



ChemLogic® CL4 & CL8

Continuous Gas Detector User Manual

[Manual version for serial #'s in the 10000's]

© DOD Technologies, Inc.
675 Industrial Drive Bldg. A.
Cary, IL 60013
Phone: 815.788.5200
DODtec.com

EC DECLARATION OF CONFORMITY
EU DECLARATION OF CONFORMITY

DOD TECHNOLOGIES INC.
675 Industrial Drive – Bldg. A
Cary, IL 60013
USA

Name and address of the company established in European Community and authorized to compile the Technical File:

ACC – Services Contact
78 Allee Primavera
Centre Ubidoca 2402
74370 Annecy
France

DOD TECHNOLOGIES INC. declares under our sole responsibility that the product described as:

Equipment Name: ChemLogic
Equipment Description: Continuous Gas Monitor
Model: CL4/CL8
Serial number(s): _____

Complies with the requirements of the following European Directives:

Low Voltage Directive 2014/35/EU
Electromagnetic Compatibility Directive 2014/30/EU.
RoHS Directive 2011/65/EU and amendment (EU) 2015/863.

Main standards considered :

EN 61010-1: 2010+A1:2019.
EN 61326-1:2013.
EN IEC 63000: 2018.

Name of authorized company representative:

Mr. Danny O'Donnell
Chief Technical Officer and Co-CEO
DOD Technologies, INC



Date: 09/01/21
At: Cary, Illinois USA

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Chapter 1 – Overview

1.1 Introduction

WARNING:

Operation of the ChemLogic® CL4/CL8 continuous gas detection system without a manual in the native language in its country of operation is illegal. A translated copy of the manual should be requested immediately from DOD Technologies and before installation of the device. Failure to do so may result in severe injury.

Contact:

Phone: +1 815-788-5200

DODtec.com

The ChemLogic CL4 & CL8 continuous gas detection systems should be used exclusively for the quick detection of toxic, corrosive, and asphyxiant gases for process measurement and personnel safety purposes. Failure to comply with the intended purpose of the device may result in injury or death.

DOD Technologies' ChemLogic CL4/CL8 simultaneously monitors eight locations (*called points*) for toxic and corrosive gases. It responds to gases that exceed a programmed alarm level by:

- Triggering visual alarms that warn of high or low concentrations
- Triggering relays or activating analog outputs to external devices
- Displaying the point number, gas type, and gas concentration
- Recording the alarm information and storing it in memory

The CL4/CL8 triggers relays for each individual point for two levels of gas concentrations. These programmable limits are factory-set at 1 TLV and 2 TLV for their respective gases.

Each point may be up to 300 feet (91.44 m) from the CL4/CL8 location. This allows operators to monitor gas concentrations in an area removed from the location where gas may actually be leaking.

The CL4/CL8 provides a fast response to a wide range of gases. It was designed for maximum uptime, so routine maintenance and service can be performed quickly and easily.

The CL4/CL8 uses a ChemLogic cassette comprised of specially formulated paper tape that records gas stains for fast and accurate results.

1.2 Sampling and Monitoring

The system draws sample flow simultaneously from all eight points. Part of the sample flow is diverted across the ChemLogic tape. All 4 or 8 channels exhaust through a single port. The ChemLogic CL4/CL8 continuous gas detection system operates at a noise level below 70 dB(A) and does not require hearing protection for operation or work within close proximity. Workplace environments outside the ChemLogic CL4/CL8 system may still require hearing protection. Please consult your safety officer for your recommended safety protocols.

1.3 Flow Connections

Flow connections consist of “quick-connect” ports on the top or side of the CL4/CL8 UNIT. There are eight inlets, one for each monitored point, and an exhaust outlet.

1.4 Electrical Connections

“Knockout panels” for external electrical connections are provided on the top or right side of the CL4/CL8. The covers are exchangeable to provide top or right-side flexibility.

1.5 Theory of operation

The system draws sample flow simultaneously from all four/eight points. Part of the sample flow is diverted across the ChemLogic Cassette. The ChemLogic CL4/CL8 uses an advanced optical detection system to measure the light level reflected from the ChemLogic tape. As the target gas is detected, the color of the of the ChemLogic tape changes. This color change results in a loss of reflected light across the ChemLogic tape. This loss of reflected light is detected by the advanced optics system in the ChemLogic CL4/CL8. It will then report an appropriate gas concentration reading and/or a gas alarm.

1.6 Time Weighted Average (TWA)

During analysis the CL4/CL8 stores the TWA information every 8 hours* (referred to as a ‘cycle’). The system retains the 5 most recent cycles in memory and will save all cycles to the CUSB Memory Stick – if installed. The number of cycles capable of being stored on the USB Memory Stick is only limited by the size of the USB Memory Stick.

***NOTE:** If analysis is stopped by the operator or due to any other factor (critical service fault, power interruption, etc.), the TWA information is saved as a separate cycle regardless of how much time has elapsed since the cycle started.

Chapter 2 – Features

2.1 External Layout

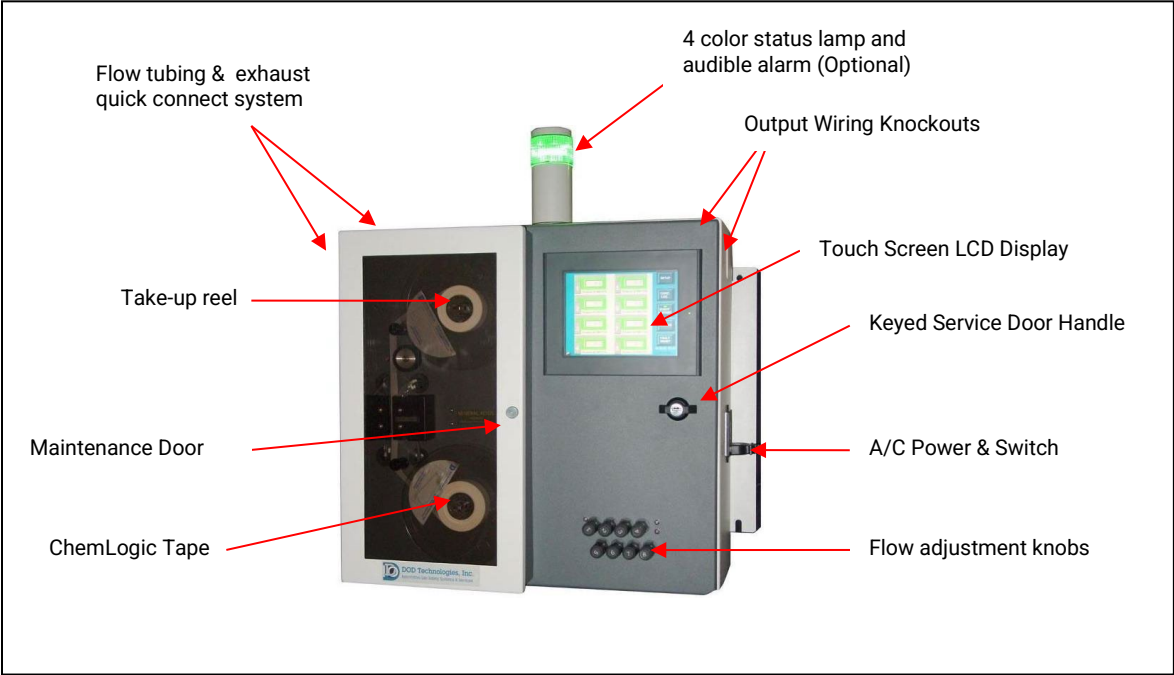







Figure 2.1

2.1.1 Warning Labels, Descriptions, & Danger Zones

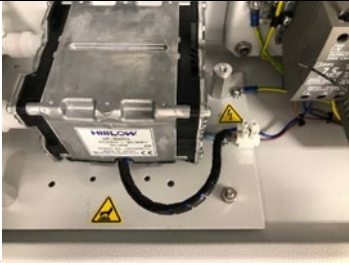


The below table references all warning labels and their meanings that may be encountered while operating and servicing the ChemLogic® CL4/CL8 continuous gas detection equipment.

