUATek 70 is ON (or OFF If running a single-position method) in the Method Editor screen. • Save Method. • Verify or edit the Schedule and send to the concentrator.
Schedule Empty	One or more of the lines in the Schedule sent have an invalid Start or Stop vial position value.	• Check that all Start and Stop vial positions entered are correct in the Schedule for the methods you are running. • Re-send the Schedule to the concentrator.

Table 4.10.3 Programming Error Codes

4.11 Troubleshoot the Sample Module Hot Water Tank

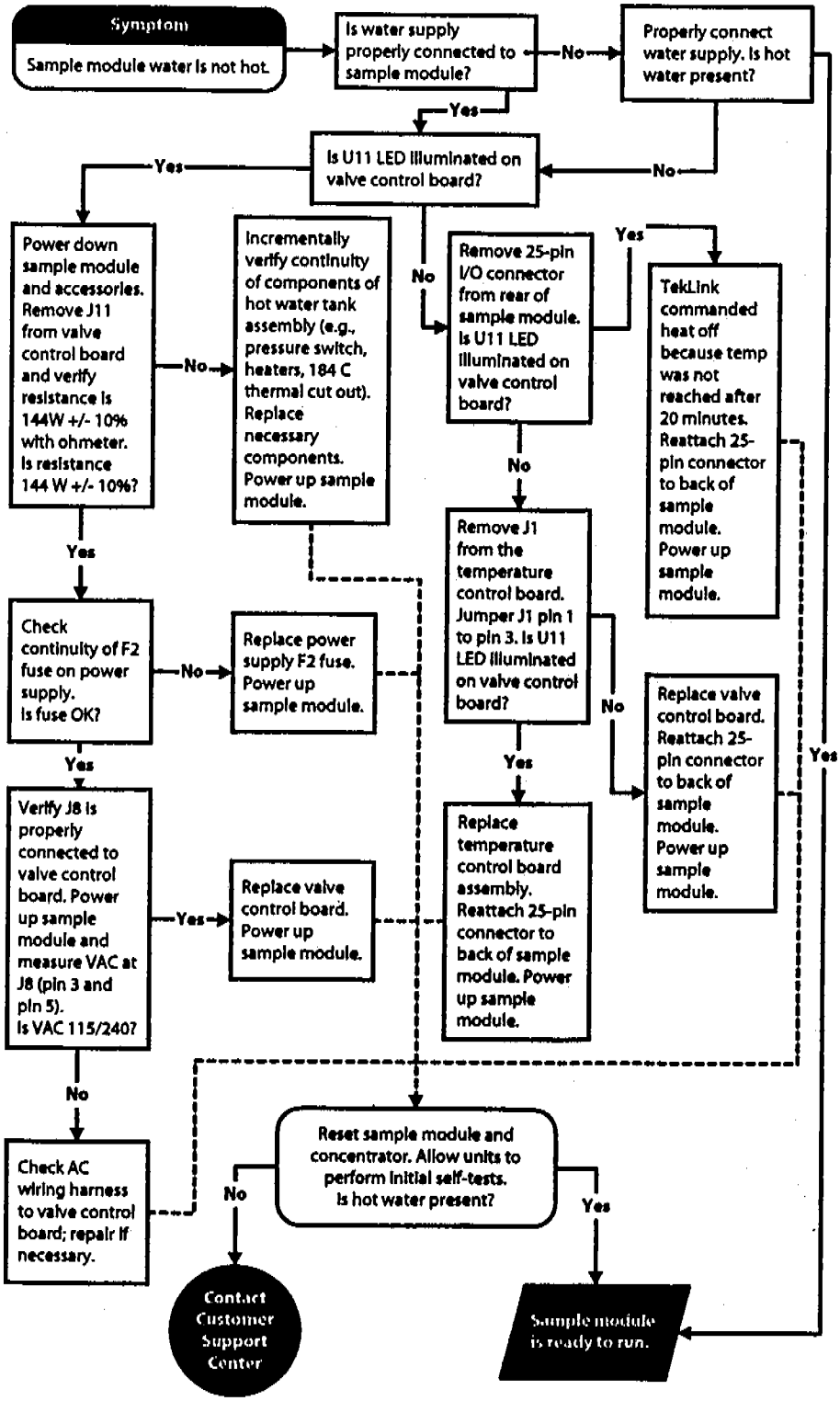


Figure 4.11.1 Sample Module Hot Water Tank Troubleshooting Flow Chart

4.12 Isolate and Troubleshoot Leaks

Please use the highlighted flow paths and check points of the Leak Check Diagrams as visual aids in Chapter 5 for troubleshooting.

Causes of leaks typically include the following:

- A loose nut where the pneumatic (gas) line enters a valve or other part.
- A ferrule (fitting inside the nut) that is damaged, worn, or missing.
- A break or hairline crack on a pneumatic line.
- A fitting that is the wrong size or type.

Allow the concentratror, sample module, and autosampler to warm up for at least thirty minutes before you leak-check the system. If you leak-check the system before the fittings have had time to reach operating temperature and expand, you will find leaks. A useful leak checking tool is an electronic helium leak checker.

Important!
If you tighten fittings before the system has pressurized and warmed to operating temperature, you can severely damage the ferrules inside the nuts. You could also strip the threads on the nuts and not be able to remove them.

Use an electronic thermal conductivity detector and helium as the pressurizing gas. If an electronic leak detector is not available, use a 1:1 solution of isopropanol and water. Apply a drop or two of the solution to the suspect fitting. If the solution bubbles, there is a leak. Use the solution sparingly to prevent contaminating the fittings.

Important!
Do not use any type of soap solution (for example, Snoop®) to check for leaks. If soap gets in the lines, it will cause increased background, adsorption, and other analytical problems.

Before Leak Checking the AQUATek 70 System

1. Make sure the Helium gas supply is connected to the sample module and that the system pressure is set to 20 psi.
2. Refer to sections 4.1.2 and 4.1.3 in this chapter for safety considerations and instructions for removing the sample module cover.
3. Refer to the troubleshooting flow chart (Figure 4.12.1) and the color leak check flow diagrams (Section 5.3) for leak troubleshooting guidelines and details.

Continued...

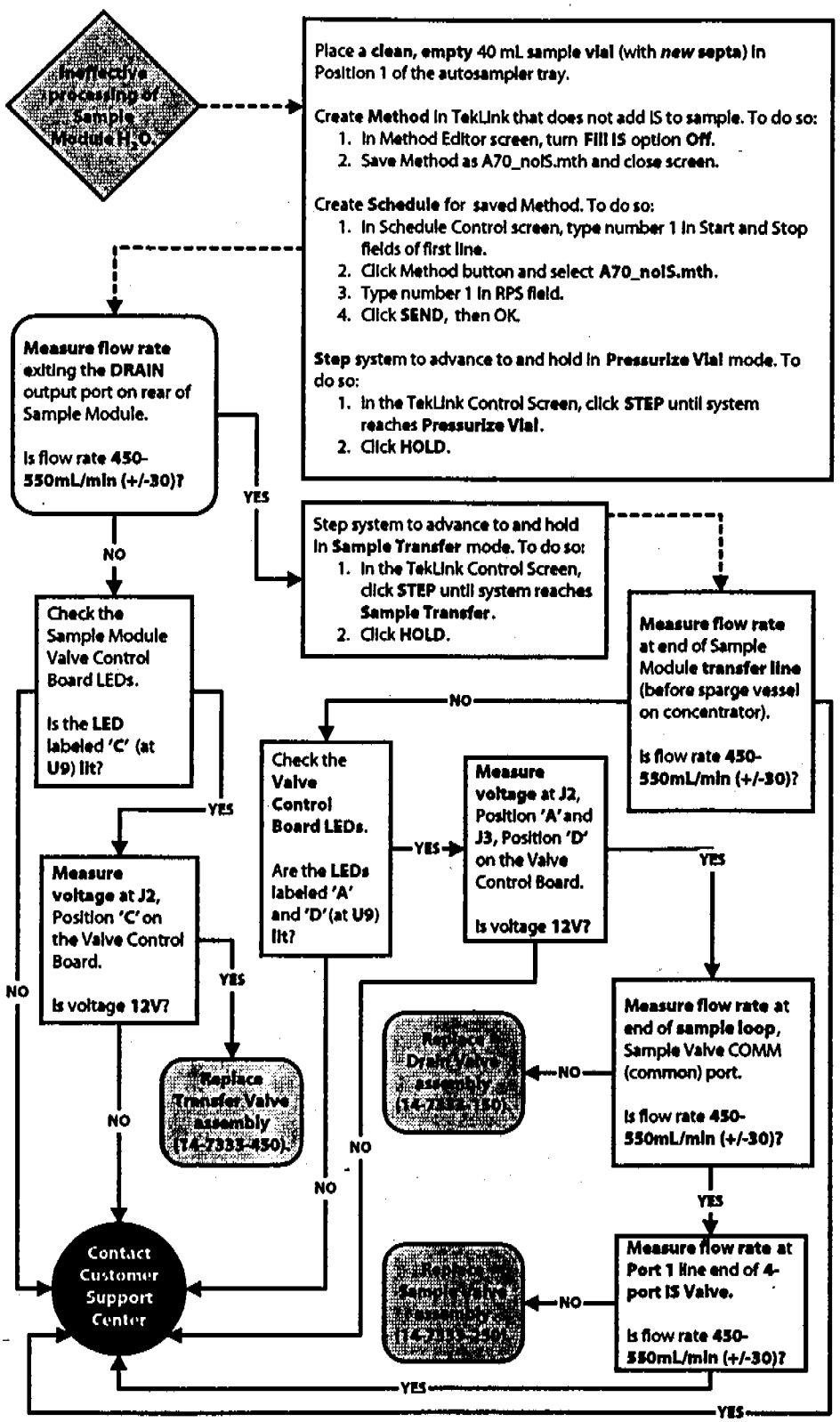


Figure 4.12.1 Sample Module Leak and Gas Flow Troubleshooting Flow Chart

Standby Leak Check

1. Step the concentrator to Standby mode.
2. Use a Helium leak detector to check the points as indicated in Figure 5.3.1.

Fill Internal Standard Leak Check

1. Step the concentrator to Fill IS mode.
2. Use a Helium leak detector to check the points (fitting and ports of Sample Module) as indicated in Figure 5.3.2.

Sample Transfer Leak Check

1. Step the concentrator to Sample Transfer mode.
2. Cap the sample transfer line reducing fitting (fitting that fits over the concentrator sparge vessel side arm). Remove and set aside the end nut from the fitting. Attach a 1/8" plug nut to the male end of the fitting to cap the end of the tubing. Tighten the fitting.
3. Use a Helium leak detector to check the points (fitting and ports of Sample Module) as indicated in Figure 5.3.3.

Pressurize Vial Leak Check

1. Place a clean sample vial (using a new septum) up onto the autosampler sample needle. It is very important to use a brand new septum for this leak check procedure to ensure an accurate reading.
2. Cap the Drain port on the rear of the sample module using a 1/8" plug nut.
3. Step the concentrator to Pressurize Vial mode and Hold.
4. Use a Helium leak detector to check the points (fitting and ports of Sample Module) as indicated in Figure 5.3.4.

Note:

If tightening a fitting does not stop a leak, look for other causes, but never overtighten the fittings.

If you are unable to determine and/or solve a leak problem, please contact the Customer Support Center at (800) 874-2004.

4.13 Isolate and Troubleshoot Gas Flow Rate Problems

Please use the highlighted flow paths and check points of the Gas Flow Rate Diagrams as visual aids in Chapter 5 for troubleshooting.

