

ChemScan[®]
UV-2150/S
Process Analyzer System

**Installation, Operation
and Maintenance Manual**

UV-2150S TM33 DP 3R Rev 7-24-08

© ASA, Inc. 2007

**Made in USA by ASA, Inc.
Applied Spectrometry Associates, Inc.
2325 Parklawn Drive, Suite I
Waukesha, WI 53186
Phone: 262-717-9500 Fax: 262-717-9530**

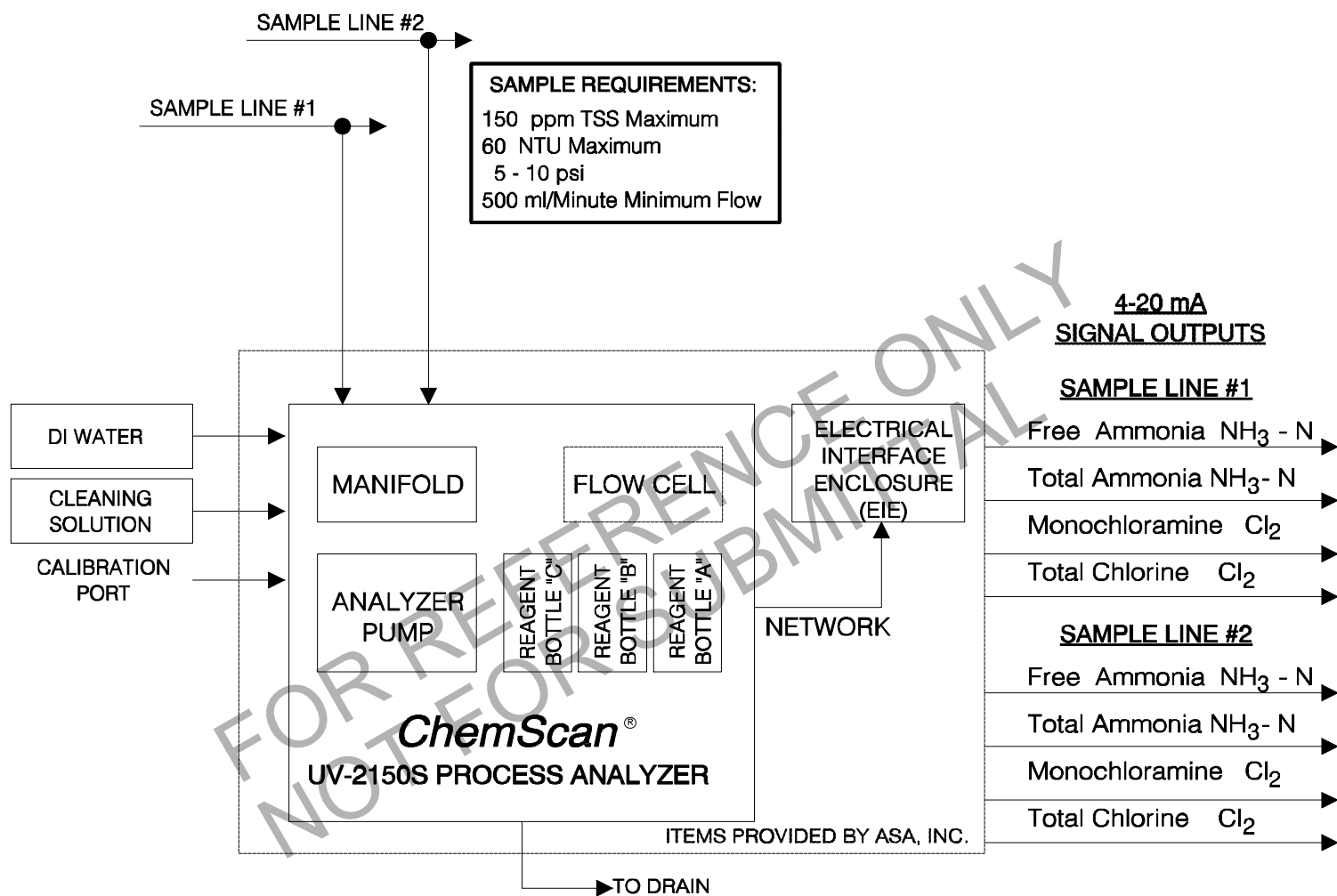
ChemScan.com

Installation and Startup

Analyzer Submittal Drawings

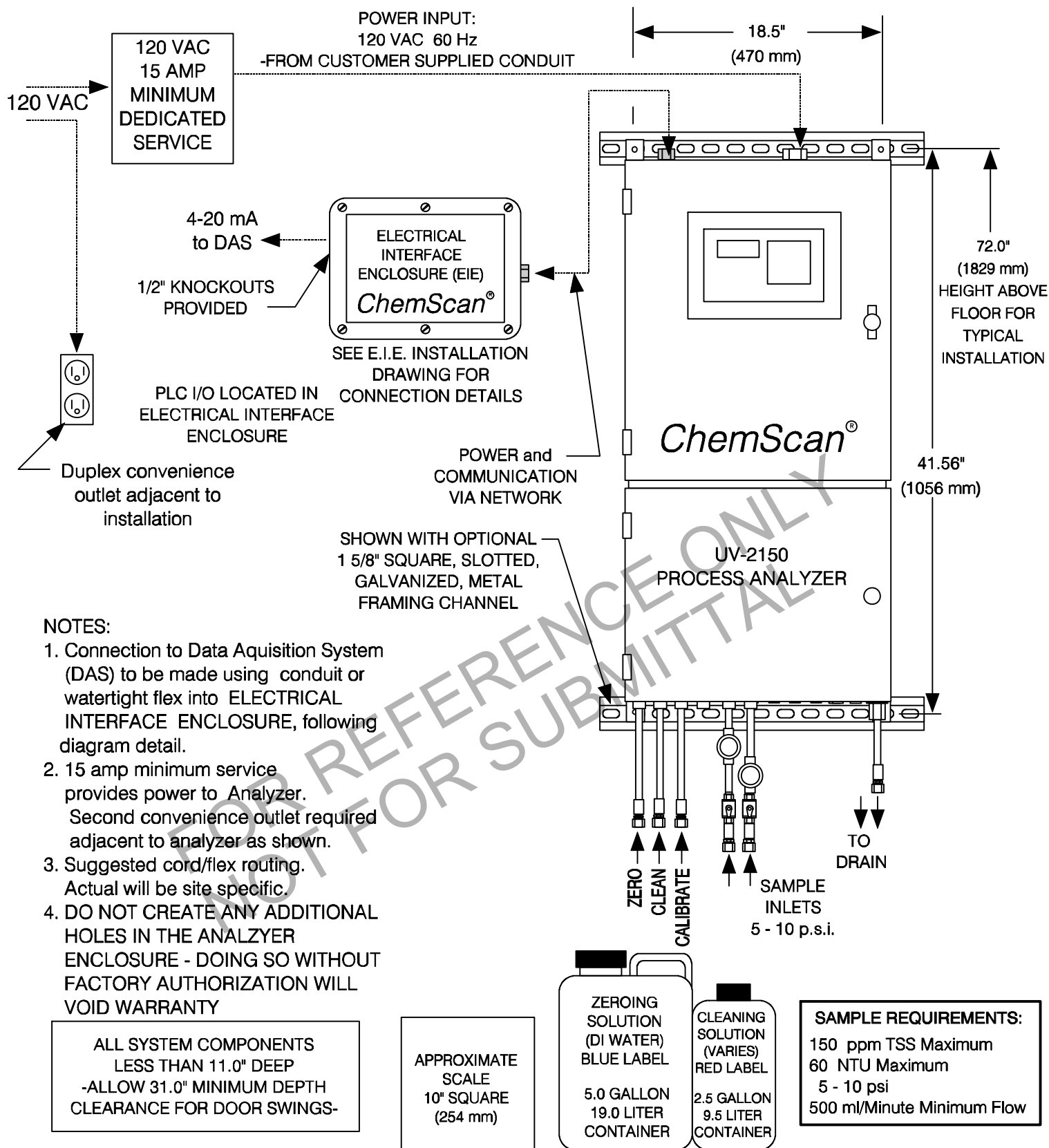
The following is the analyzer portion of the submittal package as approved by your representative. These drawings are to be used as installation directions.