	<p><u>WARNING:</u></p> <p>Hot Surface. This surface will be hot to touch and may cause injury. Please avoid or take caution when working near this zone.</p>
	<p><u>WARNING:</u></p> <p>Protective Earth Ground. Terminal Intended for connection to external conductor for protection against electric shock in case of fault.</p>
	<p><u>ATTENTION:</u></p> <p>Please read operators manual for all instruction for this machine. If manual is not in country's native language, requested updated manual before use of equipment.</p>

	<p>WARNING: Electric Shock is possible, please use caution when accessing this zone.</p>
	<p>WARNING: Moving Parts and Hand Crushing possible. Please watch hand placement when working near this zone.</p>

2.1.2 ChemLogic® CL4/CL8 Danger Zones

Please be aware of the following danger zones on the ChemLogic CL4/CL8 continuous gas detection equipment. Each zone contains warning labels for operator safety. Label meanings/descriptions can be found in the table above.

<p>A</p> 	<p>This danger zone is in the service access point of the unit. Users should be aware of hot surfaces and electrical shock.</p>
<p>B</p> 	<p>This danger zone is located on the gate assembly. During operation, operators could pinch fingers if not aware of hand placement.</p>
<p>C</p> 	<p>This danger zone is located on the right exterior of the unit. This area warns of electrical shock areas within the service door of the machine.</p>

2.1.3 Status Lamp (OPTIONAL)

The optional status lamp consists of 4 colored lights – Red, Orange, Blue, and Green along with an audible alarm. See Appendix A for ordering information.

2.1.4 Output Wiring Knockouts

There are two knockouts available for output wiring located on the top panel near the right side and on the right-side panel near the top.

2.1.5 Touch Screen Display

The CL4/CL8 uses a full-color touch panel LCD display. All menus and data entry are accomplished by touching the appropriate area of the screen – see Chapter 5 “Basic Operation”.

2.1.6 Keyed Service Door Access

The door uses a key lock to restrict internal access. See Section 2.3 for detailed information on the service area.

2.1.7 A/C Power & Switch

A/C power is connected on the right-side panel with a standard cable. The on/off power switch is located adjacent to the power cable connection.

2.1.8 Flow Adjustment

Flow adjustments for all 4/8 points are located on the front panel. Refer to Section 5.2.d regarding flow adjustment.

2.1.9 ChemLogic® Cassettes

ChemLogic Cassettes are accessed by opening the maintenance door. Refer to Section 6.3 regarding tape installation/replacement.

2.1.10 Maintenance door

The maintenance door allows easy access to the ChemLogic Cassette for installation and replacement.

IMPORTANT: The maintenance door should remain closed and latched except when changing the ChemLogic Cassette. Do not open the door while in Analysis Mode.

2.1.11 Take-Up Reel

An empty take-up reel is inserted at the same time the ChemLogic® Cassette is installed (see Section 6.3). During installation the previous take-up reel which is full is removed from CL4/CL8 and discarded. The previous ChemLogic Cassette reel which is now empty should then be used as the next take-up reel.

2.1.12 Tubing Connections

Sample tubing and exhaust use a quick connection system for simple installation. The connections may be made on either the top or left side of the CL4/CL8. See Section 3.3 for information on connecting the sample and exhaust tubing. See also Appendix C for essential information on transport times for gas from sampling point to the CL4/CL8.

IMPORTANT: End of line filters are required at all times on each channel – see Section 6.2.

2.2 Maintenance Area

The maintenance area allows easy access for changing ChemLogic Cassettes in the CL4/CL8. Figure 2.2 shows the internal layout with the access panel open. See Section 3.5 for cassette installation.



Figure 2.2

2.3 Internal Layout – Service Area

Internal access to the CL4/CL8 for installation and service uses the keyed handle located on the right side of the front panel. Figure 2.3 shows the internal layout of the CL4/CL8 with the service door open.



DANGER: Turn off the unit and disconnect the A/C power to the unit before opening the Service Door.

The door should be opened by trained service personnel (See Section 6.2)

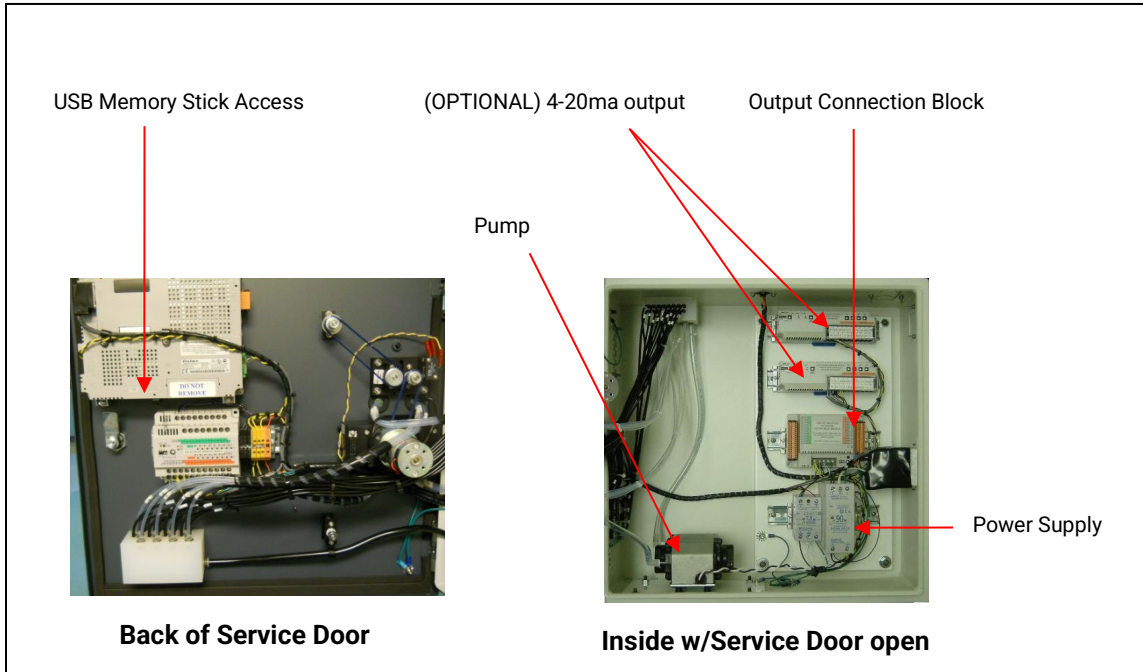


Figure 2.3

2.4 Password Security

Access to many of the features is controlled through password protection which is entered through the screen displayed in Figure 2.4.

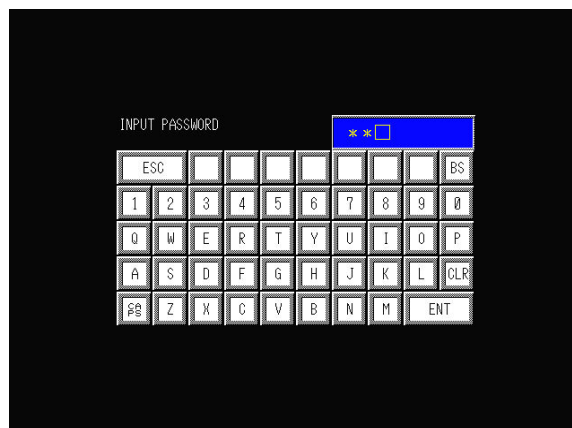


Figure 2.4

Whenever someone attempts to access a screen that is password protected, the screen shown in Figure 2.2 will appear (see important note below). Several of the setup & configuration screens of the CL4/CL8 require entry of an administrative password. Factory service screens require the entry of a service password.

IMPORTANT: Once a password is entered it remains active for 2 minutes after entry so that it does not need to be repeatedly entered when switching between screens. Please remember that anyone using the touch screen may access restricted screen locations during this time if the machine is left unattended.

NOTE: If you forget or lose your Administrative Password, please contact DOD Technologies. See Chapter 7 for contact information.