Gas flow rate problems can be caused by tubing restrictions, bad valves, loose or bad fittings, and other conditions.

Allow the concentratror, sample module, and autosampler to warm up for at least thirty minutes before you check gas flow rates. If you check system gas flow rates before the fittings have had time to reach operating temperature and expand, you might obtain false flow rate readings. Use a gas flow meter to measure gas flow rates.

If you are unable to determine and/or solve a leak problem, please contact the Customer Support Center at (800) 874-2004.

Before Flow Checking the AQUATek 70 System

1. Make sure the Helium gas supply is connected to the sample module and that the system pressure is set to 20 psi.
2. Refer to sections 4.1.2 and 4.1.3 in this chapter for safety considerations and instructions for removing the sample module cover.
3. Refer to the troubleshooting flow chart (Figure 4.12.1) and the color gas flow diagrams (Section 5.4) for gas flow troubleshooting guidelines and details.

Standby Gas Flow Rate Check

1. Step the concentrator to Standby mode.
2. Disconnect the IS flow restrictor outlet fitting (see Figure 5.4.1).
3. Measure the flow rate at the IS flow restrictor outlet. If you do not get a reading of 450-550 cc/min from the IS flow restrictor, then check flow rates at outlets of the previous fittings and valves in flow path (see highlighted path in Figure 5.4.1).

Sample Transfer Gas Flow Rate Check

1. Step the concentrator to Sample Transfer mode.
2. Remove and set aside the end nut from the reducing fitting that attaches the sample transfer line from the sample module to the concentrator sparge vessel side arm.
3. Measure the flow rate exiting the sample transfer line. If you do not get a reading of 450-550 cc/min, then check flow rates at outlets of the previous fittings and valves in flow path (see highlighted path in Figure 5.4.2).

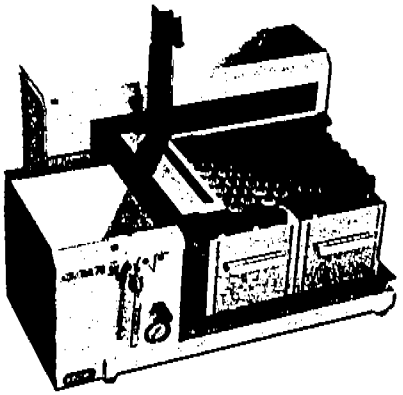
Continued...

Purge Lines Gas Flow Rate Check

1. Step the concentrator to Purge Lines mode.
2. Disconnect the top sample line fitting from the top of the autosampler sample needle.
3. Measure the flow rate exiting the sample line. If you do not get a reading of 450-550 cc/min from the IS flow restrictor, then check flow rates at outlets of the previous fittings and valves in flow path (see highlighted path in Figure 5.4.3).

Fill Internal Standard Gas Flow Rate Check

1. Replace the sample module IS vessel with a clean, empty IS vessel.
2. Step the concentrator to Fill IS mode.
2. Remove and set aside the end nut from the reducing fitting that attaches the sample transfer line from the sample module to the concentrator sparge vessel side arm.
3. Remove and set aside the drain tubing from the Drain port on the rear of the sample module.
4. Measure the flow rate exiting the Drain port. If you do not get a reading of 30 (± 10) ml/min, then check flow rates at outlets of the previous fittings and valves in flow path (see highlighted path in Figure 5.4.4).



#5

DIAGRAMS

5.1 AQUATek 70 Figures and Diagrams

Table 5.1.1
List of AQUATek 70 Figures and Diagrams

5.2 Valve Configurations for Operating Modes

	P	SAMPLE	DRAIN	TRANSFER	PRESSURIZE
STANDBY[1]	—	—	—	—	—
PRESSURIZE VIAL[2]	—	—	—	✓	—
FILL IS[3]	✓	✓	✓	—	—
SAMPLE TRANSFER[4]	—	✓	✓	—	—
PREHEAT[1]	—	—	—	—	—
PRE-PURGE[1]	—	—	—	—	—
RINSE LINES[5]	—	—	✓	—	✓
PURGE LINES[6]	—	—	✓	—	—
PURGE[1]	—	—	—	—	—
DESORB READY[1]	—	—	—	—	—
DESORB[6]	—	—	✓	—	—
BAKE RINSE[7]	—	—	✓	—	✓
BAKE TRANSFER[4]	—	✓	✓	—	—
BAKE SWEEP[6]	—	—	✓	—	—
BAKE[1]	—	—	—	—	—