KEY	
—▶	FLUID
—▶	ELEC. SIGNALS
—	ASA, INC. ITEMS



ChemScan®
 Functional Block Diagram of
 Chloramination Monitoring System

ASA, Inc.	PHONE: 262-717-9500
	FAX: 262-717-9530
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DATE: 10/20/06 BY: LJB	
Functional Block Diagram of Chloramination Monitoring System	
FILE # 2150SBDH	



OPEN DRAIN REQUIRED
BELOW SYSTEM
FOR DRAIN TUBES

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UV-2150 Analyzer System Installation Diagram
- Front View, Wall Mount - Dual Inlet

ASA, Inc.

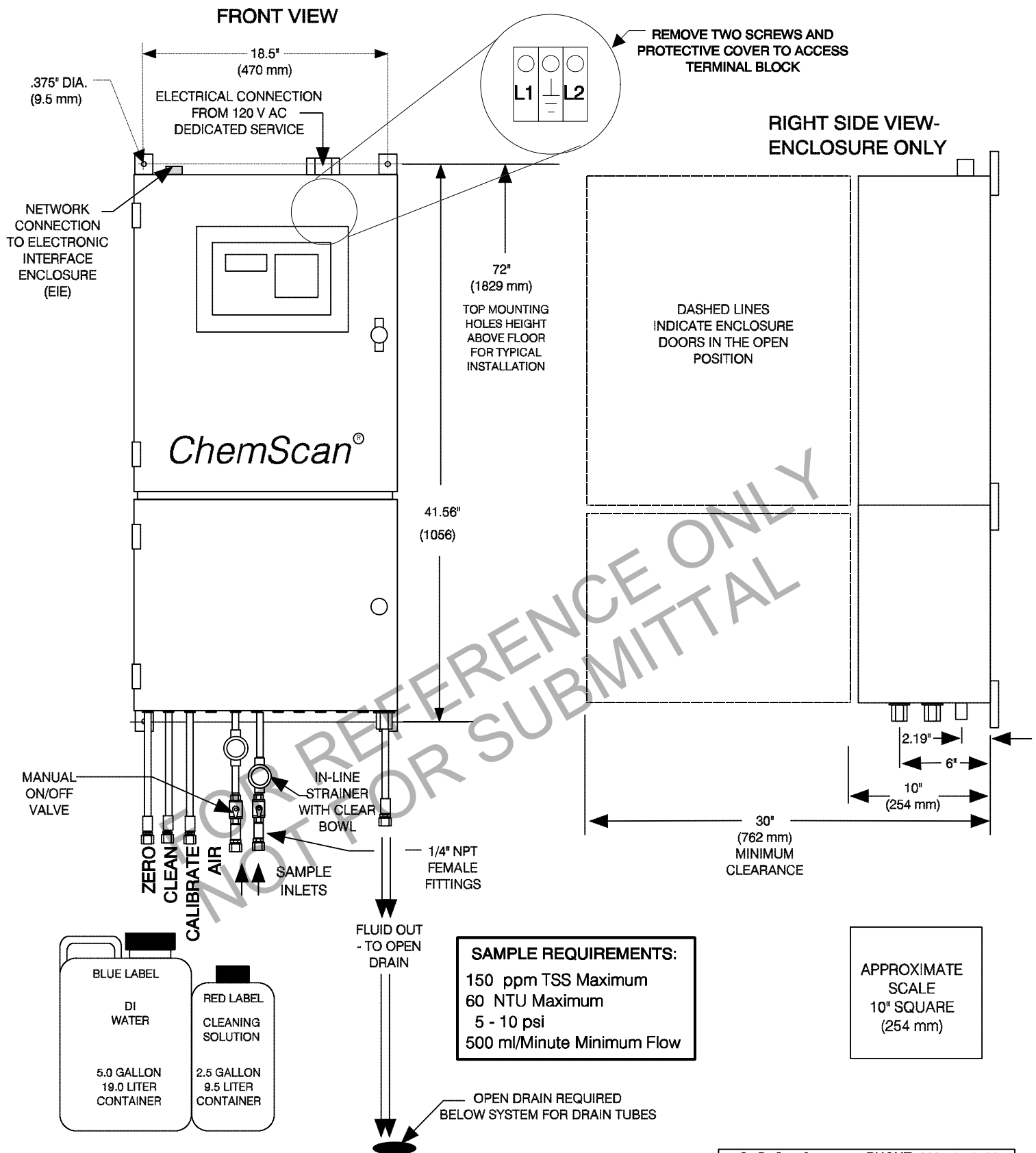
PHONE: 262-717-9500
FAX: 262-717-9530

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DATE: 9/6/06 REV: 1/2/06 BY: LJB

ChemScan UV-2150 Analyzer System
Installation Diagram - Wall - Dual Inlet

FILE # 22CWPC

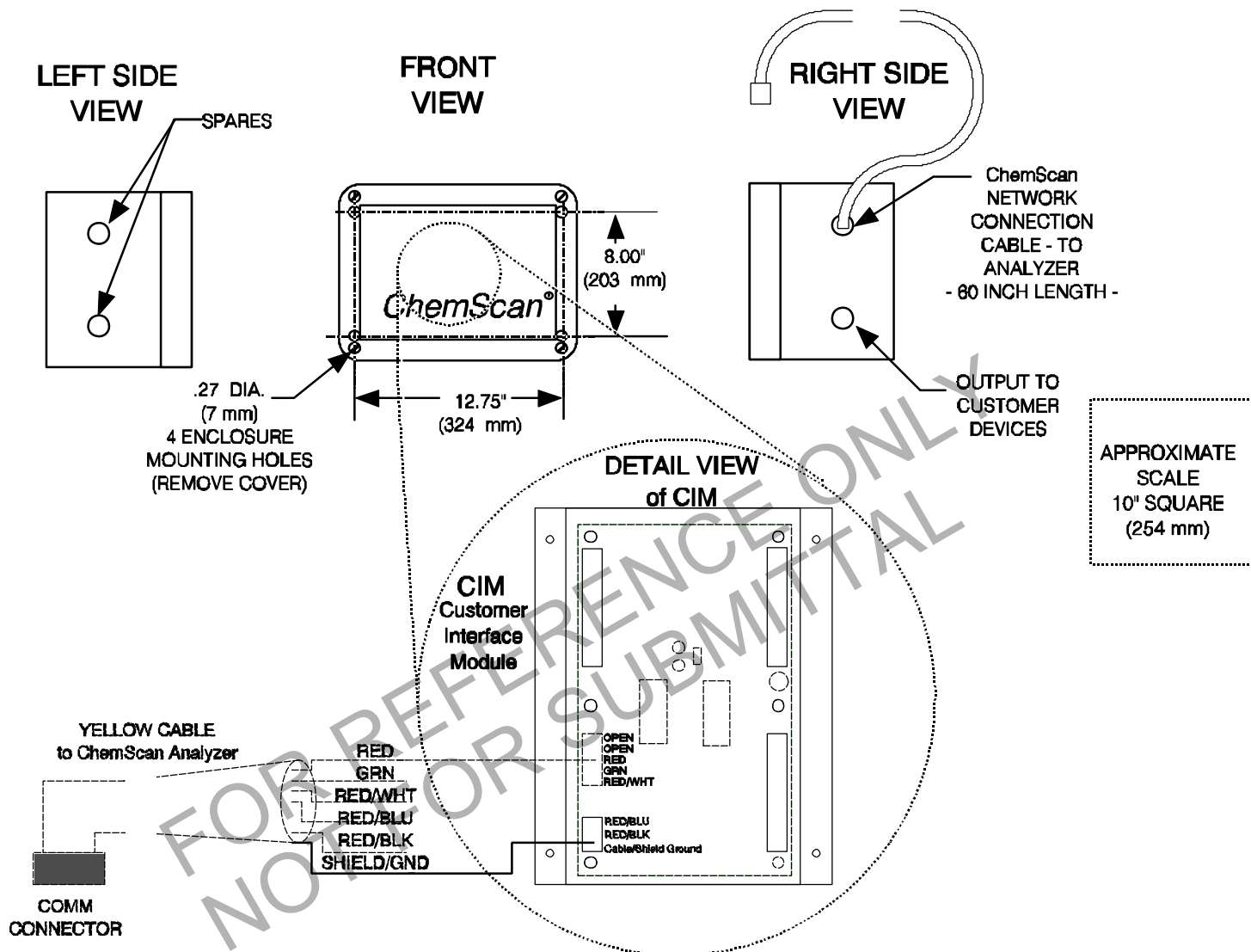


- UV-2150S Series Process Analyzer
- WEIGHT: 125 lbs (56.7 kg)
- DIMENSIONS: 20 x 40 x 10" DEEP, (51 x 102 x 26 cm)
- POWER: 120 V AC 4 AMP