2.5 USB Memory Stick

The CL4/CL8 uses a USB Memory Stick to store historical information including concentration logging, event history, configuration information, and TWA data. The use of higher speed USB Memory Stick (2x, etc.) may not be compatible with the CL4/CL8. USB Memory Sticks may be purchased through DOD Technologies – see Appendix A.

Chapter 3 – Installation

3.1 Selecting a location

The CL4/CL8 should be placed in a location as central as possible to the locations being monitored while considering the following restrictions:

- The maximum sample line length is 300 ft. Using the shortest possible sample line length will reduce transport times and increase the response time of the CL4/CL8.
(see Appendix C)
- A/C power is required to the unit.
- Locate near proper ventilation keeping in mind the maximum length of the exhaust tubing is 25ft.
- The CL4/CL8 requires stable temperature and humidity levels within range to operate properly.

Recommendations

Do not place it in a location that will expose the CL4/CL8 to moisture, dust, corrosive gas, or any unusual environmental conditions that could damage the unit and/or cause it to operate inaccurately.

3.1.1 Lifting Instructions

It is recommended that installation of this unit requires the help of 3 individuals. Two individuals should lift the unit into its desired location while the third person secures the device into a mounted position. If the device must be manually handled, follow the following steps each time:

1. Size up the Load

- Check if the weight of the object is listed on it
- If not, push, pull, gently kick or rock the object to be moved before you attempt to move it – get a feel for its weight, size and shape
- Check whether the weight is evenly distributed
- Recognize what your own limits are and stick to these limits

Ensure the area is clear

- Work out where the load is going
- Ensure that your intended pathway is clear and free of obstacles
- Make sure that your vision will not be blocked when moving large objects

Position your feet correctly

- Place your feet a comfortable distance apart (shoulder width). A broader base of support increases stability. With a narrow base of support with your feet too close together, you are more likely to lose your balance.
- Point your feet in the direction that you intend to travel
- Always turn with your feet, not your hips or shoulders. Never twist as you move or go to lift!

Get as close to the load as possible

- Walk over to the load – don't stand still and reach for it

Maintain the normal curves in your spine You need to try and work in your power zone – above your knees and below the shoulders

- Keep the back straight and the head looking up
- Half bend the knees and use your leg muscles
- Bend forward at the waist
- Stick your bottom out
- Bend your back as little as possible Keep your head looking up, not down
- Put weight down through your heels, not the toes

Use the correct grip

- Have a firm grip by using the palms and the base of the fingers Don't just use your fingertips as this can cause strain on the hands, wrists and forearms

Lift Smoothly

- Grip the load firmly and hold it close to your body. Keep the heaviest side closest to your body.
- Brace' (tighten) your stomach muscles. Remember to breathe out when you lift. However, remember that bracing the stomach muscles does not mean 'holding your breath'.
- Thrust with the legs - Use the leg muscles to move the load (quadriceps and gluteal muscles).
- They are much bigger and stronger than the back muscles.
- Complete the movement smoothly and without jerkiness.