For diagram of mode #	See page
1	5-3
2	5-4
3	5-5
4	5-6
5	5-7
6	5-8
7	5-9

Table 5.2.1
Active Valves During Specific Modes

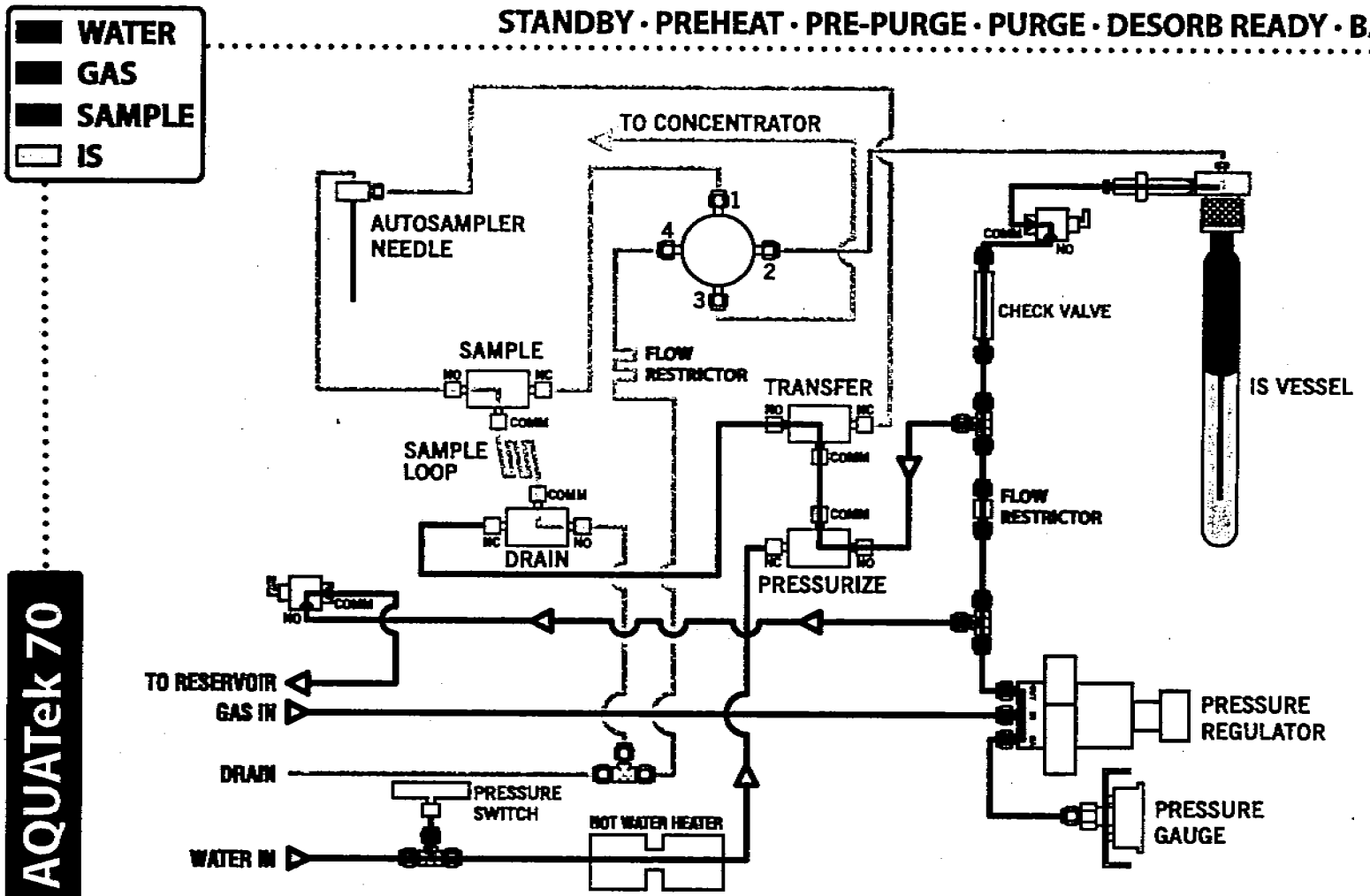


Figure 5.2.1 Standby, Preheat, Pre-purge, Purge, Desorb, Ready, and Bake

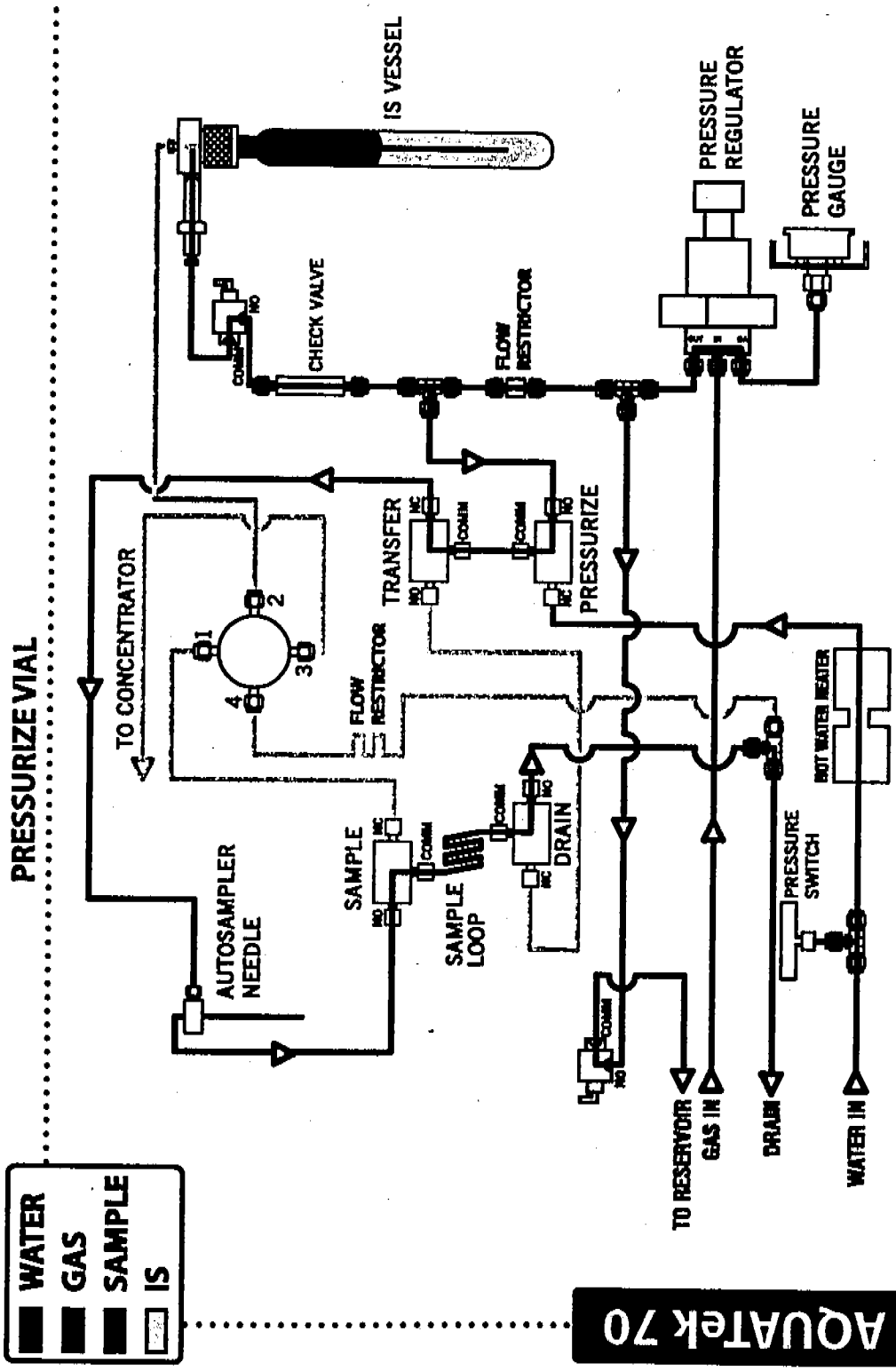


Figure 5.2.2 Pressurize Vial

FILL INTERNAL STANDARD

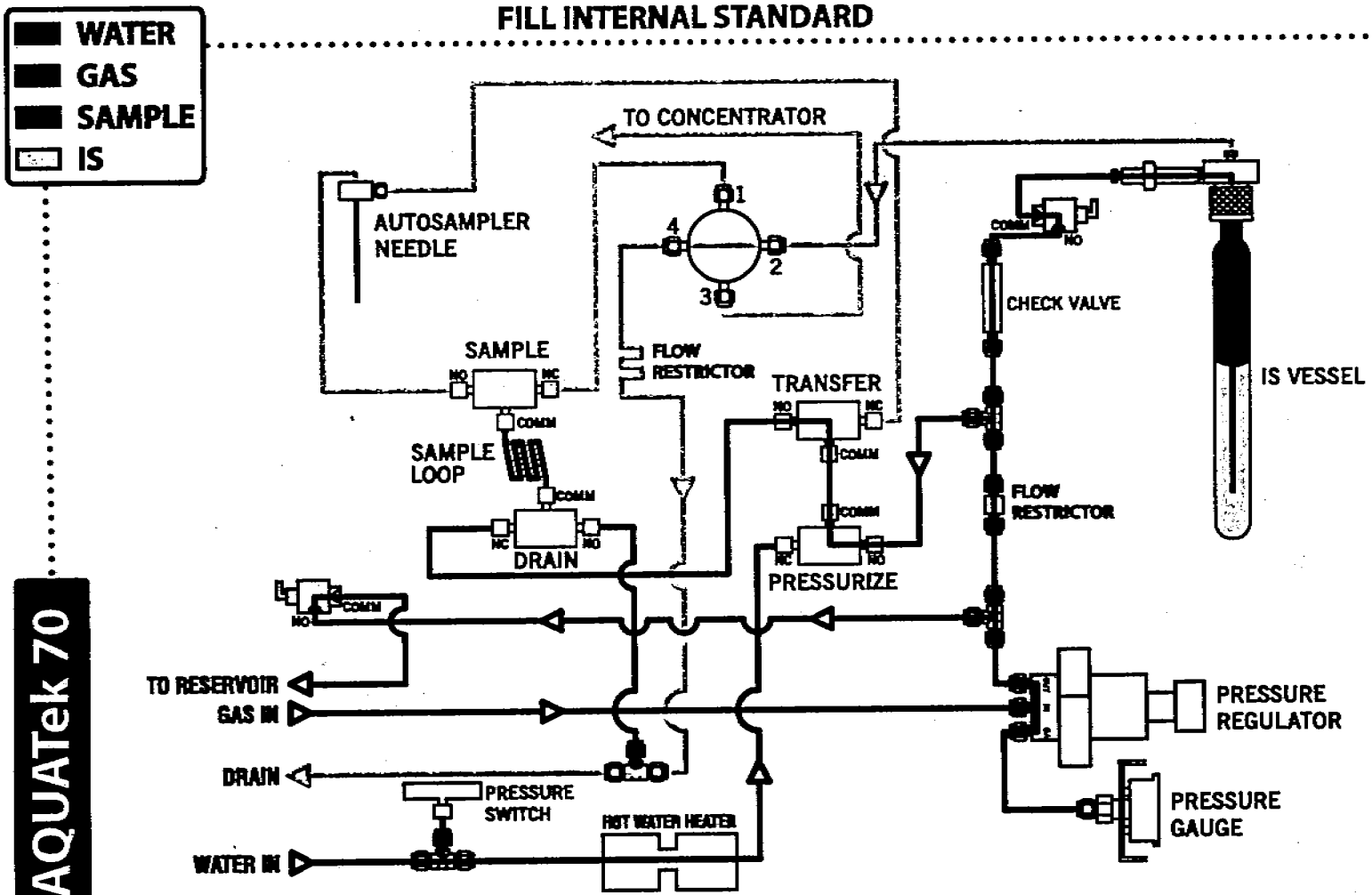


Figure 5.2.3 Fill Internal Standard

SAMPLE TRANSFER · BAKE TRANSFER

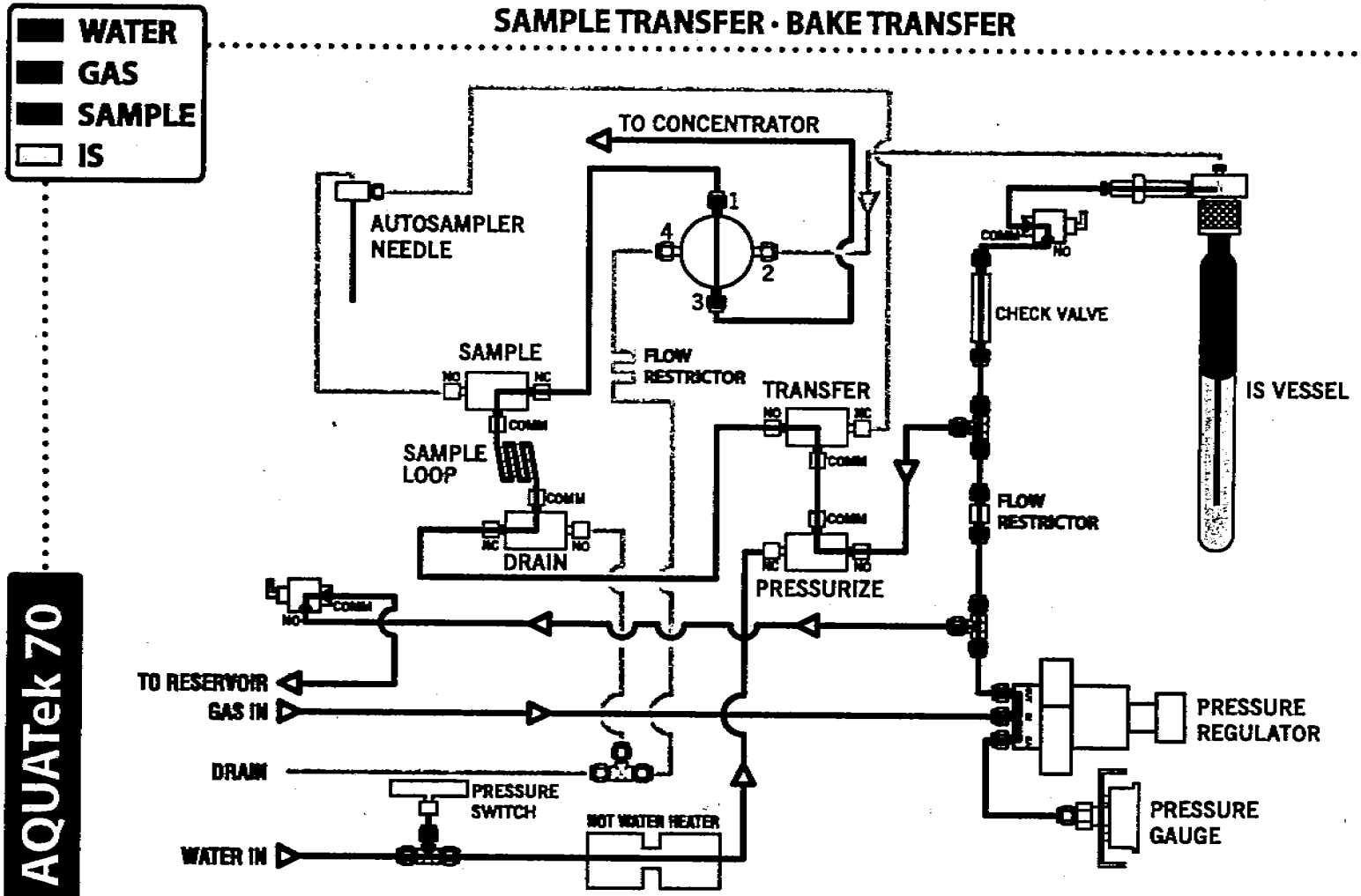


Figure 5.2.4 Sample Transfer and Bake Transfer

RINSE LINES