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UV-2150 Analyzer Installation Diagram/
System Plumbing Details with
Auto Zero and Cleaning - Dual Inlet

ASA, Inc.	PHONE: 262-717-9500 FAX: 262-717-9530
Applied Spectrometry Associates, Inc.©'97	
DATE: 8/5/06 REV: 1/2/06 BY: LJB	
ChemScan UV-2150 Process Analyzer Installation Diagram - Dual Inlet	
FILE # 2150S2C	



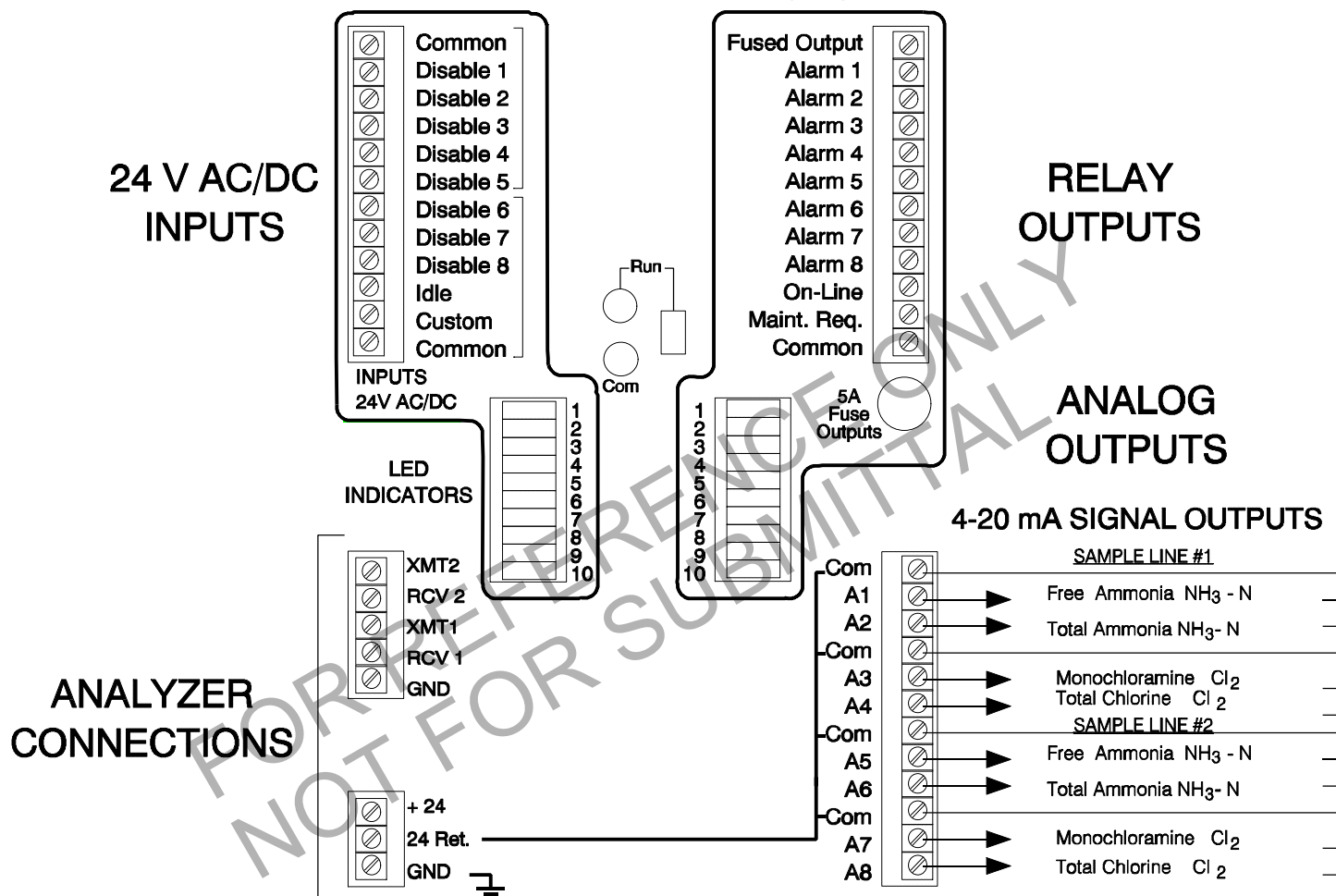
- **ELECTRICAL INTERFACE ENCLOSURE (EIE)**
 WEIGHT: 20 lbs (9.1 kg)
 DIMENSIONS: 14 X 10.5 X 8" DEEP (36 X 27 X 20 cm)
 POWER: (Provided by ChemScan Network Cable)
 ENCL. RATING: NEMA 4
- **ACCESS HOLES PROVIDED, FOR 1/2" SEALTITE HUBS TO BE FIELD INSTALLED FOR 4-20 SIGNALS**

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UV-Series System Electrical Interface Enclosure Installation Diagram

ASA, Inc.	PHONE: 282-717-9500 FAX: 282-717-9530
Applied Spectrometry Associates, Inc. ©'06	
DATE: 9/13/04 REV: 6/6/06 BY: LJB	
UV-Series System Electrical Interface Enclosure - Installation Diagram w/ CIM	
FILE # ELECIMH	

**ASA Inc./ ChemScan Analyzer
Customer Interface Module (CIM)**



UV-Series Electrical Interface Enclosure -
CIM IN/OUT Module Connection Details

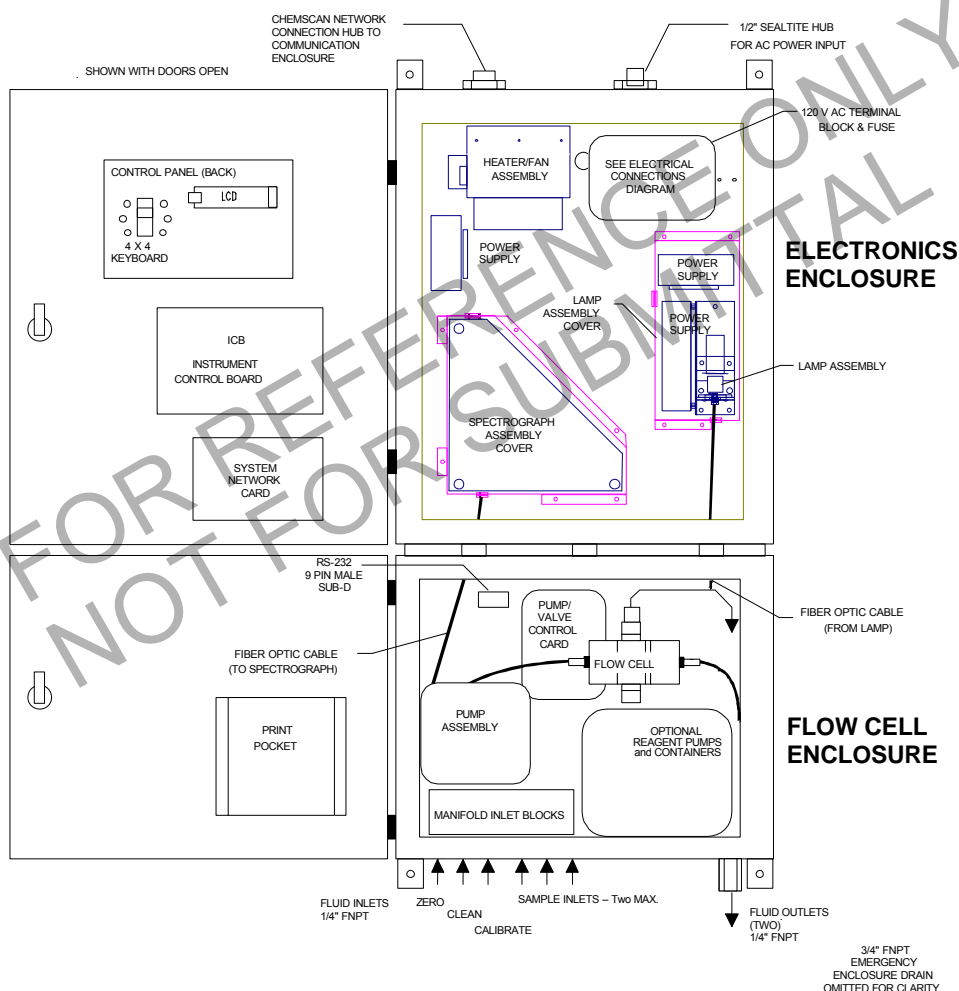
ASA, Inc.	PHONE: 262-717-9500 FAX: 262-717-9530
Applied Spectrometry Associates, Inc.©'04	
DATE: 2/16/06 BY: LJB	
UV-Series Electrical Interface Enclosure - Schematic - Output Module	
FILE # EICIMC8A	

UV-2150/S Series Analyzer

Analyzer Description

The ChemScan UV-2150/S Analyzer is an on-line process-monitoring instrument. It has the capability of measuring multiple parameters including free ammonia, total ammonia, true monochloramine and total chlorine. The precise measurement of these parameters is critical for optimizing today's advanced water treatment processes. The analyzer can perform a complete sample profile faster than any other single analyzer. It has been designed to minimize maintenance time and reagent costs.