3.2 Mounting

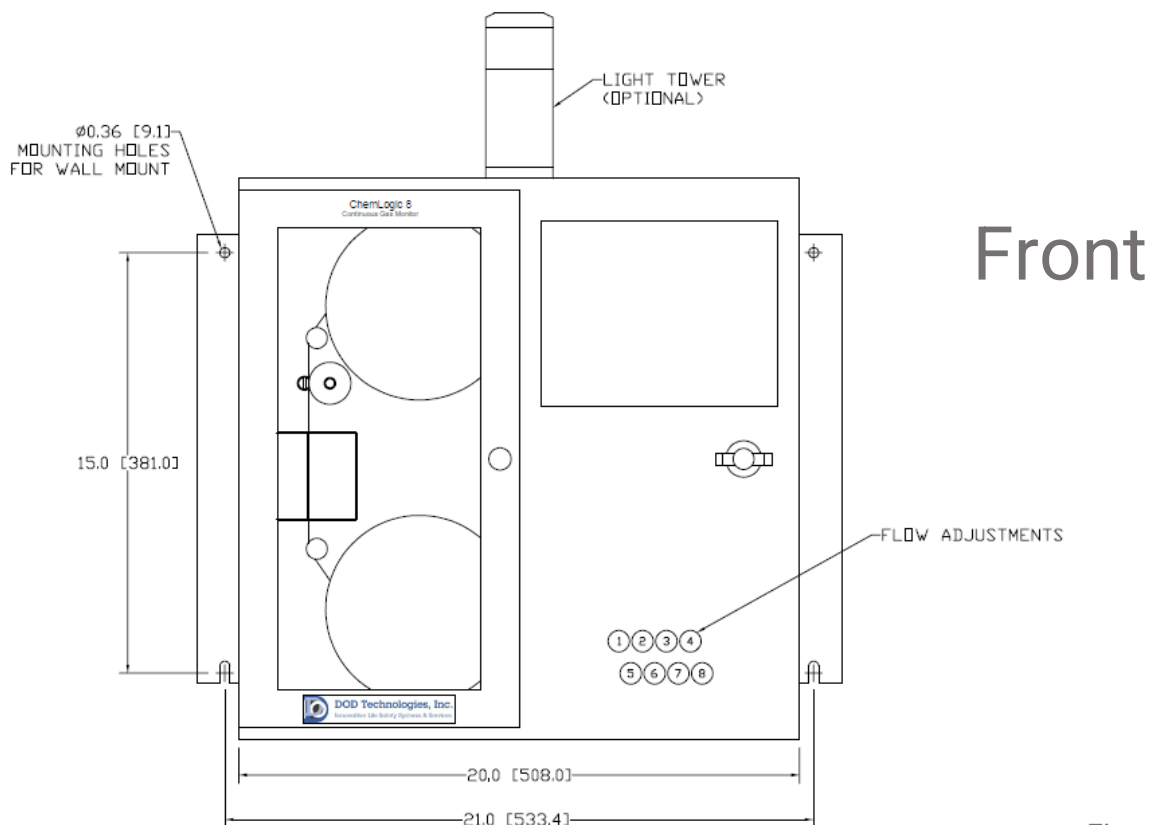


Figure 3.1

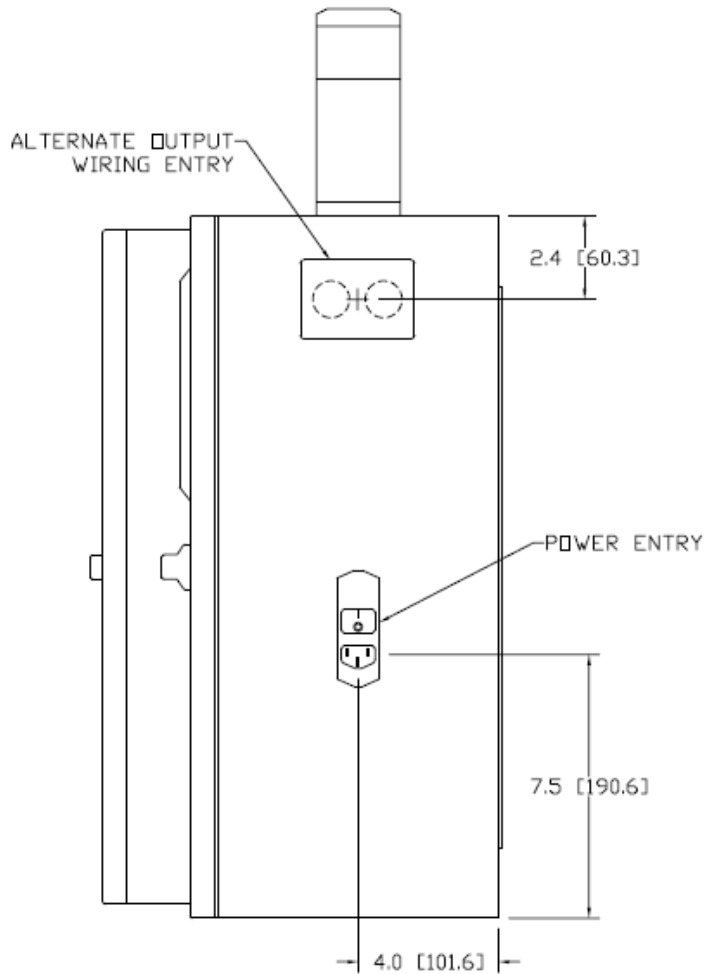
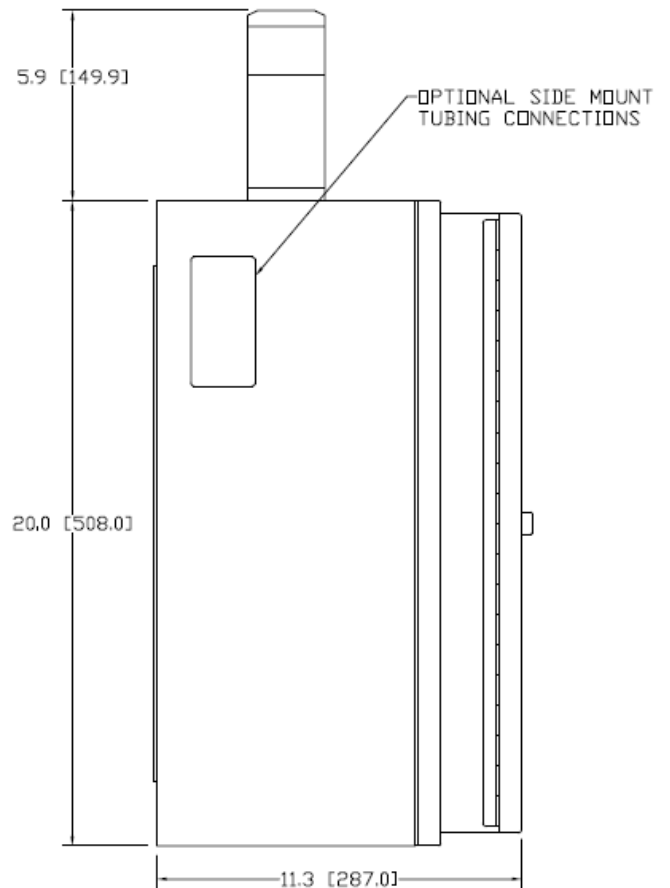


Figure 3.2

Right Side



Left Side

Figure 3.3

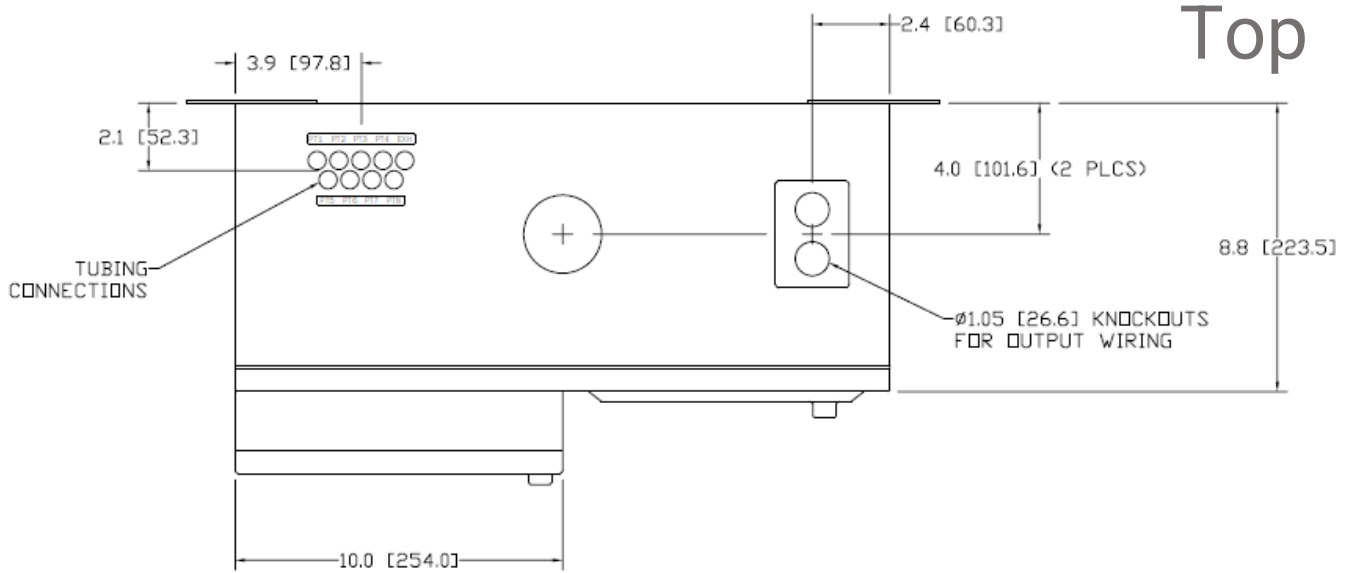


Figure 3.4

Refer to Figure 3.1 for dimensional requirements for wall mount. Be sure the CL4/CL8 is properly secured to the wall.

3.3 Sample Tubing

Sample tubing may be connected to the CL4/CL8 on the top or left side of the CL4/CL8 (see Section 3.3.1). All sample tubes are 1/4" OD x 3/16" ID Teflon FEP (300 ft max length) which may be purchased from DOD Technologies (See Appendix A).

Fully depress each sample tube into the proper hole when attaching. To detach the tube, push on the collet and pull the tubing out.

3.3.1 Sample Manifold Relocation

The quick-connect system used to attach sample tubing and exhaust may be located on the top or left side of the machine. To move the manifold, Follow the procedures in Section 6.2 to open the service door.

- Remove the four (4) mounting screws shown in Figure 3.5 to detach the manifold.
- Remove the 4 lock nuts holding the cover plate over the unused manifold opening
- Remove the cover plate
- Align the manifold inside the CL4/CL8 with the holes in the new position
- Replace the screws holding the manifold in place and tighten accordingly.
- Replace the cover plate over the unused opening and secure with the four lock nuts.

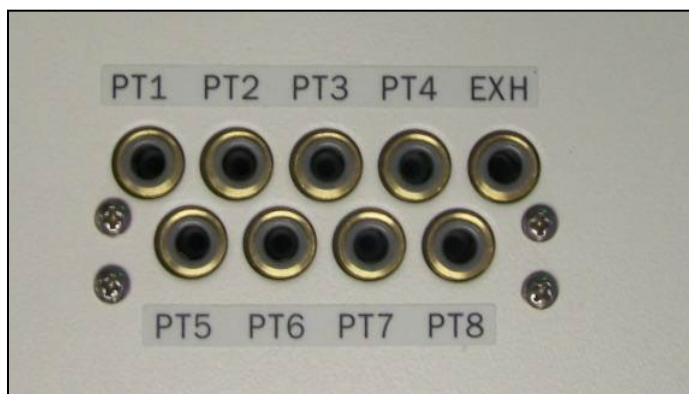


Figure 3.5

Sample tubing may be purchased from DOD technologies (see Appendix A)

IMPORTANT: All sample tubing used with the CL4/CL8 must be 1/4"OD x 3/16" ID FEP Teflon. Use of any other tubing may damage the CL4/CL8 and/or cause inaccurate gas concentration readings.

3.3.2 End-Of-Line Particulate Filters

End-of-line particulate filters must be installed on all 4 or 8 sample lines at all times to prevent damage to the unit. Unused lines must either be plugged or have a filter installed. Filters require regular maintenance – see Chapter 6.

IMPORTANT: All points require filtration to prevent dust accumulation in tubing and internal damage to the CL4/CL8. Dust that collects in the tubing or the internal system may cause sample loss and inaccurate gas concentration readings.

End-of-line particulate filters may be purchased from DOD Technologies (see Appendix A).

3.4 Exhaust tubing

The exhaust line must be 3/8" OD x 1/4" ID tubing with a maximum length of 25ft. Polyethylene, polypropylene or Teflon may also be used.

Exhaust tubing may be purchased from DOD Technologies (see Appendix A).