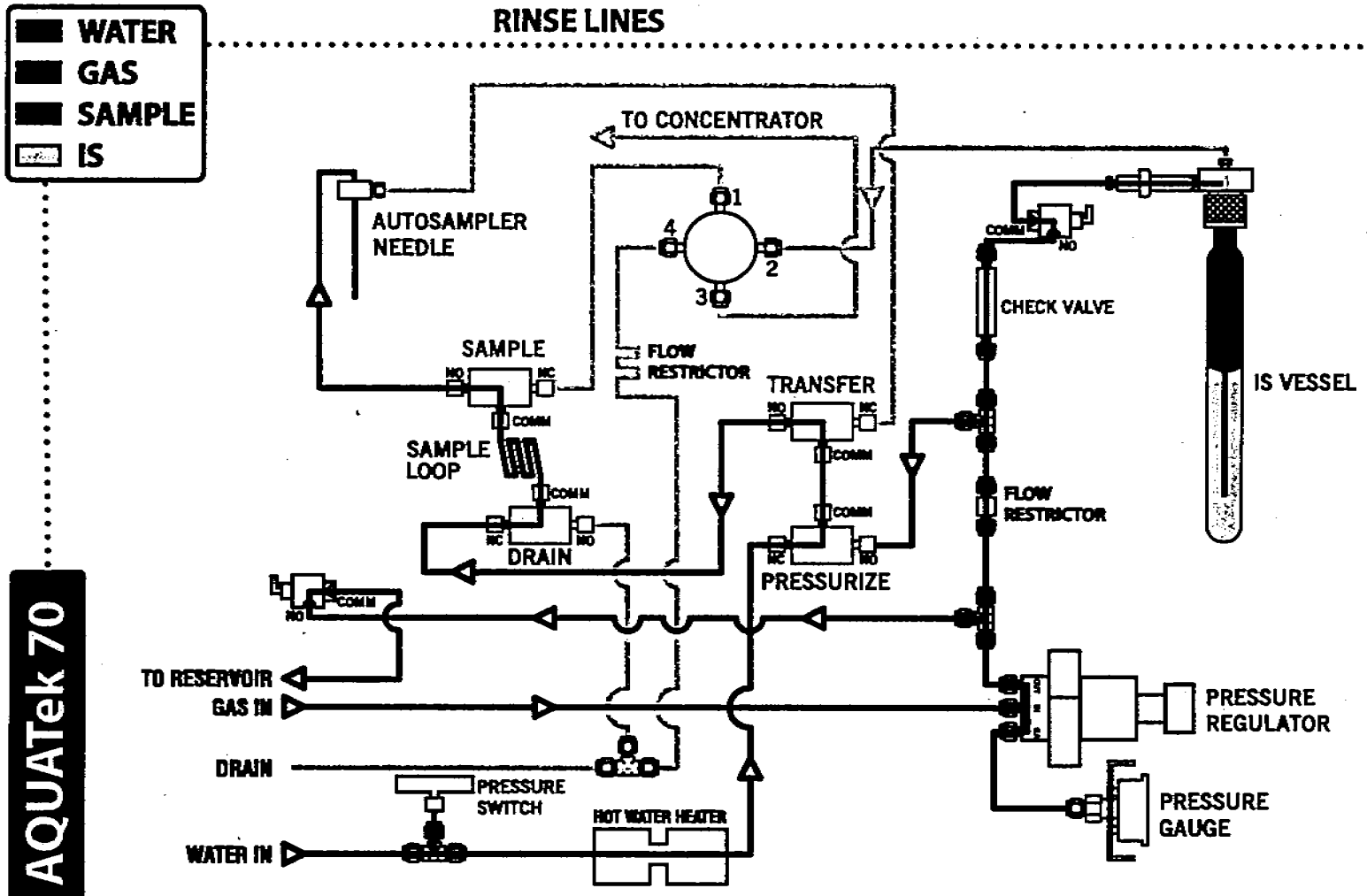


Figure 5.2.5 Rinse Lines

PURGE LINES · DESORB · BAKE SWEEP

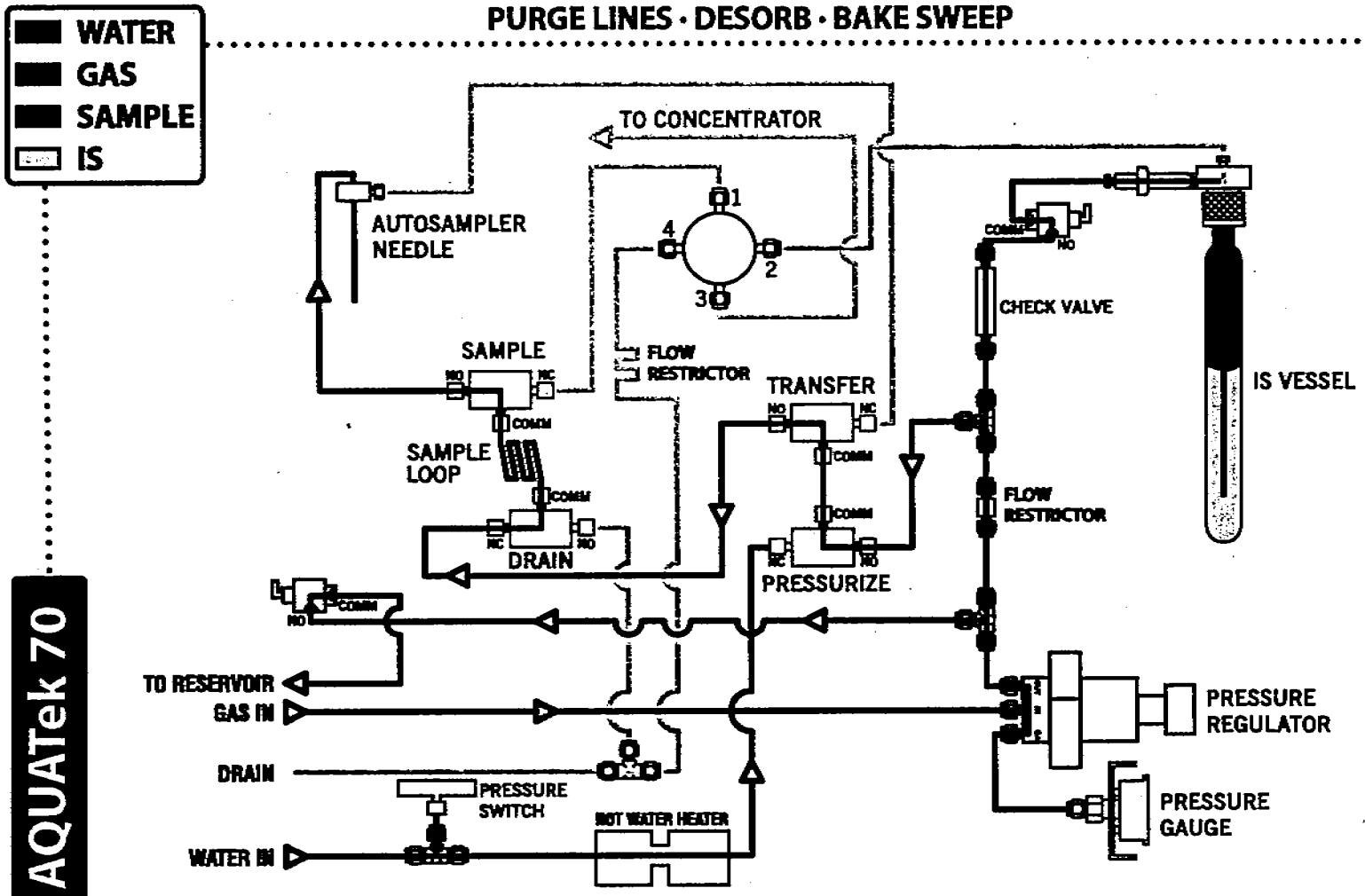


Figure 5.2.6 Purge Lines, Desorb, Bake Sweep

AQUATek 70

BAKE RINSE

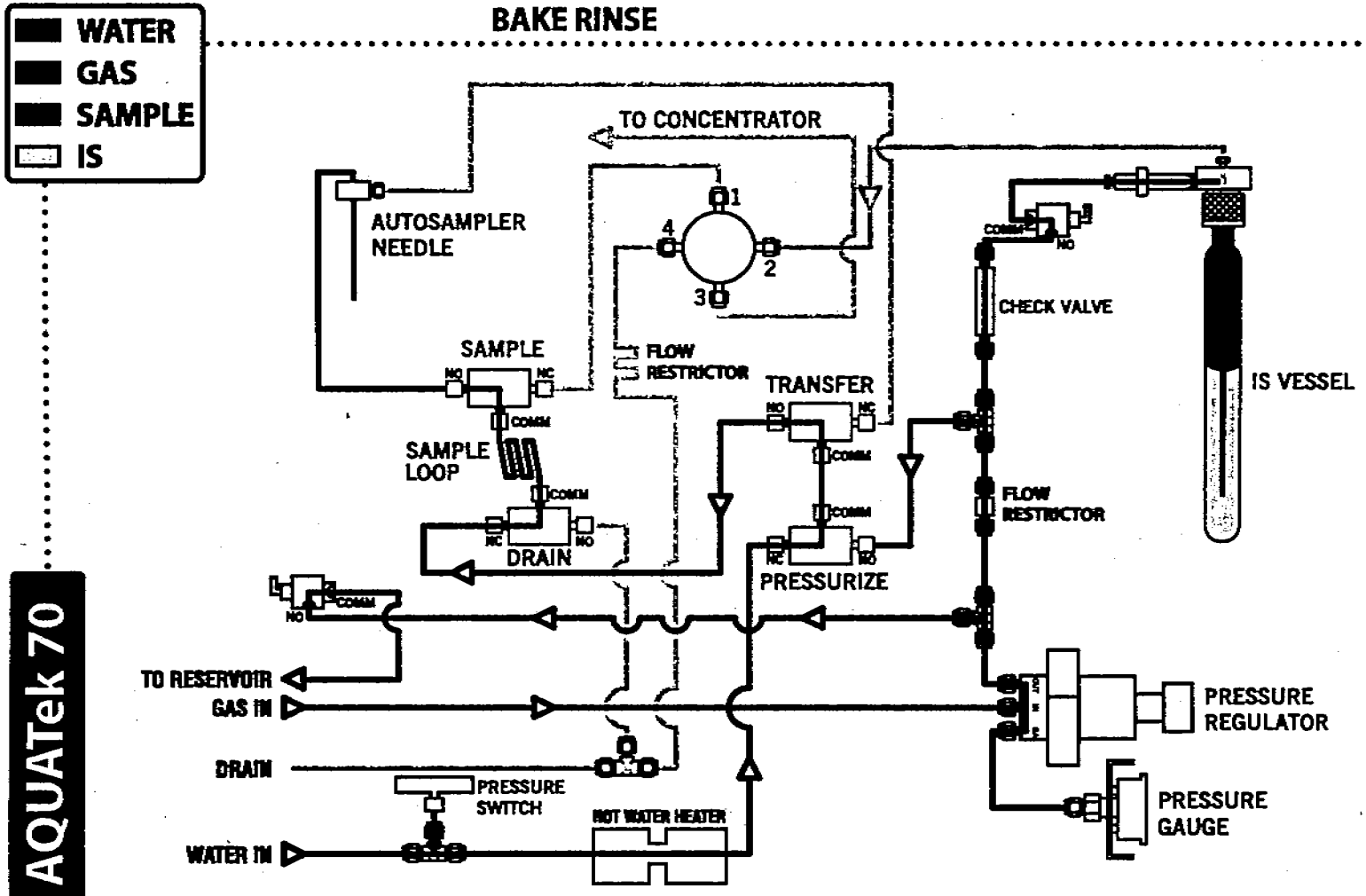


Figure 5.2.7 Bake Rinse

LEAK CHECK: STANDBY MODE

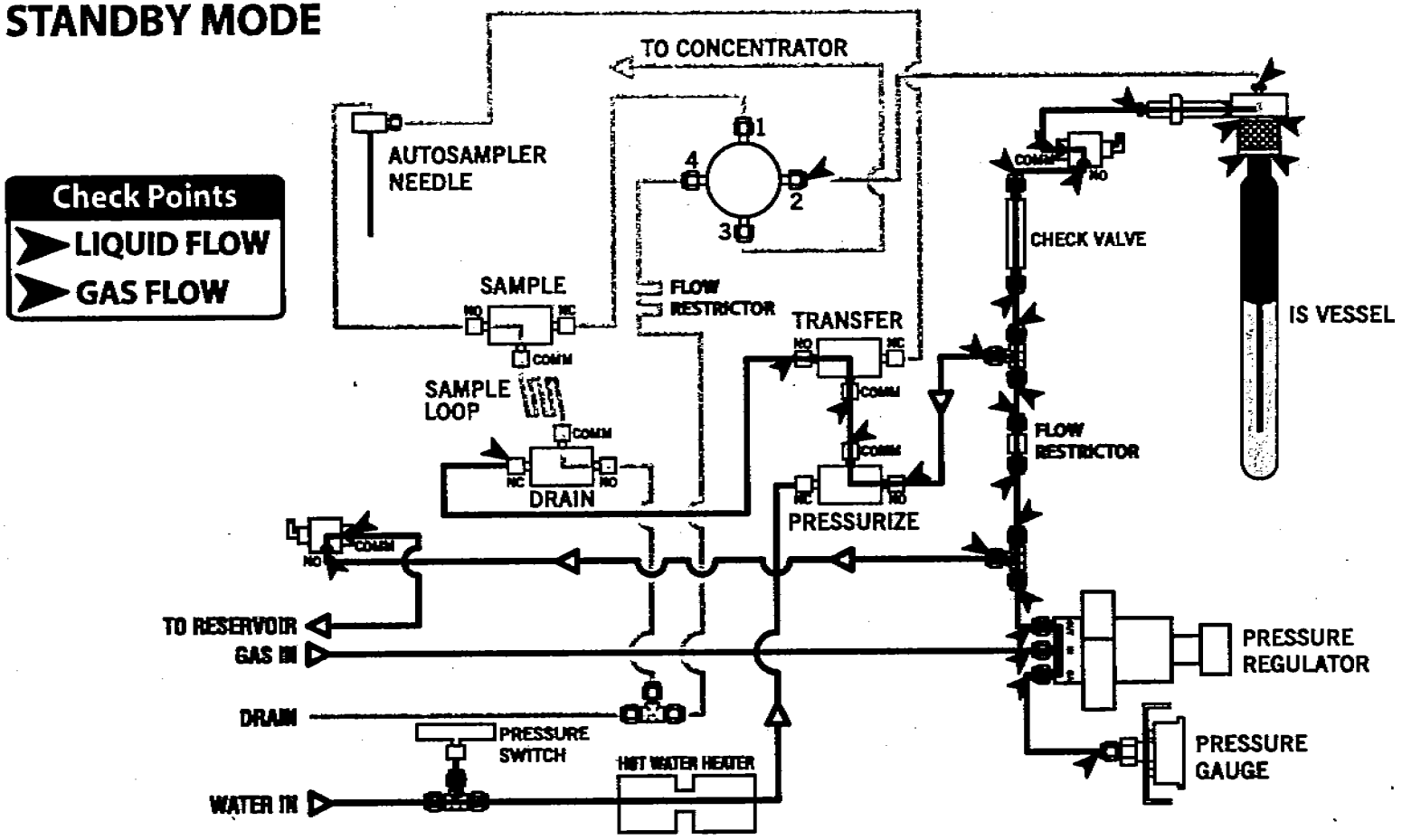


Figure 5.3.1 Leak Check Points; Standby Mode

LEAK CHECK: FILL INTERNAL STANDARD MODE

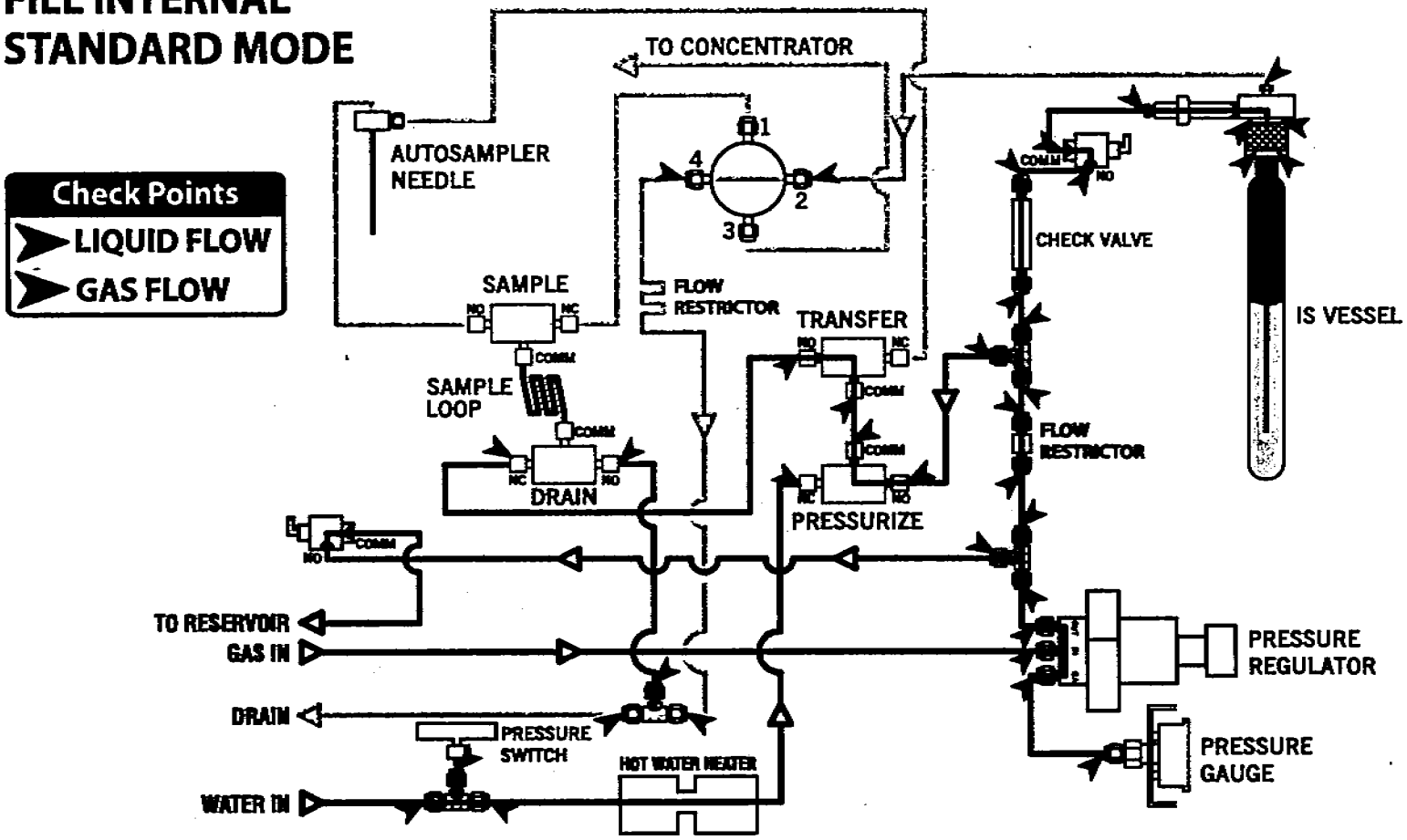


Figure 5.3.2 Leak Check Points; Fill Internal Standard Mode

LEAK CHECK: SAMPLE TRANSFER MODE