The analyzer has a built-in manifold to accept samples from two locations. The analyzer is equipped with automatic zeroing and cleaning capability. Periodically the analyzer will pump zeroing solution into the flow cell. The analyzer tests for the need for cleaning the flowcell and zero stability. Once the diagnostic parameter is satisfied, the analyzer will return to the on-line sequence. If any abnormal operation is detected, the analyzer will alert the operator by displaying a "Maintenance Required" message.



Typical ChemScan UV-2150/S Instrument Layout
Number of Sample Lines and Quantity of Reagent Containers Varies

FILE# TYPLYT05

Menu Structure

The analyzer is equipped with an operator interface consisting of a display and keypad. The operational parameters can be adjusted through the operator interface. NOTE: Whenever a “+” is displayed in the lower right of the display, use the + key to display more menu choices. A complete menu structure table can be found at the end of this section.

The keypad is used to enter numerical values and to select menu choices for the analyzer. There are three main menu paths:

- 1) RUN
- 2) SETUP
- 3) CAL

RUN Menu

The RUN menu is generally used to initiate a sample analysis. Where multiple analytes are measured, the menu will request an analyte line number for read once and read cal sample options.

- 1) READ-ONCE
- 2) ON-LINE
- 3) SAMPLE
- 4) READ CAL SAMPLE

The READ ONCE choice under the RUN menu will instruct the instrument to initiate a reading for a specific analyte (or parameter) chosen and display the results on the LCD display. The analyzer will perform the complete analysis sequence required to measure the selected parameter. The analyte numbering has been configured for your site. The CLEAR key followed by the MAIN MENU key will return the analyzer to the MAIN menu.

The ON-LINE choice will place the system in the automatic mode of operation. Each sample line will be flushed and read in accordance with the intervals entered under the SETUP menu options. To interrupt the on-line mode, press the CLEAR key followed by the security code.

The SAMPLE choice will allow a selected sample line to be flushed for an indefinite interval, controlled by the operator using the + (start flushing) and - (stop flushing) keys. To return to the RUN menu press the CLEAR key.

The READ CAL SAMPLE choice allows the chosen analyte (or parameter) to be analyzed in a sample drawn in through the calibration inlet port. Once the analyte has been chosen the + and - keys are used to draw the sample into the flowcell for analysis. A minimum of 500 ml should be used to insure a complete flush of the cell. Press the ENTER key to initiate the sample analysis. Upon completion of the sample analysis the complete spectral signature is logged in the data log and the concentration is displayed. To return to the RUN menu, press the CLEAR key. If repeat analysis will be performed, be sure to flush the cell for each analysis. A physical sample is typically obtained for laboratory analysis. Once the laboratory sample has been analyzed, the values can be compared and used to make calibration adjustments.

SETUP Menu

The SETUP menu is used to configure the operational parameters used during the operation of the analyzer.

- 1) FLUSH TIME
- 2) TIME 'TWEEN READS
- 3) SECURITY CODE
- 4) AUTO ZERO INTRVL
- 5) ANALYTE INTER
- 6) SET TIME/DATE
- 7) ACCUM TIME
- 8) ALARM SETPOINTS
- 9) PRIME INJECTORS

The FLUSH TIME choice sets the amount of time the sample will be flushed through the flowcell before analysis. The FLUSH TIME of each sample line can be adjusted. FLUSH TIME should be sufficient to insure complete removal of the previous sample. The typical minimum flush time is 60 seconds.

The TIME 'TWEEN READS choice sets the time, in minutes, between each On-Line read event, starting with the first sample line to be read. Sufficient time to read all parameters in all sample lines should be allowed before a new On-Line read event is initiated.

The SECURITY CODE choice allows the operator to select a unique four-digit code. (Default code is 0000.) This code will be the only code, which will permit On-Line operation to be interrupted and provide access to the main menu.

The AUTO ZERO INTRVL option permits the operator to select the number of On-Line read events between each automatic zero event. Frequency of zeroing is site specific and is set to the frequency necessary for stable operations. Typically the interval is set to perform a zero once each day.

The ANALYTE INTER option allows a different sample frequency for each analyte. If all analytes are to be read during each On-Line read event, each analyte interval should have a setting of "01". A setting of "00" will deactivate an analyte. A setting of "02" will cause the analyte to be read during every other On-Line read event.

The SET TIME/DATE choice allows the current time and date to be entered. NOTE: The analyzer may not adjust the time and date at day light savings time or leap year.

The ACCUM TIME choice is used when a filtering system is used with the analyzer. It allows a sample to be accumulated for a period of time before the read sequence begins. If a ChemScan Sample Line Sequencer is installed, the sequencer will control the accumulator and the analyzer's ACCUM TIME must be set to 0.

The ALARM SETPOINTS choice sets a concentration for each analyte where if exceeded, the alarm relay contact will close. Alarm contacts must be specified prior to purchase of the analyzer.

The PRIME INJECTORS option is used to control the operation of the injector pump(s). Select the injector pump to prime and use the + key to start the injector and the - key to stop the injector. NOTE: The injectors are numbered from right to left.

CAL Menu

The CAL Menu is used to perform and test manual zeroing, to pass control of the analyzer to a PC or laptop connected to the serial port or to enter calibration values.

The ZERO menu allows an operator to instruct the instrument to READ ZERO solution (DI water) and automatically make appropriate mathematical adjustments for any film build up on optical surfaces within the system. The operator may initiate an AUTO ZERO cycle or may perform a MANUAL ZERO. The operator may also TEST ZERO using a choice under this Menu option. A full description of zeroing the analyzer can be found in the maintenance section of this manual. The CLEAN option allows the cleaning solution to be manually pumped into the flowcell.

The PC CNTRL choice passes command control from the keypad to a PC or laptop computer connected to the serial port. This is used most often to download the internal data logs from the system.

The ADJ choice allows a calibration adjustment to be entered for each analyte (or parameter). An adjustment can be made to the SLOPE and/or OFFSET of the calibration. When a parameter is measuring consistently high or low as compared to the lab, a simple offset adjustment can often correct the predictions. The calibration adjustment will be applied to all readings from that point on. A complete description of calibration adjustment can be found in the maintenance section of this manual.

MENU STRUCTURE

MAIN

ACTION

-1) RUN

- | | |
|-----------------------------------------------------------------------------|-------------------------------------------|
| -1) READ-ONCE
ENTER ANALYTE # | -READ AN ANALYTE |
| -2) ON-LINE | -PUT SYSTEM ON-LINE |
| -3) SAMPLE
ENTER SAMPLE LINE#
+ TO FLUSH - TO STOP
CLEAR TO RETURN | -FLUSH A SAMPLE LINE |
| -4) READ CAL SAMPLE
ENTER ANALYTE # | -READ AN ANALYTE AND
STORE THE SPECTRA |

-2) SETUP

- | | |
|-------------------------------------------------------------------------------|-----------------------------------------------------------|
| -1) FLUSH TIME
ENTER SAMPLE LINE #
SAMPLE FLUSH TIME
LINE X XX.X SEC | -SET SAMPLE LINE FLUSH
TIME |
| -2) TIME 'TWEEN READS
TIME BETWEEN RUNS
XXX.X MIN | -SET TIME BETWEEN READINGS |
| -3) SECURITY CODE
ENTER SECURITY CODE
SET SECURITY CODE | -MODIFY THE SECURITY CODE |
| -4) AUTOZERO INTRVL
AUTO ZERO/CLEAN
EVERY XX READ(S) | -SET NUMBER OF READINGS
BETWEEN AUTO ZERO AND
CLEAN |
| -5) ANALYTE INTRV
ENTER ANALYTE #
ANALYTE X INTRVL
EVERY XX READ(S) | -SET NUMBER OF READINGS
BETWEEN AN ANALYTE UPDATE |
| -6) SET TIME/DATE | -SET THE CURRENT AND DATE |
| -7) ACCUM TIME | -SET SAMPLE ACCUMULATION
TIME (FILTER SYSTEMS ONLY) |
| -8) ALARM SETPOINT | -SET THE ALARM CONCENTRATION |
| -9) PRIME INJECTOR | -OPERATION INJECTOR PUMPS |