3.5 A/C Power

A 6ft power cord is included – **DO NOT** use extension cords with the CL4/CL8. Longer cords are available from most electrical supply stores.

3.6 Output Wiring

Figure 3.2 details the connection method for both the standard relay output module and the optional 4 to 20 ma modules.

See Appendix B for a listing of output module connections.

3.6.1 Standard Output Relay Module Wiring

The standard output module requires an external 24V supply connected to V1+/- and V2+/- (see Appendix B). Outputs 0-15 are powered through V1 while outputs 16-31 are powered through V2. Each output can handle up to 0.2 Amps with a total maximum current of 1.6Amps to each group of 16 outputs at any time. See Figures 3.6 and 3.7 for information on wiring the CL4/CL8 standard relay outputs.

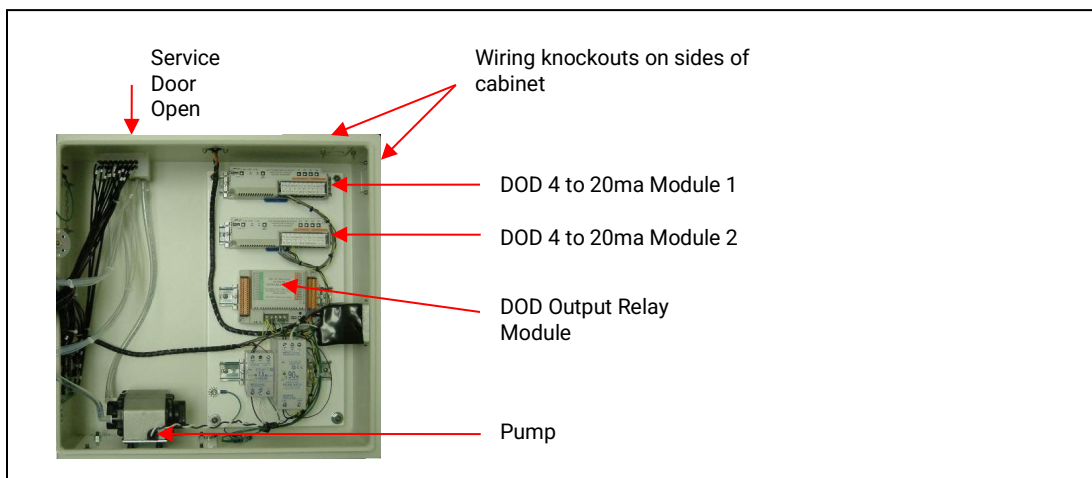


Figure 3.6

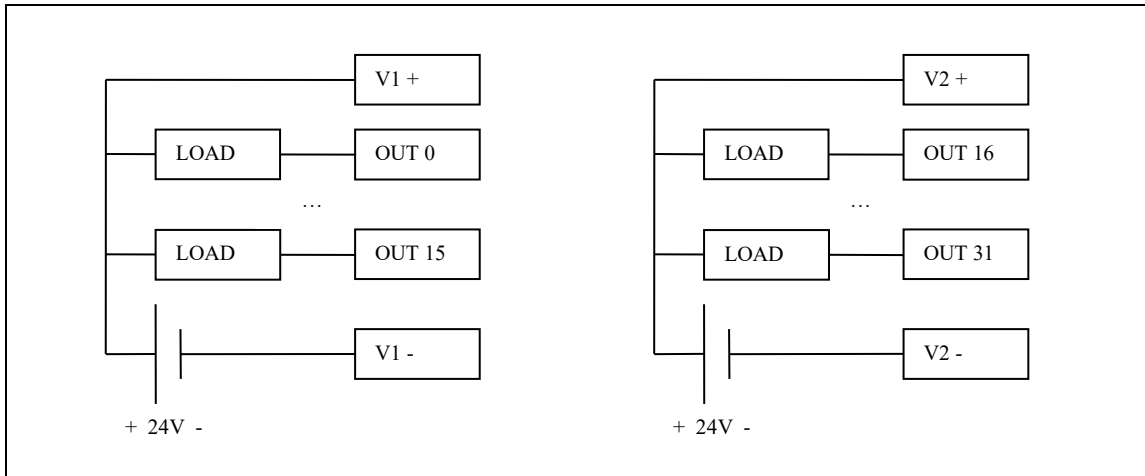


Figure 3.7



DANGER: Before performing any wiring modifications, be sure that power to the CL4/CL8 is disconnected and remove the output connector from the output relay block.

Use only AWG22 to AWG18 twisted wire (wire sizes UL1015 and UL1007)
Strip from .26" to .31" (6.5mm to 8.0mm) from each wire to insert into the connector.

1. To connect the wires to the spring-loaded output connector:
2. Insert the screwdriver into the square shaped hole which will open the round hole for the wire.
3. Continue to hold the screwdriver while inserting the wire into the round shaped hole.
4. While holding the wire in place remove the screwdriver which closes the clamp onto the wire.
5. **IMPORTANT:** Be sure the wire is inserted completely into the hole. Failure to do so could result in system failure, electrical shock.
6. To remove a wire, re-insert the screwdriver in the hole as described in step 1 and gently pull the wire out while the spring is compressed.

3.6.2 Optional 4 to 20ma Output Module Wiring

Figure 3.8 details a typical connection to one of the eight (8) 4 to 20ma output connections. See Appendix B for a complete list of terminal connections on the optional 4 to 20ma output block.

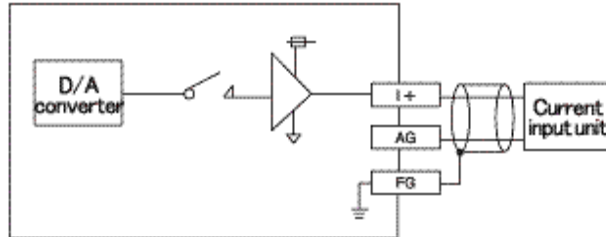


Figure 3.8



DANGER: Before doing any wiring, modifications be sure that power to the CL4/CL8 is disconnected.

IMPORTANT: Verify that all I/O unit terminal screws are securely tightened even if they are not used.

3.6.3 Optional 8 Point Relay Module (Item #2-500-012)

See Appendix B for a complete list of terminal connections on the optional output block.

IMPORTANT: Verify that all I/O unit terminal screws are securely tightened even if they are not used.



DANGER: Before doing any wiring, modifications be sure that power to the CL4/CL8 is disconnected.

Chapter 4 - Setup & Configuration

4.1 Set System Date and Time

See Section 5.2.2

4.2 Gas Selection

Each point on the CL4/CL8 must be setup for the appropriate gas and configured accordingly. See Section 5.2.1 for information on selecting the gas for each point.

4.3 Alarm Settings

See Section 5.2.a for information on how to adjust the alarm settings after the gas has been selected for each point.

4.4 Output Relays

The CL4/CL8 supports both energized and de-energized relays and may be configured for either latching or non-latching faults/events.

When configured for energized relays, the outputs are normally in a high state and change to a low state when the corresponding fault / alarm occurs. De-energized relays work in the opposite manner. See Section 5.2.f. When the power is ON, the Power Loss relay is always in the normally high state.

When latched outputs are selected (Section 5.2.f), any fault or alarm that occurs will remain until the 'fault reset' button is touched. If non-latching outputs are selected the output will reset automatically if, and when, the condition that caused the fault/alarm goes away.

NOTE: A message is added to the event log each time the 'fault reset' button is touched.

4.5 Concentration Logging

Three levels of concentration logging can be configured in the CL4/CL8.

1. >0 - All concentrations detected \geq LDL are added to the concentration log.
2. AP1 - Anytime alarm level 1 is reached, the concentrations are added to the log.
3. AP2 - Anytime alarm level 2 is reached, the concentrations are added to the log.

Regardless of which point the gas is detected on, all CL4/CL8 points are logged as long as the trigger is active. For AP1 or AP2 logging the system will continue to log concentrations as long as the alarm level is active. If latching faults are enabled the system will continue to log until the 'fault reset' button is touched. See Section 5.3

4.6 Install New Cassette

See Section 6.3 for installation instructions.