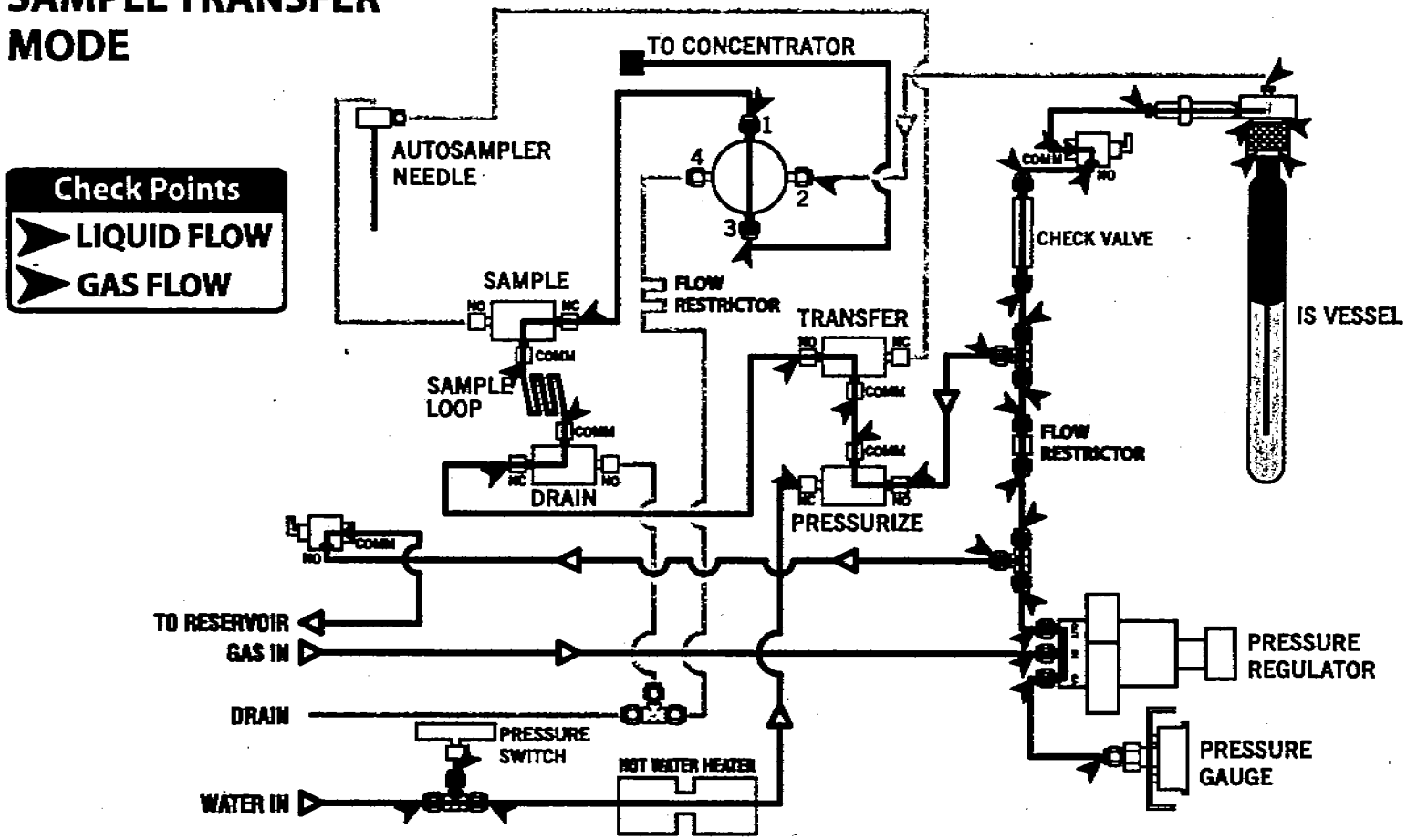


Figure 5.3.3 Leak Check Points; Sample Transfer Mode

LEAK CHECK: PRESSURIZE VIAL MODE

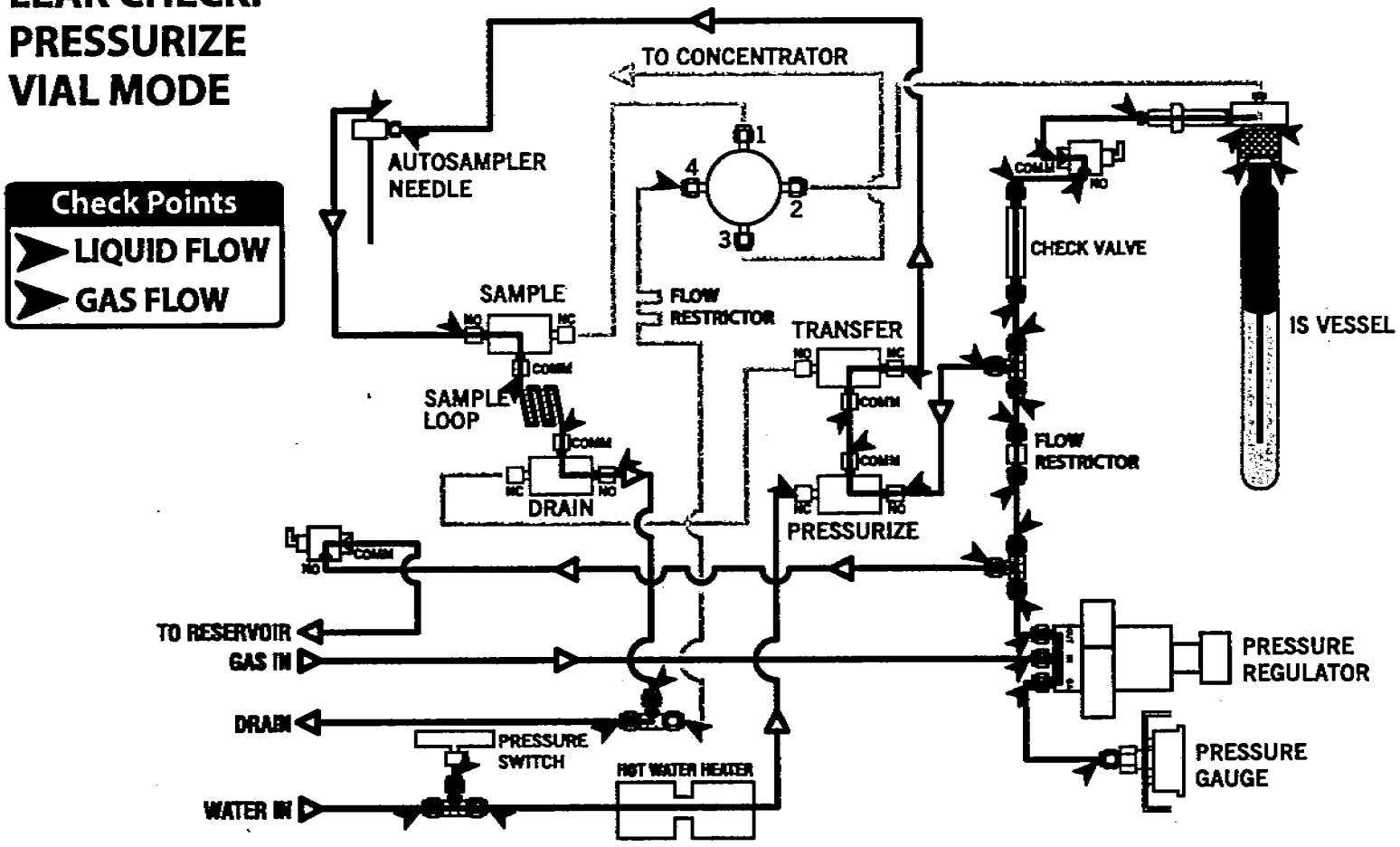


Figure 5.3.4 Leak Check Points; Pressurize Vial Mode

GAS FLOW RATE CHECK: STANDBY MODE

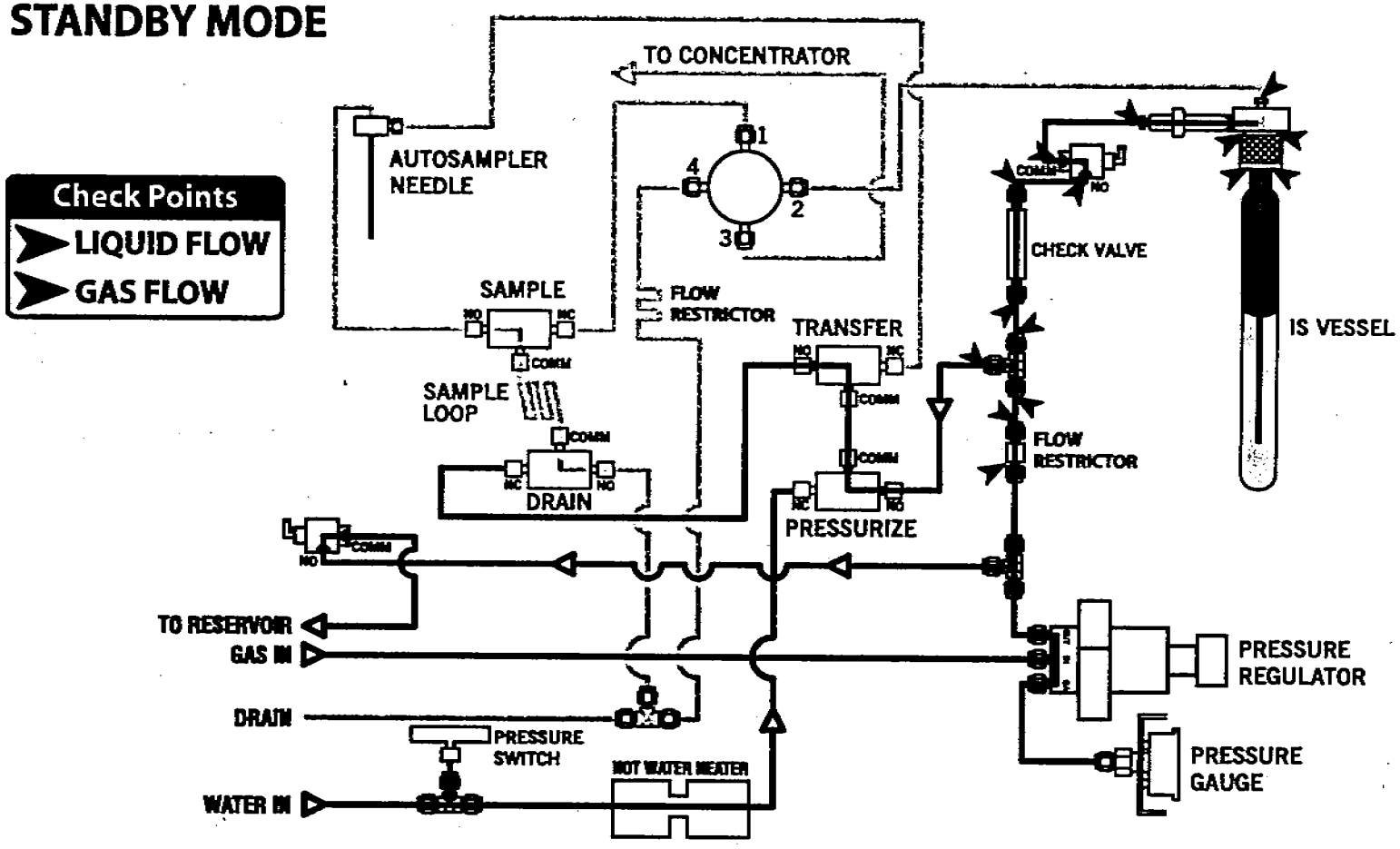


Figure 5.4.1 Gas Flow Rate Check Points; Standby Mode

GAS FLOW RATE CHECK: SAMPLE TRANSFER MODE

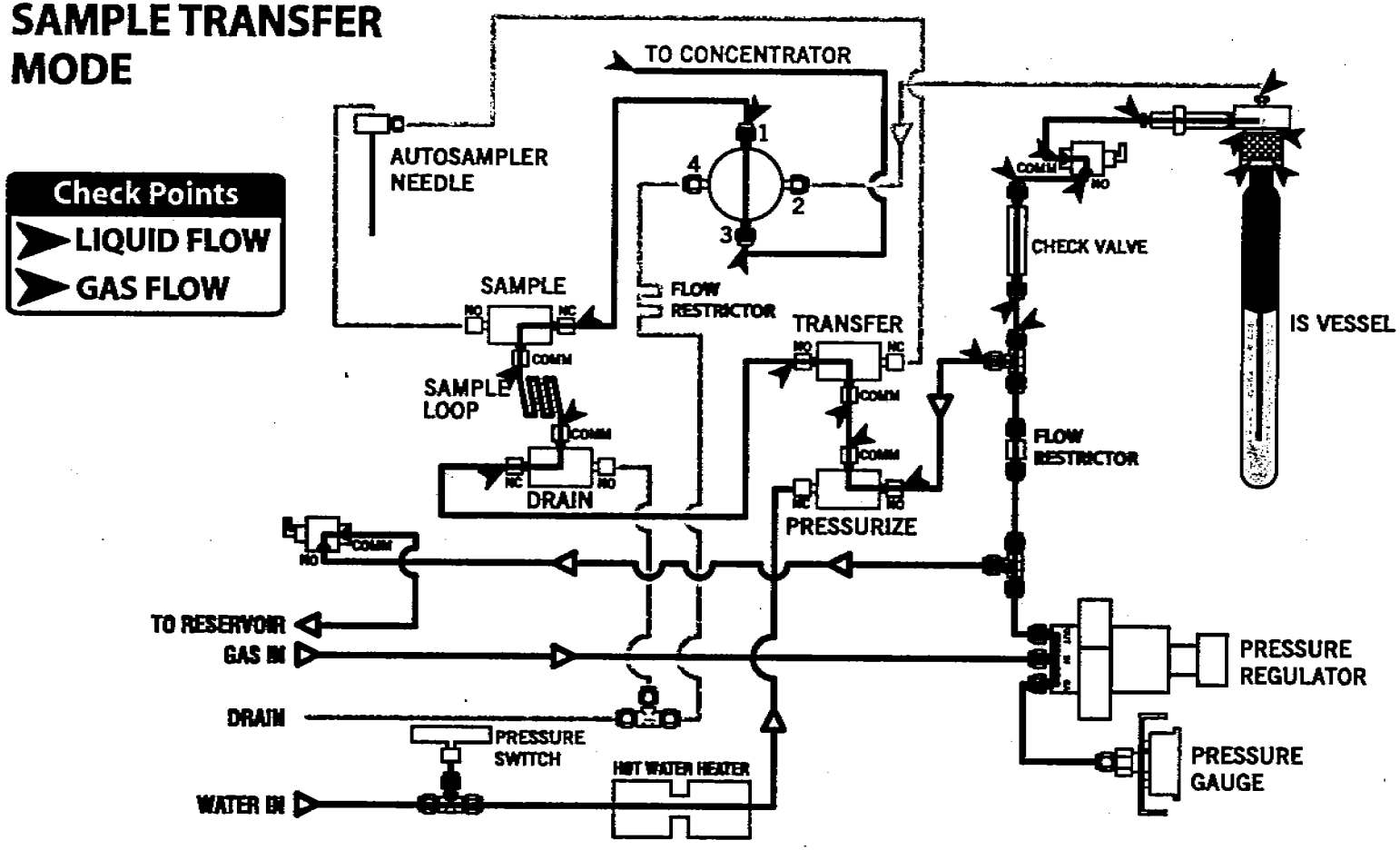


Figure 5.4.2 Gas Flow Rate Check Points; Sample Transfer Mode

GAS FLOW RATE CHECK: PURGE LINES MODE

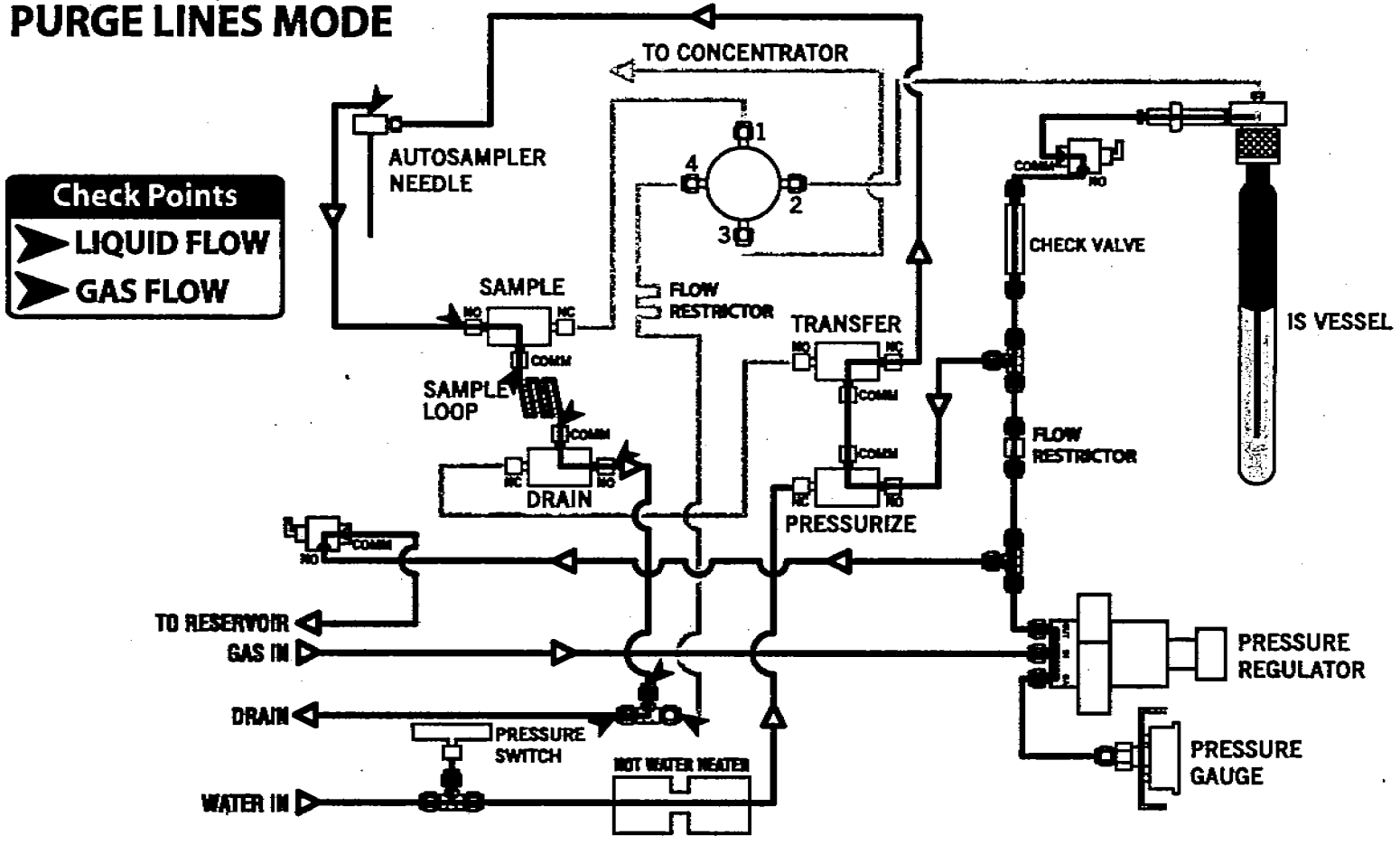