-3) CAL

- | | |
|--------------------------------------|-----------------------------------------------------------|
| -1) ZERO | |
| -1) READ ZERO | |
| -1) AUTO ZERO | -INVOKE AUTO ZERO |
| -2) MANUAL ZERO | -INVOKE MANUAL ZERO |
| ZERO: + FLUSH-STOP
ENTER TO READ | |
| -2) TEST ZERO | |
| TEST: + FLUSH-STOP
ENTER TO READ | -TEST ZERO BY READING
ZEROING SOLUTION AGAIN |
| -3) CLEAN | |
| + FLUSH - STOP
CLEAR TO RETURN | -CLEAN FLOW CELL WITH
THE CLEANING SOLUTION |
| -2) PC CNTRL | |
| PRESS ENTER TO GIVE
CONTROL TO PC | -PASS CONTROL TO THE PC
FOR DATA ACCESS |
| -3) ADJ | |
| ENTER ANALYTE # | |
| 1) SLOPE 2) OFFSET | -ADJUST THE SLOPE AND
INTERCEPT FOR FUTURE
READINGS |

Analyzer Maintenance

The analyzer has been design to minimize the total amount of maintenance time. Typically the analyzer requires less than 2 hours of maintenance per month.

Maintenance Schedule

Routine maintenance of the UV-2150/S series analyzer is limited to a few periodic procedures as follows:

Daily

- Observe operation looking for abnormal operation

Weekly

- Fill Zeroing and Cleaning solution containers.
- Inspect and clean Inlet Strainers

Monthly

- Replace the Reagent Chemicals
- Perform a Calibration Verification and Adjustment
- Perform Manual Zero Operation and Log Indicator Numbers

Every 2 Years

- Replace Battery
- Replace Flash Lamp

Maintenance Procedures

The following pages are procedures describing the routine maintenance operations.

Interrupting On-Line Operation

To interrupt on-line operation the "Clear" key is pressed. The following message will appear:

ENTER SECURITY CODE
—

Enter the 4-digit security code followed by the ENTER key. Press the MAIN MENU key to return the Main Menu. If an invalid security code is entered or if the entry of the code takes longer than 30 seconds, the following message will be displayed for 5 seconds:

INVALID SECURITY CODE

Sample Line Screens

The sample lines connected to the manifold are equipped with small mesh screens to prevent the entry of large particles and debris into the system. These screens must be periodically cleaned or replaced.

To clean the strainers, INTERRUPT on-line mode and close the sample line valve. Unscrew the strainer bowl and remove the screen. If algae is growing on the screen clean it with a bleach solution. Rinse the screen and bowl thoroughly with tap water. Install the screen into the strainer bowl. Be sure the o-ring is installed and screw the bowl onto the housing. Open the sample line valve and look for leaks.

If the analyzer is equipped with a sample circulation chamber, remove and clean the inlet strainer with a mild bleach solution. Rinse the strainer thoroughly and return it to the circulation chamber.

After all strainers have been cleaned, return the analyzer to the on-line mode.

Reagent Replacement

Periodically the reagents must be replenished. This time period depends on the number of sample lines and time between reading cycles. Whenever possible the replenishment period has been setup to correspond to an even week interval. Always replace the chemicals do not simply add reagent to the existing container. This will assure the analyzer is operating using a fresh reagent all the time.

- 1) Interrupt the On-Line mode as described above.
- 2) Without lifting the reagent container, unscrew the reagent cap. The reagent tube connector has been designed to allow the cap to spin without the tubing rotating.
- 3) Carefully lift and slide the used reagent container out of the analyzer enclosure.
- 4) Cap the used reagent container.
- 5) Unscrew the replacement reagent container cap and carefully raise the reagent container onto the tube.
- 6) While holding the reagent bottle screw the on the cap.
- 7) Slide the reagent bottle into the analyzer enclosure and tighten the cap.
- 8) If the previous reagent container has been emptied or the previous reagent is in question prime the injectors using the following steps.

From the MAIN MENU, press 2 for SETUP. The SETUP MENU will be displayed:

SETUP: _ 1) FLUSH
2) TIME "TWEEN RUNS +

Press the "+" key to display more options. Keep press the "+" key until the 9th option is displayed.

8) SET ALARM LEVELS
9) PRIME INJECTORS

Press 9 for PRIME INJECTORS.

PRIME INJECTOR #:_

Enter the injector number to be tested.

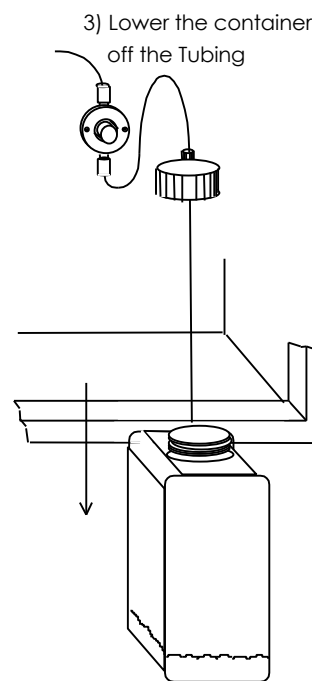
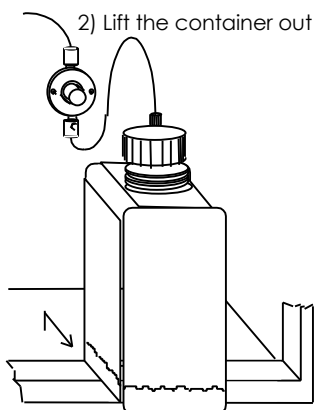
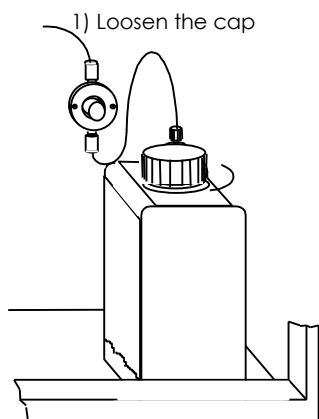
PRIME _: +starts
-stops, C QUITs

Press the "+" key to begin the injector operation. The injector will continue to operate until the "-" key or "CLEAR" key is pressed.

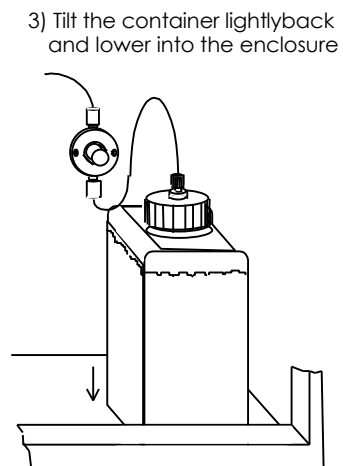
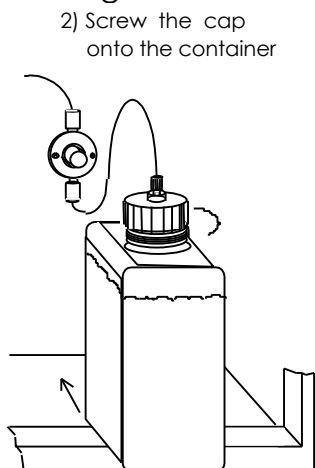
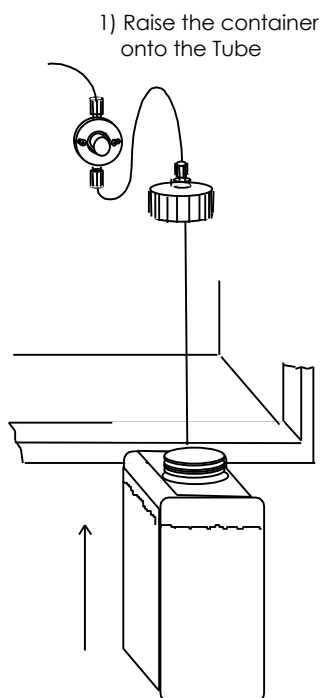
- 9) Return the unused portion of the reagent to the lab for proper disposal.

Reagent Replacement

Removing the Container



Installing the



4) Check reagent tube connector tightness on pump

5) Prime the injector (if necessary)

4100TST4

Manual Instrument Zeroing Procedure

The ChemScan UV-2150/S Series Analyzer must be zeroed occasionally to correct for drift and flow cell fouling. The analyzer will automatically perform a zero on a regular basis (typically daily). However it is important to periodically perform a Manual Zero Operation to track the indicator numbers. This procedure simply involves rinsing the flow cell with deionized water, initiating a zero reading and testing the zero.