4.7 USB Memory Stick

The use of a USB Memory Stick is highly recommended to retain historical and performance information including events, alarms, and gas concentrations. USB Memory Sticks are available from DOD Technologies (see Appendix A) and at most retail electronic stores. See Section 6.4 for information on inserting and replacing a USB Memory Stick. See also Appendix F for information on the data stored on the USB Memory Stick.

4.8 Setup Complete

Enter Analysis.

Chapter 5 – Basic Operation

CL4/CL8 Menu Overview

<ul style="list-style-type: none"> I. Initialization (Power on) (sec. 5.1) <ul style="list-style-type: none"> a. Setup Mode b. Timer II. Setup (11 button menu) (sec. 5.2) <ul style="list-style-type: none"> a. Gas & Alarm Settings <ul style="list-style-type: none"> i. Points 1-4 ii. Points 5-8 b. Set Date/Time c. Load Tape d. Adjust Flow e. *Calibration Factors f. *Set/Test Outputs g. **Factory Settings h. Events History i. Fault Reset j. Start Analysis III. Concentration Log (sec. 5.3) IV. Analysis (5 buttons & 8 points w/detail) (sec. 5.4) <ul style="list-style-type: none"> a. Setup b. Concentration Log c. Event History d. Silence e. Fault Reset f. Point Detail (1-8) V. USB Memory Log (sec. 5.5) VI. Time weight average (sec. 5.6) 	<p style="text-align: center;">Legend</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p style="text-align: center;">User Screens (No Password Required)</p> <p style="text-align: center;">*Administrative Screens (Administrator Password Required)</p> <p style="text-align: center;">**Service Screens (Service Password Required)</p> </div>
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5.1 Initialization

When the CL4/CL8 is powered on it will begin with an initialization screen (Figure 5.2) which is followed by the restart screen (Figure 5.3).

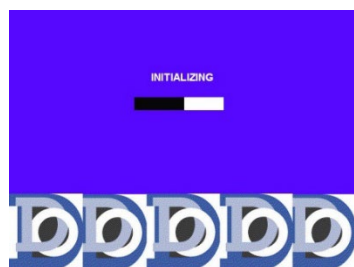


Figure 5.2

Automatic

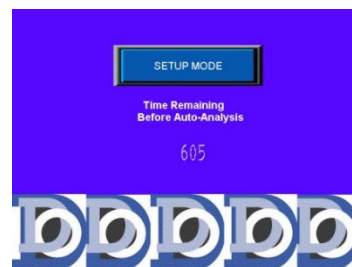


Figure 5.3

If the operator touches the 'SETUP MODE' button before the timer reaches 0 the Setup screen appears (Section 5.2) otherwise after a timeout the system will start analysis (Section 5.4)

5.2 Setup / Main Menu

The setup menu is accessed either by touching the 'SETUP MODE' button on power up (Section 5.1) or by touching 'SETUP' from the analysis screen (Section 5.5). Figure 5.4 below shows the setup screen and explains the various buttons.

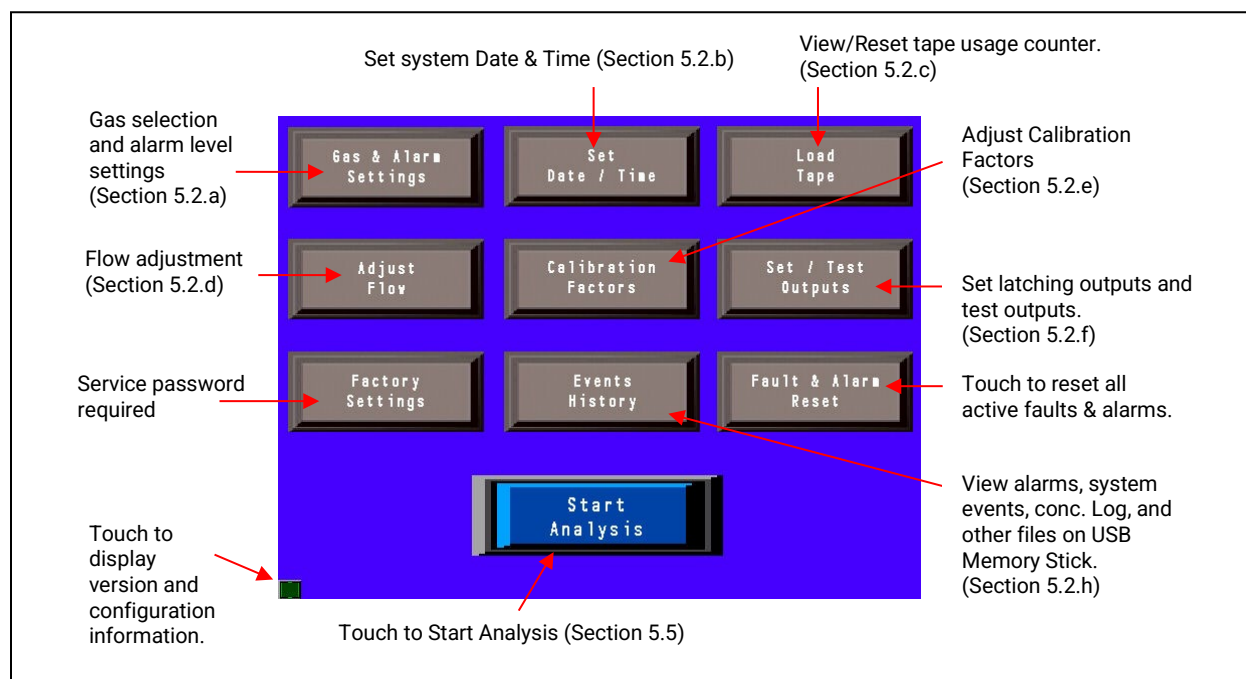


Figure 5.4

5.2.1 Gas & Alarm Settings Menu

Touching the 'GAS & ALARM SETTINGS' button on the setup screen brings up the screen shown on the left in Figure 5.5 which displays the configuration of points 1-5. Touching the 'NEXT' button will bring up the screen shown on the right of Figure 5.5 which displays the configuration of points 5-8. Touching the 'BACK' button will then return to the SETUP screen.

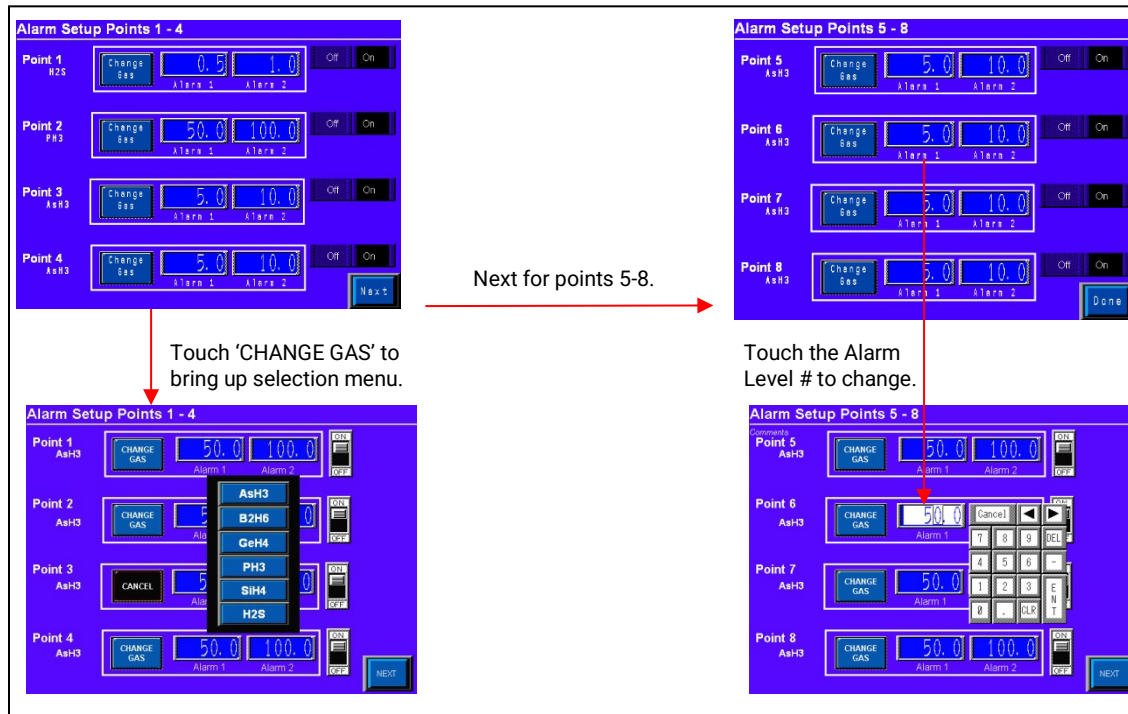


Figure 5.5

Touching the 'CHANGE GAS' button brings up the gas selection menu from which you may either select a new gas or touch the 'Cancel' button. Touching any of the alarm level numeric displays will bring up the keypad to change the alarm level. The valid alarm levels are listed in Appendix X for each gas. An invalid alarm level entry will bring up an error message.