Figure 5.4.3 Gas Flow Rate Check Points; Purge Lines Mode

GAS FLOW RATE CHECK: FILL INTERNAL STANDARD MODE

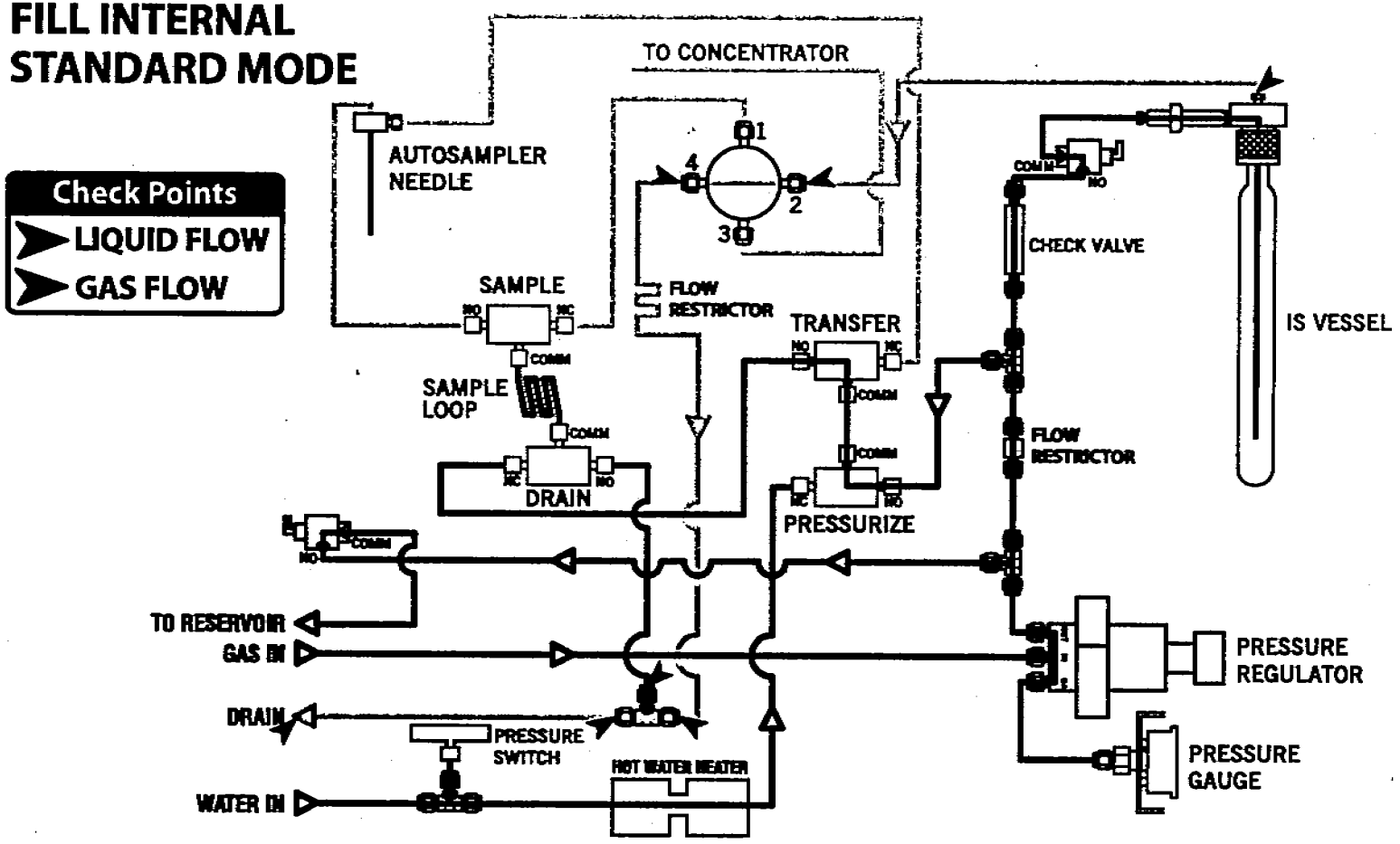
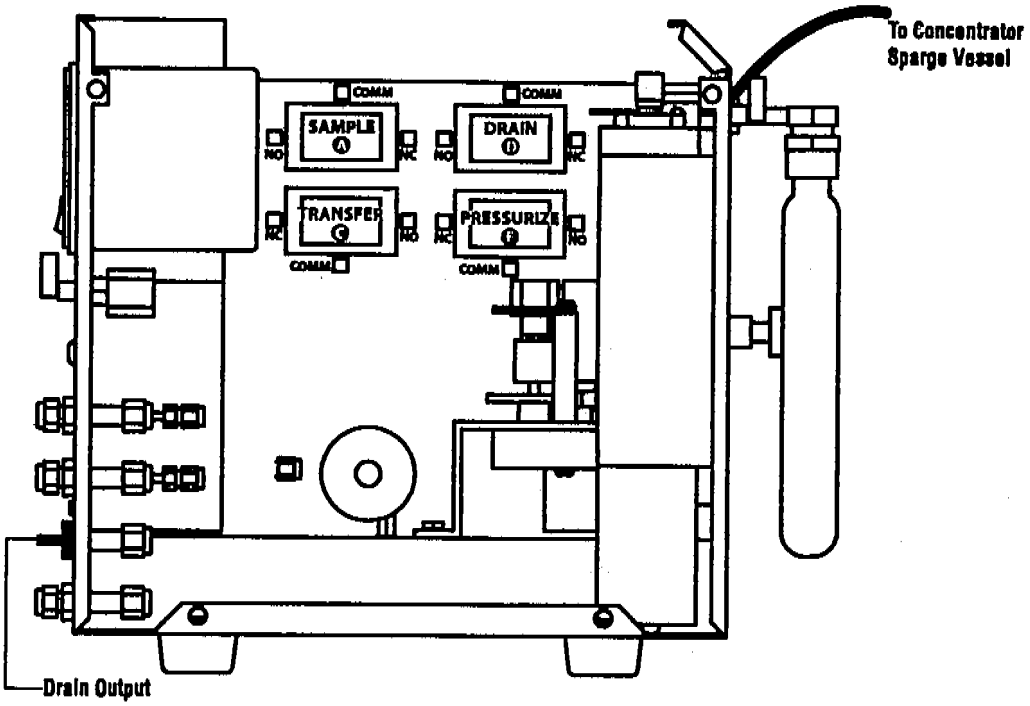
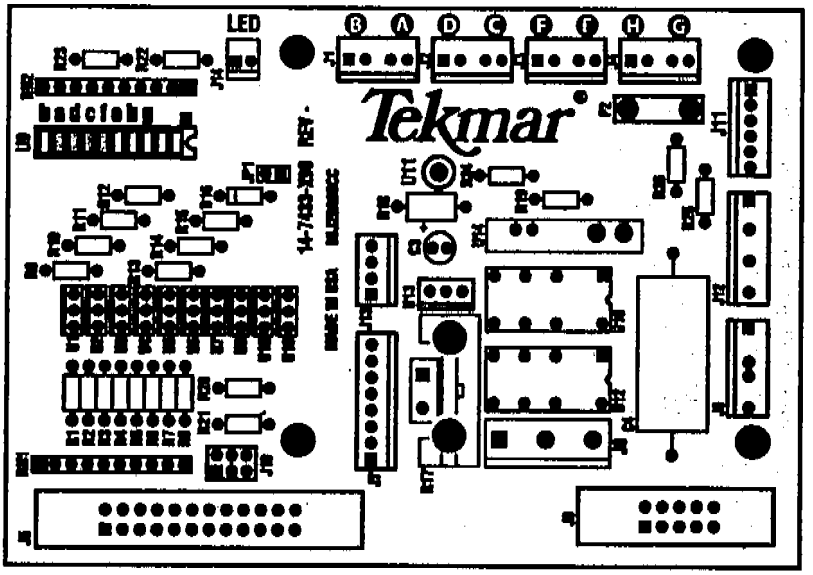


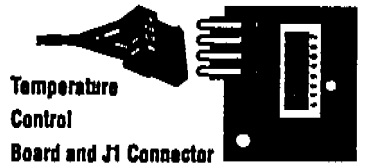
Figure 5.4.4 Gas Flow Rate Check Points; Fill Internal Standard Mode

5.5 H_2O Transfer Problems



Valve Control Board





Temperature Control Board and J1 Connector

5.5.1 Sample Module Solenoid Valves and Corresponding Areas of Valve Control Board

5.6 AQUATek 70 Wiring Diagram

Assembly Description	Reference #
Computer Boards	
Temperature Control Board	7
Valve Control Board	5
Valve Assemblies	
3-Way, Drain Valve	4
3-Way, Pressurize Valve	10
3-Way, Sample Valve	9
3-Way, Transfer Valve	11
4-Port Valve (100/115V or 230V)	1
Cables/Wiring Harnesses	
Cable, 25 Pin, Female	16
Cable, 9 Pin, Male	15
Wiring Harness, (AC)	13
Wiring Harness, (DC)	12
Wiring Harness, Temperature Control Board	14
Electronic Parts	
LED, Square .370 x .270, Yellow	8
Power Entry Module	2
Power Supply, 65W	3
Pressure Switch, 1/8 NPT, 10-100PSI	17
Water Reservoir/Heaters (100/115V or 230V)	6