Items Required:

1 gallon of deionized water

Interrupt on-line mode:

Press the CLEAR key on the keypad. The following message will appear:

ENTER SECURITY CODE

—

Enter 0000 or the current security code followed by the MAIN MENU key and the Main Menu will be displayed:

MAIN: _ 1) RUN
2) SETUP 3) CAL

Instrument Zeroing:

On the instrument keypad, press 3 for CAL. The CAL MENU will be displayed:

CAL: _ 1) ZERO
2) PC CNTRL 3) OFFSET

Press 1 for ZERO. The following will be displayed:

ZERO: 1) READ ZERO
2) TEST ZERO 3) CLEAN

Press 1 for READ ZERO. The following message will be displayed:

READ ZERO: 1) AUTO
2) MANUAL ZERO

Selection of 1) AUTO will cause the system to immediately initiate an auto zero cycle. The instrument will automatically flush with DI water, take a reading, compare the values to certain set points, determine if cleaning is necessary, auto clean, re-zero and re-test.

Selection of 2) MANUAL ZERO will require the operator to manage the zeroing procedure and to interpret the indicator results.

Press 2 for MANUAL ZERO. The following message will be displayed:

ZERO: + FLUSH - STOP
ENTER TO READ

Using the + key to begin flushing the deionized water. Allow the water to flush for 2 minutes and press the - key to stop flushing. Press ENTER to take the reading. The instrument will read the deionized water and store the reading as a zero.

Checking the zero:

Following the reading of the zero, the ZERO MENU will be displayed.

ZERO: 1) READ ZERO
2) TEST ZERO

Press 2 for TEST ZERO. The following will be displayed:

TEST: + FLUSH - STOP
ENTER TO READ

Using the + and - keys to control the pump, allow deionized water to flush for 8-10 seconds. Press the ENTER key to initiate the reading. Following the reading the READ ONCE RESULTS will be displayed. Record the concentration values in the log. Press the 2 key on the keypad. Record the values for:

MX	AV
MN	TL

Press the 3 key on the keypad. Record the values for:

230	424
248	448

Press CLEAR and MAIN MENU to return to the MAIN MENU.

If the MX value is greater than 0.005 or if the MN value is less than -0.005 repeat the Zeroing procedure.
If the 230 or 248 values are less than 2500, the flow cell should be chemically cleaned.

Returning to on-line mode:

From the MAIN MENU, press 1 for RUN. The RUN MENU will be displayed:

RUN_: 1) READ-ONCE
2) ON-LINE 3) SAMPLE +

Press 2 for ON-LINE. The instrument is now in the ON-LINE MODE.

Instrument Zeroing:

Zero the instrument using the MANUAL INSTRUMENT ZEROING PROCEDURE.

Following the zeroing procedure, note the 230 and 248 values. If they are less than 2500, the FLOW CELL must be disassembled and cleaned.

Returning to On-Line Mode:

From the MAIN MENU, press 1 for RUN. The RUN MENU will be displayed:

RUN_: 1) READ-ONCE
2) ON-LINE 3) SAMPLE +

Press 2 for ON-LINE. The instrument is now in the ON-LINE MODE.

Mechanical Cleaning Procedure

Occasionally the automatic cleaning of the flow cell will not remove enough of the fouling on the flow cell windows. If the analyzer readings are erratic or the chemical cleaning solution is being consumed more rapidly than normal, perform the MANUAL ZEROING PROCEDURE. If the 230 and 248 values are below the specified range, perform a mechanical cleaning.

Items needed

One #2 Phillips screw driver.

One wide mouth liquid container 50 - 100 ml.

One box of laboratory lens wipes.

One gallon of deionized water for zeroing.

Flushing the Flow Cell

From the MAIN MENU, press 3 for CAL. The CAL MENU will be displayed:

CAL: _ 1) ZERO
2) PC CNTRL 3) OFFSET

Press 1 for ZERO. The following will be displayed:

ZERO: 1) READ ZERO
2) TEST ZERO 3) CLEAN

Press 2 for TEST ZERO. The following will be displayed:

TEST: + FLUSH - STOP
ENTER TO READ

Using the + and - keys to control the pump, allow deionized water to flush for 60 seconds. Press the - key to stop the flow. Press the CLEAR key followed by the MAIN MENU key to return to the Main Menu.

Removing the Flow Cell Assembly

- 1) Hold a small container under the flow cell sample inlet fitting. Loosen the fitting and capture the deionized water into the container. Remove the tubing from the fitting.
- 2) Remove the tubing from the top of the flow cell.
- 3) Remove the thumb screw securing the injector tubing harness.
- 4) Remove the injector fittings in the front of the flow cell by unscrewing the brown colored fittings.
Note: Take care not to drip the reagents on your skin. They are acid or caustic solutions.
- 5) Remove the remaining thumb screw securing the flow cell.
- 6) Carefully remove the flow cell assembly by sliding it out the front of the flow cell mount.

Disassembling and Cleaning the Flow Cell Assembly

- 1) Remove the two screws mounting the flow cell to the cover plate.
- 2) Remove the four window plate mounting screws.
- 3) Clean the windows using laboratory lens wipes dipped in water or cleaning solution.
- 4) Wipe the windows and flow cell completely dry.

Assembling and Mounting the Flow Cell Assembly

- 1) Mount the window plates to the flow cell body with the larger window against the o-rings and the cover plate mounting holes facing the same direction as the injector ports. Be sure the o-ring is installed and fully compressed.
- 2) Wipe the outside of the flow cell.
- 3) Mount the cover plate to the window plates.
- 4) Carefully slide the flow cell into the flow cell mount and secure using the upper thumb screw.
- 5) Screw the injector tubes into the injector ports.
- 6) Screw in the thumb screw securing the injector tube harness.
- 7) Attach the fluid tubing and tighten the fittings.

Testing the Flow Cell Assembly

- 1) Perform the MANUAL ZEROING PROCEDURE.

Following the zeroing procedure, note the 230 and 248 values. If they are less than 2500, call ChemScan Service for further instructions.

Battery Replacement

The Lithium Battery on the ICB is used to hold the nonvolatile memory when the power is removed from the analyzer. It is very critical that the battery not get too low, as the analyzer configuration will be lost upon power down. Therefore the battery should be checked / replaced every two years.

Test:

- 1) Open the Electronics Enclosure door. LEAVE THE POWER ON THE ANALYZER.
- 2) Measure the voltage across the battery located on the circuit board on the door of the upper enclosure.
- 3) If the battery voltage is less than 3.3 VDC, replace it.

Replacement:

- 1) LEAVE THE POWER ON THE ANALYZER.
- 2) Note the polarity of the installed battery and remove it by pulling it straight out.
- 3) Find the polarity markings on the replacement battery, with the + on the top, insert the replacement battery. Be sure it is completely seated in the battery holder.
- 4) Verify the voltage of the new battery (3.3 VDC Minimum) by measuring on the contacts of the battery holder. Double-check the polarity

NOTE: If the battery is not installed properly or fails and the A. C. power to the analyzer is disconnected or interrupted, the following will occur:

When the A. C. power is restored to the analyzer, the display will read: "RAM DATA RESET" or something other than "MAIN MENU" when the "MAIN MENU" key is pressed.

Properly install a new battery and reinstall the analyzer configuration software. (Refer to prior instructions provided by ASA personnel or call ASA, Inc. for the details on this procedure.)

Reagent Injector Pump Test and Replacement

The reagent injector pump provides a small volume of reagent to the flowcell to aid the analyzer in measurement of certain parameters. The injector pump is a piston style pump, which delivers 0.1 ml per stroke. On each analysis the analyzer performs a verification of the reagent volume. If the analyzer detects an incorrect volume of reagent in the cell, it will display a message "SCU READ ERROR" following the reading. If the analyzer detects an incorrect volume of reagent in the cell for three consecutive readings, it will disable the parameter, set the parameter's output to maximum of range and display the message "MAINTENANCE REQUIRED". The parameter is enabled any time the on-line mode is interrupted.

Items needed:

One #2 Phillips screw driver.

One small flat bladed screwdriver.

One wide mouth liquid container 50 - 100 ml.

One 5 - 10 ml graduated cylinder (if needed)

One injector pump (if needed)

Testing an Injector Pump

Injector Back Flow Test

The injector pumps are design to prevent ANY back flow through the pump. Back flow is when solution from the flowcell flows back through the pump and into the reagent container. This is a rare but possible failure to the pump due to wear or if particulate has gotten into the reagent. To test for injector back-flow perform the following procedure.