The toggle switch to the right of each point allows the individual points to be disabled when not in use. The word 'DISABLED' will then appear on the analysis screen for that point and no calculations will be made.

5.2.2 Set Date/Time

Touching the 'SET DATE/TIME' button on the setup screen brings up the screen shown in Figure 5.6.

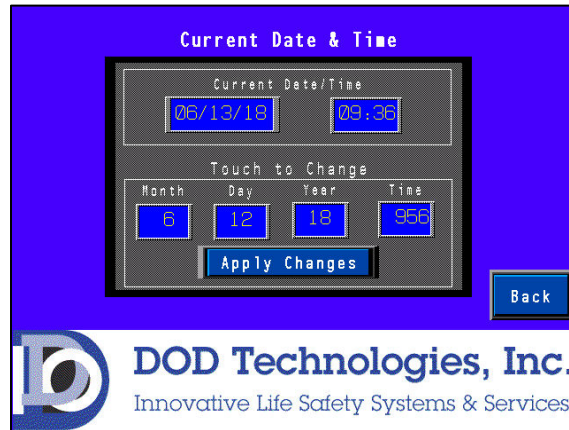


Figure 5.6

Touching any of the numeric displays for Month, Day, Year, and Time will bring up the numeric entry keypad. The time must be entered in 24-hour (Military) time format. Touch the 'BACK' button to return to the setup menu.

IMPORTANT: After entering the new date & time you must touch the "Apply Changes" button to update the system date/time.

5.2.3 Load Tape

Touching the 'LOAD TAPE' button on the setup screen brings up the screen shown in Figure 5.7.

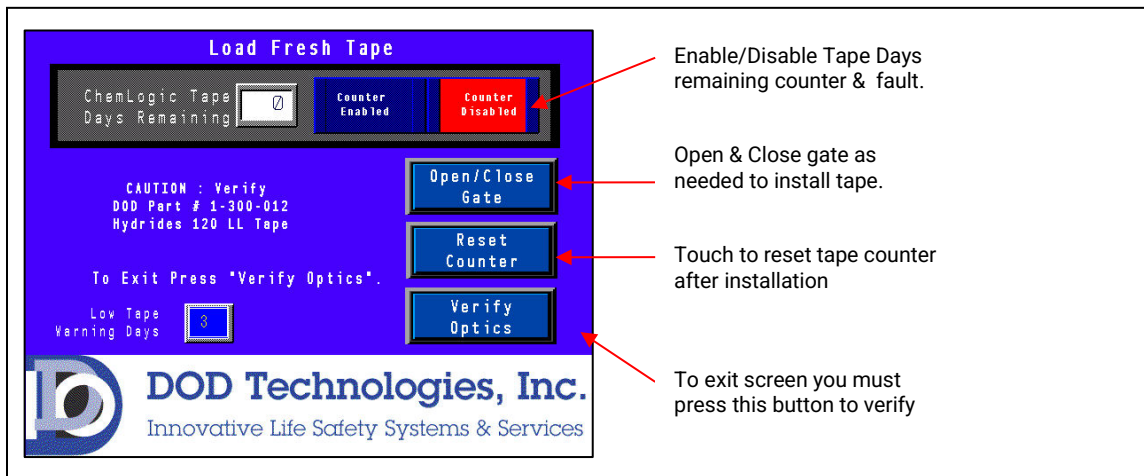


Figure 5.7

IMPORTANT: Each time a new tape is loaded into the CL4/CL8 the 'RESET COUNTER' button must be touched to accurately track tape usage.

Each time the 'OPEN/CLOSE GATE' button is touched, the gate will open or close appropriately. If the gate is currently closed, touching the button will open the gate. If the gate is currently open* touching the button will close the gate.

NOTE: If the gate is not completely open touching the button will open the gate to the proper open position. Touch the button again to close.

To Exit the screen optics verification is required. When the 'Verify Optics', button is touched the machine will verify the tape is aligned correctly and the optics are calibrated appropriately. During this time a 'ONE MOMENT PLEASE' window will appear. When verification is complete one of the two screens in Figure 5.8 will appear.

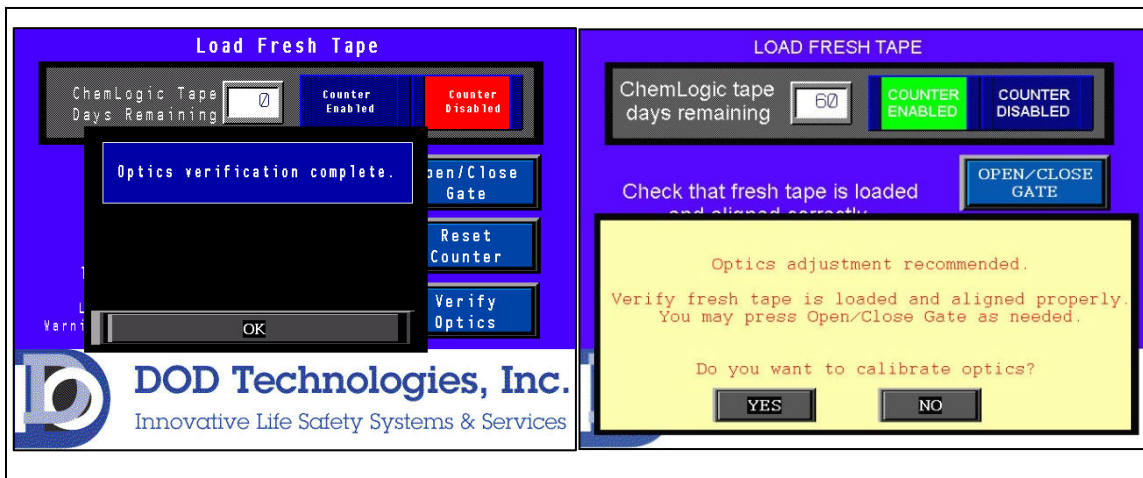


Figure 5.8

If successful touch the "OK" button to return to the setup menu. If unsuccessful verify that the tape is installed and aligned correctly by using the 'OPEN/CLOSE GATE' button as needed. Once you have verified that the tape is installed correctly you can touch the 'YES' button to recalibrate the optics for the new tape or press 'NO' to return to the setup menu.

IMPORTANT : If you choose 'NO' when asked to calibrate the optics as shown to the right of Figure 5.8 the CL4/CL8 may not function properly. Contact DOD Technologies for more information.

5.2.4 Flow Adjustment

Touching the 'ADJUST FLOW' button on the setup screen brings up the screen shown in Figure 5.9 along with advancing the tape and turning the pump on. Use the corresponding flow adjustment knobs located on the front panel to adjust the flow so that each level is as close as possible to the black line in the middle of the green section.

***NOTE:** There may be a slight delay between the time the knob is turned, and the updated reading is reflected on the screen. Adjust the knob slowly and wait a few seconds to verify that the level is accurate.