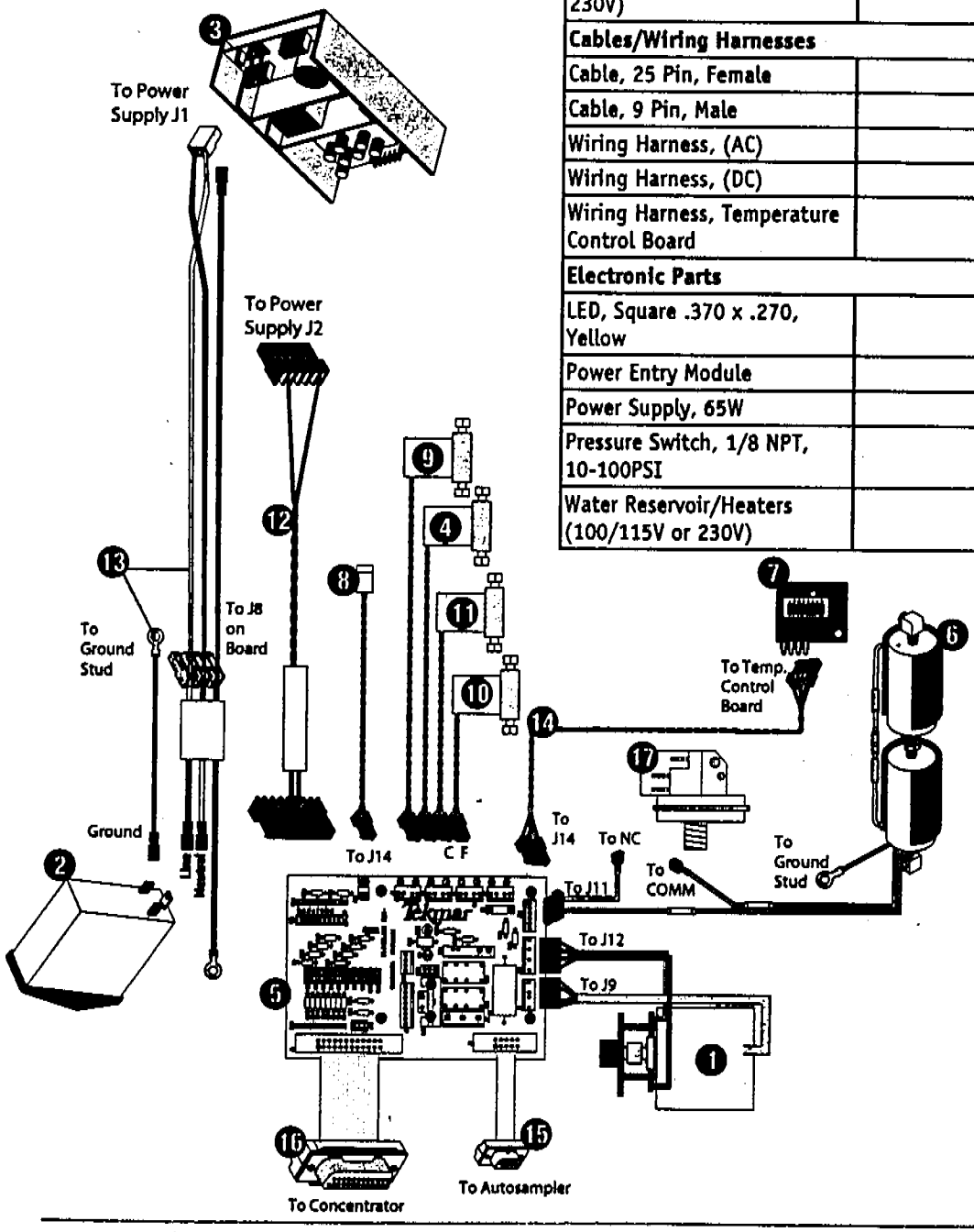


Figure 5.6.1 Electrical Part Assemblies

5.7 Sample Module Part Assemblies

AQUATek 70 Sample Module Mechanical Assemblies

Assembly Description	Reference #
Computer Boards	
Temperature Control Board	1
Valve Control Board	2
Valve Assemblies	
3-Way, Drain Valve	3
3-Way, Pressurize Valve	4
3-Way, Sample Valve	5
3-Way, Transfe r Valve	6
4-Port Valve (100/115V or 230V)	7
Electronic Parts	
Power Entry Module	8
Power Supply, 65W	9
Pressure Switch, 1/8 NPT, 10-100PSI	10
Water Reservoir/Heaters (100/115V or 230V)	11

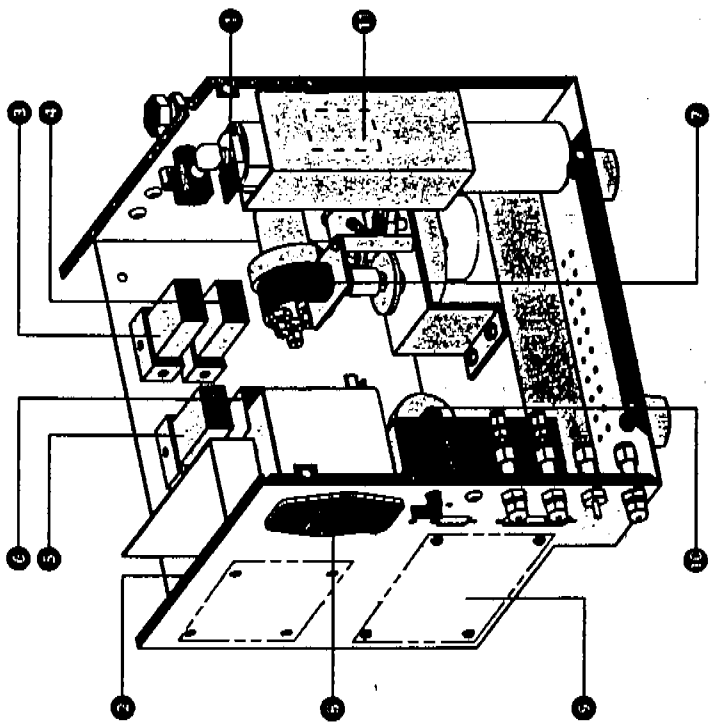
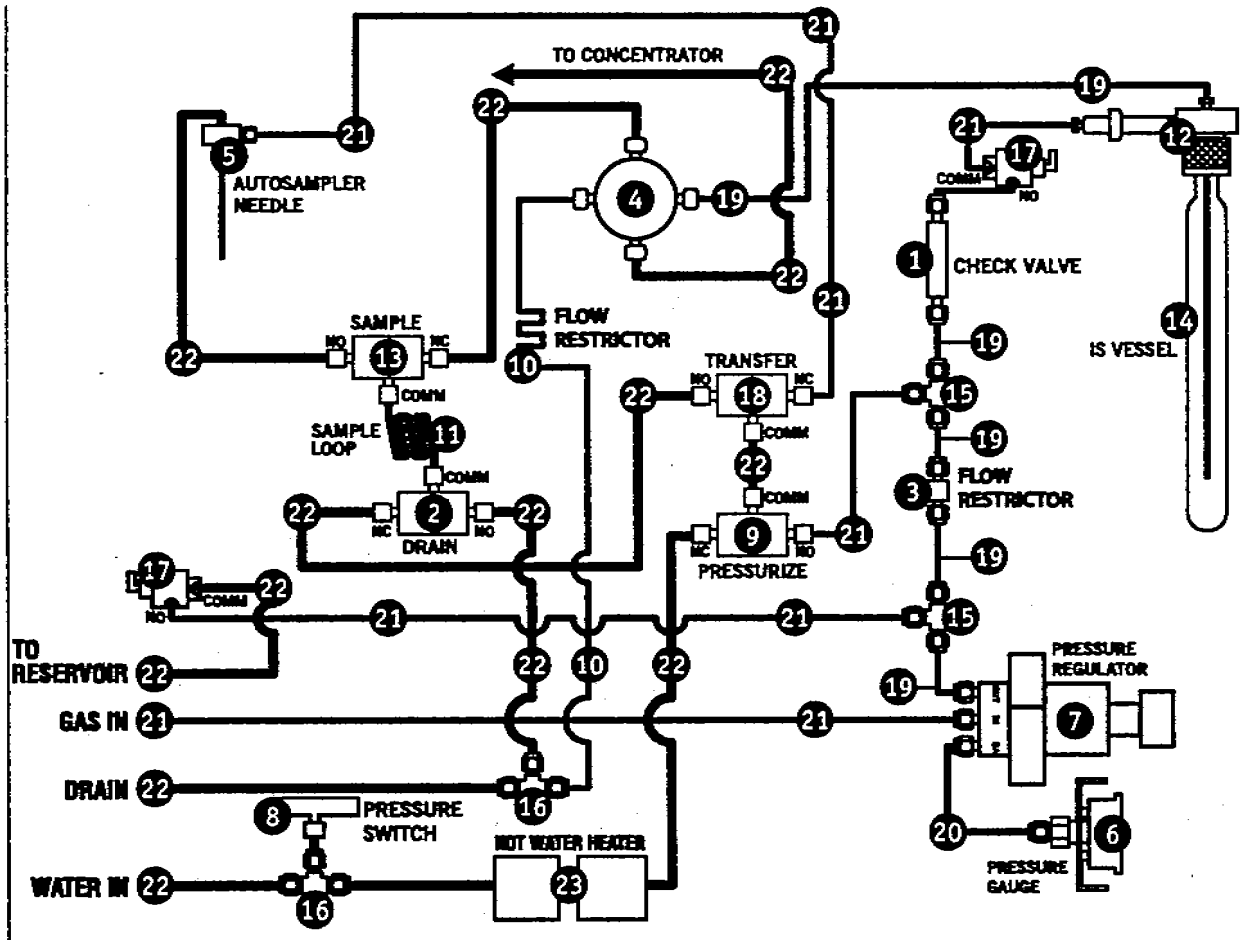
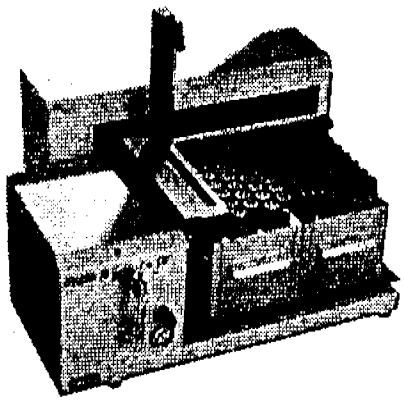


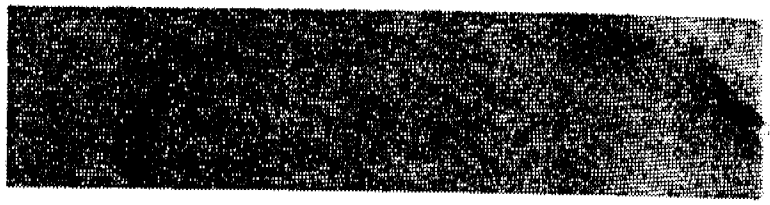
Figure 5.7.1 Sample Module Part Assemblies



Assembly Description	Ref. #
Check Valve	1
Drain Valve, 3-Way	2
Flow Restrictor, Union, 1/16 , 500cc, with Fittings	3
IS Valve, 4-Port (100/115V or 230V)	4
Needle Assembly, Autosampler	5
Pressure Gauge, 0-30 psi	6
Pressure Regulator, Valve, 1/16 Fit, 0-60 psi	7
Pressure Switch, 1/8 NPT, 10-100PSI	8
Pressurize Valve, 3-Way	9
Flow Restrictor, SS Tubing, 1/16 x .004	10
Sample Loop, Teflon (5, 20, or 25 mL)	11
Sample Mount Fitting, 1/2 - 1/16	12
Sample Valve, 3-Way	13
Standard Vessel with UV Coating, 0.330 ID	14
Tee, 1/16 , Brass	15
Tee, 1/8 , Brass	16
Toggle Valve, 3-Way	17
Transfer Valve, 3-Way	18
Tubing, Nickel, 1/16	19
Tubing, Pressure Gauge, 6	20
Tubing, Teflon, 1/16	21
Tubing, Teflon, 1/8	22
Water Reservoir/Heater (100/115V or 230V)	23

Figure 5.8.1 Sample Module Flow Path Assemblies





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