- 1) Remove the reagent container from the analyzer lower enclosure.
- 2) Rest the reagent tube on the lip of the lower enclosure where the end of the tube is resting so that if a drop would form it would be suspended at the end of the tube.
- 3) Allow the tube to rest for at 20 - 30 minutes. Watch for drops forming at the end of the tube.
- 4) If drops are forming and dripping off the end of the tube in the 30 minute time period, double check the tightness of the reagent tube at the injector. If the reagent continues to drip, replace the injector pump and reagent. If no drops are formed or the droplet does not grow over the 30 minute time period, the injector does not have a back flow problem.

Injection Volume Test

The injector pumps have been calibrated at the factory to provide approximately 0.05 ml per injection stroke. The injection volume can be verified using the following steps:

- 1) Flushing the Flow Cell

From the MAIN MENU, press 3 for CAL. The CAL MENU will be displayed:

CAL: _ 1) ZERO
2) PC CNTRL 3) OFFSET

Press 1 for ZERO. The following will be displayed:

ZERO: 1) READ ZERO
2) TEST ZERO 3) CLEAN

Press 2 for TEST ZERO. The following will be displayed:

TEST: + FLUSH – STOP
ENTER TO READ

Using the + and - keys to control the pump, allow deionized water to flush for 60 seconds. Press the - key to stop the flow. Press the CLEAR key followed by the MAIN MENU key to return to the Main Menu.

2) Hold a small container under the flow cell sample inlet fitting. Loosen the fitting and capture the deionized water into the container. Remove the tubing from the fitting.

NOTE: The reagent may be an acid or base. Use normal precautions while handling reagents.

3) Trace the injector tube from the injector to be tested to the flow cell. Remove the injector tube fitting from the flow cell.

NOTE: Typically the injectors do not lose calibration. It is more likely the injector is not injecting at all. Therefore it may not be critical to measure the injection volume but to verify the reagent is being injected.

4) Place the injector tube into a 5 - 10 ml graduated cylinder.

5) Initiate the injector:

From the MAIN MENU, press 2 for SETUP. The SETUP MENU will be displayed:

SETUP: _ 1) FLUSH
2) TIME "TWEEN RUNS +

Press the "+" key to display more options. Keep pressing the "+" key until the 9th option is displayed.

8) SET ALARM LEVELS
9) PRIME INJECTORS

Press 9 for PRIME INJECTORS.

PRIME INJECTOR #: _

Enter the injector number to be tested.

PRIME _ : +starts
-stops, C QUITs

Press the "+" key to begin the injector operation. The injector will continue to operate until the "-" key or "CLEAR" key is pressed.

6) If the volume is being tested, count the injections. Since the injector will deliver 0.05 ml per injection, 50 injections will provide approximately 2.5 ml.

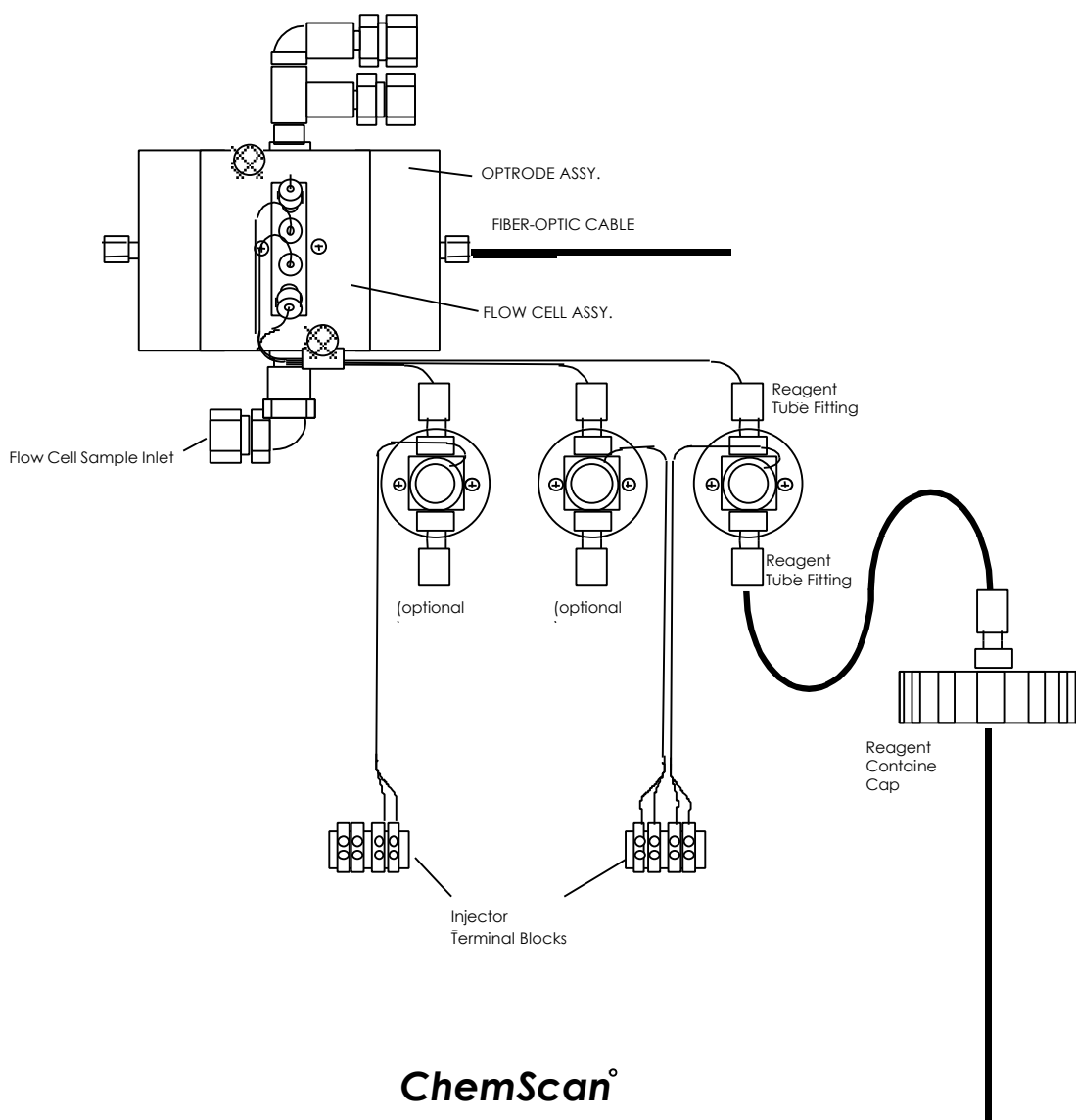
7) If the injector pump is not clicking every 1-2 seconds, check the voltage at the injector terminal strip. The voltage should be 20 - 24 VAC each time the injector is energized. If the voltage is not present, the valve and pump control board may be faulty. Disconnect the pump wires and test again. If the voltage returns, the pump is faulty and must be replaced.

If the injector is not providing adequate volume, replace the injector pump. If the injector is providing the appropriate volume, install the injector pump tube into the flow cell.

Replacing an Injector Pump

If an injector pump has failed the back flow test, the volume test or has malfunctioned in some other way, it is faster and more efficient to replace the injector rather than attempting to repair it. It is a good idea to have one spare injector pump for each analyzer installed. The follow procedure describes the steps to replace an injector pump.

- 1) Flush the flow cell with DI water as describe step 1) of the above *Injection Volume Test* procedure. Then empty the flow cell as described in step 2) of the above *Injection Volume Test* procedure.
- 2) Turn the power to the analyzer off.
- 3) Remove the reagent tubing from the top and bottom of the injector. Allow the reagent to flow back into the reagent container.
- 4) Remove all of the reagent containers from the analyzer lower enclosure. NOTE: The reagents may contain acidic or caustic. Take precautions while handling the open reagent containers. Always cap the open reagent containers before removing them from the enclosure.
- 5) Remove the injector wires by using a small flat bladed screwdriver to loosen the terminal screws.
- 6) Remove the two mounting screws and remove the injector. NOTE: Take precautions not to come in contact with the reagent contained in the injection pump.
- 7) Install the replacement injector by reversing the above steps. Be sure the reagent tubes are tight. Loose fittings will cause a reagent leak or an air leak causing insufficient reagent to be delivered to the flow cell.



ChemScan[®]

Injector Pump Components

410NINJ2

Replacing a Manifold Valve

The manifold valves are 24VAC solenoid operated valves. These valves are controlled by the Valve and Pump Control Board. When energized, the red indicator in the valve connector is lit and the valve opens.

Testing Valve Operation

Each of the valves can be operated manually through menu choices except the air valve. To test the operation of the a valve in question, see the *MENU STRUCTURE* section

<u>Valve</u>	<u>Procedure</u>
Zero Valve	TEST ZERO
Clean Valve	MANUAL CHEMICAL CLEAN
Cal. Valve	READ CAL SAMPLE
Line 1	RUN - SAMPLE (LINE 1)
Line 2	RUN - SAMPLE (LINE 2)
Air Valve	Observe during READ ONCE

If the red indicator light comes on but the valve does not “click”, the valve is faulty and must be replaced. If the red indicator light does not come on when energized, check the voltage at the valve and pump control board.

Testing Flow Through the Valve

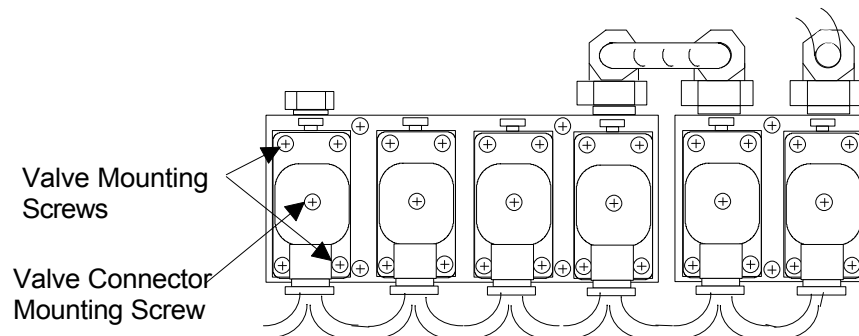
To test the flow through the valve manually, press the manual bypass button on the top of the valve. This button can be locked in the pressed position by turning the button 90 degrees while pressing it down.

NOTE: Do not leave the button in the locked position for normal operation. This will greatly affect the analyzer results.

Valve Replacement

To remove a valve, the flow off to the sample line, loosen the valve connector mounting screw and slide the connector off. NOTE: DO NOT REMOVE THE RED MARKED VALVE ALIGNMENT SCREWS. Remove the two valve mounting screws and remove the valve.

To install the replacement valve mount the valve using the same mounting screws. NOTE: Be sure the three o-rings are in place before mounting the valve. Tighten the valve mounting screws so that the o-rings are fully compressed and the valve is bottomed out on the manifold block. Slide the valve connector and gasket on. Tighten the connector screw.



Replacing the Analyzer Pump

The analyzer pump is 24VDC diaphragm style pump. It has been selected to minimize maintenance time and parts costs associated with other types of pumps.

Testing Pump Operation

The pump can be operated by using the TEST ZERO procedure. From the TEST ZERO menu, the pump can be operated using the +/- keys.

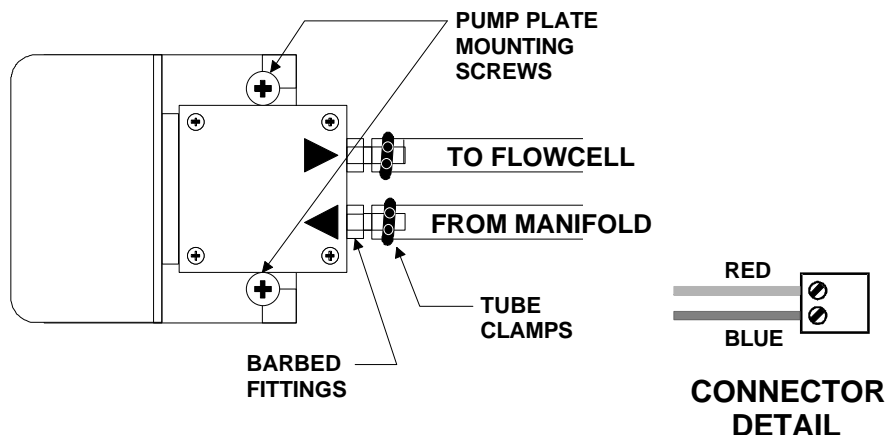
The pump flow can be tested by timing the filling of a 500 ml sample bottle. If the 500 ml bottle is filled within 70 seconds the pump is providing adequate flow to the cell.

If the sample is not pumped at an adequate rate or the pump does not turn at all, test the voltage at the valve and pump control board. The voltage should be 20-25 VDC.

Pump Replacement

Remove AC power from the analyzer. Remove the four Phillips head screws from the cover of the Valve/Pump Driver Card Box to access the pump power connector. **Note** the wire polarity; disconnect the two-conductor plug from the circuit board. The pump can now be replaced by removing the pump tubes and the two pump plate mounting screws indicated in the following figure. It is usually easiest to remove the two pump tubes by cutting the two pump tubes as close to the pump inlet fittings as possible. **Note** the inlet and outlet arrows on the pump and the location of the tubes.

Remove the pump from the small gray PVC pump plate by removing the two small Phillips head screws under the plate. Install the new pump on the plate in the reverse manner. Mount the new pump/plate assembly in the same location. The tubes should have sufficient length to reconnect to the barbed fittings to the new pump. Connect the wires with the correct polarity. Return power to the analyzer.



Long Term Shut-Down Procedure

Occasionally the analyzer may need to be taken out of service for an extended period of time. If the analyzer will be out of operation for a period greater than 2-3 days, perform the following procedure to insure a more trouble free startup.

- 1) Interrupt the On-line Mode as by pressing the CLEAR key followed by the security code, then the ENTER key.
- 2) If your analyzer uses reagents, remove and cover the reagents from the lower enclosure and cover
- 3) Flush the injector pumps
 - a) Place the injector inlet tubes into a small container of distilled or deionized water.
 - b) From the Main Menu, select 2 for Setup.
 - c) From the Setup Menu, select 9 for Prime Injectors.
 - d) Select 1 for the first injector and press the + key to begin flushing the tubing and pump. Allow the pump to operate for 2 minutes then press the – key to stop the injector.
 - e) Repeat steps “a” through “d” for the remaining injector pumps.
 - f) Return to the Main Menu.
 - g) To flush the Flow-Cell with Zeroing Solution, select 3 for Cal, 1 for Zero then 2 for Test Zero. Press the + key to begin flushing. Allow the cell to flush for 2 minutes then press the – key to stop the pump. Press the CLEAR key followed by the MAIN MENU key.

At this time the ChemScan unit can rest idle in the MAIN MENU. If power will be removed from the analyzer for an extend period of time, verify the battery voltage before removing power. If the analyzer will be moved please call ChemScan Service for further instructions.

Analyzer Self-Diagnostics and Error Messages

MAINTENANCE REQUIRED message:

The UV-2150/S series analyzer performs an autozero each day. As the deionized water is measured, the light intensity values are monitored. If the light intensity values fall below the preset value, the system will attempt to chemically clean the flow cell. This process will be repeated up to 3 times. If the intensity values are still too low, the MAINTENANCE REQUIRED message will be flashed on the display along with the analyte concentrations. The flow cell will need to be mechanically cleaned to rectify the problem.

The analyzer also monitors the UV absorbance spectrum on each reading. If the spectrum is abnormal for three readings in a row, the analyte will be disabled the concentration value will be set to the maximum and the message MAINTENANCE REQUIRED will be displayed. A typical cause for abnormal spectrum is a plugged sample line, empty reagent container or a malfunctioning injector pump.

Whenever the message MAINTENANCE REQUIRED is displayed or an analyte has been disabled, first perform a MANUAL ZERO PROCEDURE. If required, manually clean the flowcell. If the of the flow cell passes the test zero specifications, verify sample flow through each sample line and verify injector pump operation.

The analyzer is continually monitoring the internal network status. If a network problem is detected, the message NETWORK ERROR will be displayed. The system has been programmed to reinitialize the network if an error is detected. If the message continues to be displayed and operation appears abnormal, call ASA, Inc. to report the operational conditions when the problem occurred.

The analyzer monitors the memory configuration each time the system is powered. If it detects a problem in the memory, the message "RAM DATA RESET" will be display and all the configuration data will be set to the factory defaults. If this occurs, reload the analyzer using the supplied configuration diskette.

ChemScan®
Service Information and Replacement Parts List

Analyzer Service and Parts Provided By:
Applied Spectrometry Associates, Inc.
Manufactures of ChemScan Process Analyzers

Contact:

ASA, Inc.
2325 Parklawn Drive, Suite i
Waukesha WI 53186

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