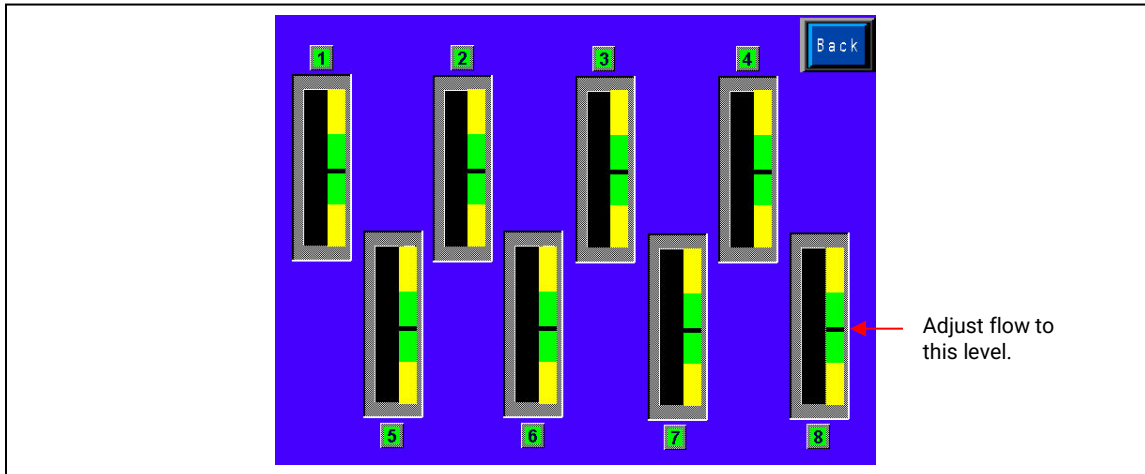


Figure 5.9

Touch the 'BACK' button to return to the setup menu.

5.2.5 Calibration Factors

Touching the 'CALIBRATION FACTORS' button on the setup screen brings up the screen shown in Figure 5.10. This screen requires administrator password access. Contact DOD (see Chapter 7) for information on the use of Calibration Factors.

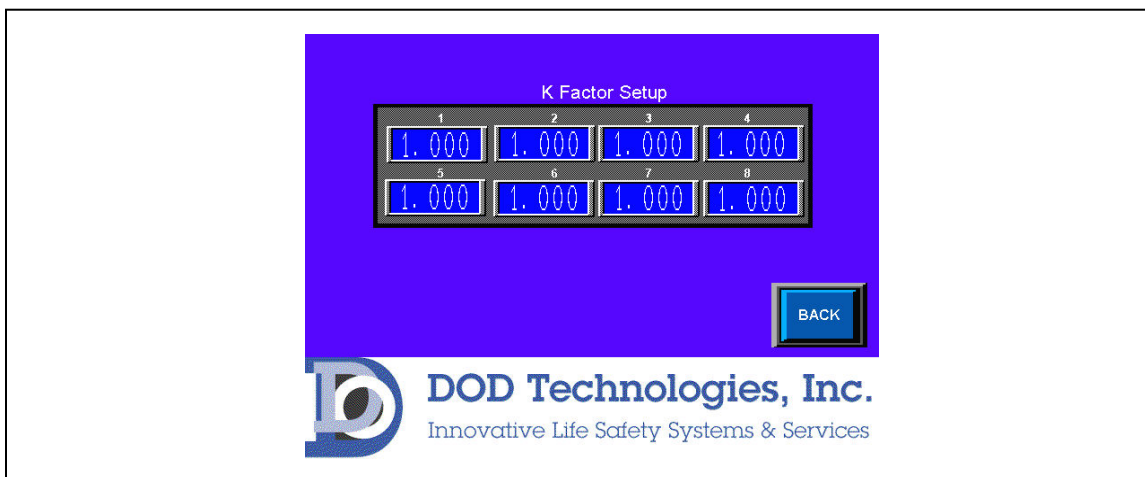


Figure 5.10

Touching any of the numeric displays for any of the channels will bring up the numeric entry keypad. The value entered must be between 0.5 and 2.000 for each channel.

NOTE: This screen requires the Administrator password for access – See Section 2.4

5.2.6 Set & Test Outputs

Touching the 'SET/TEST OUTPUTS' button on the setup screen brings up the screen shown in Figure 5.11. This allows the user to test relays and analog outputs.

Two other features on this screen:

1. Require a password to exit analysis – If enabled the level 1 password must be used for anyone to exit the analysis screen. When disabled a simple "Are you sure?" window appears.
2. Idle Timeout – Set from 1-60 minutes to trigger a fault when the machine is left in idle. Setting this to 0 minutes disables the fault.

CAUTION: Activating these outputs will trigger any connected alarms

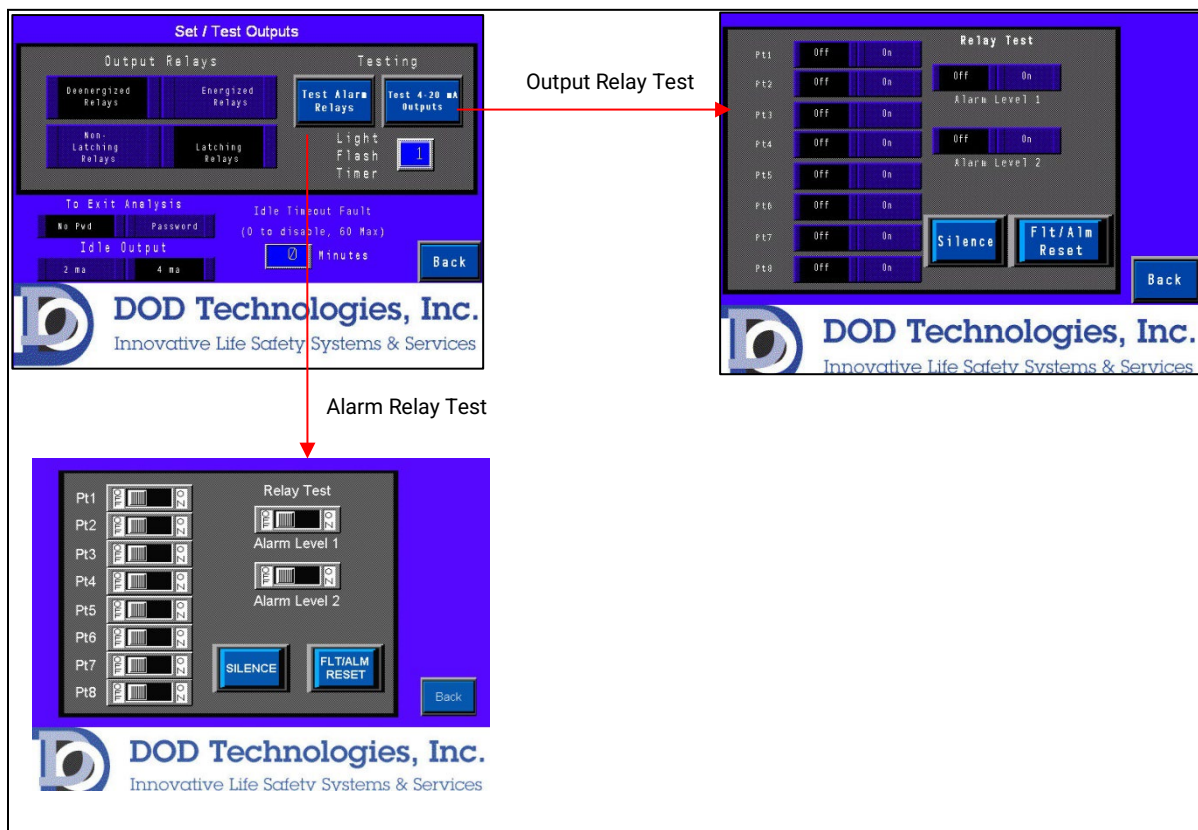


Figure 5.11

5.2.7 Factory Settings

This button is reserved for technical service and requires a service password. Contact DOD Technologies (Section 7) for service information.

5.2.8 Event History

Touching the 'EVENT HISTORY' button on the setup screen brings up the screen shown in Figure 5.11.

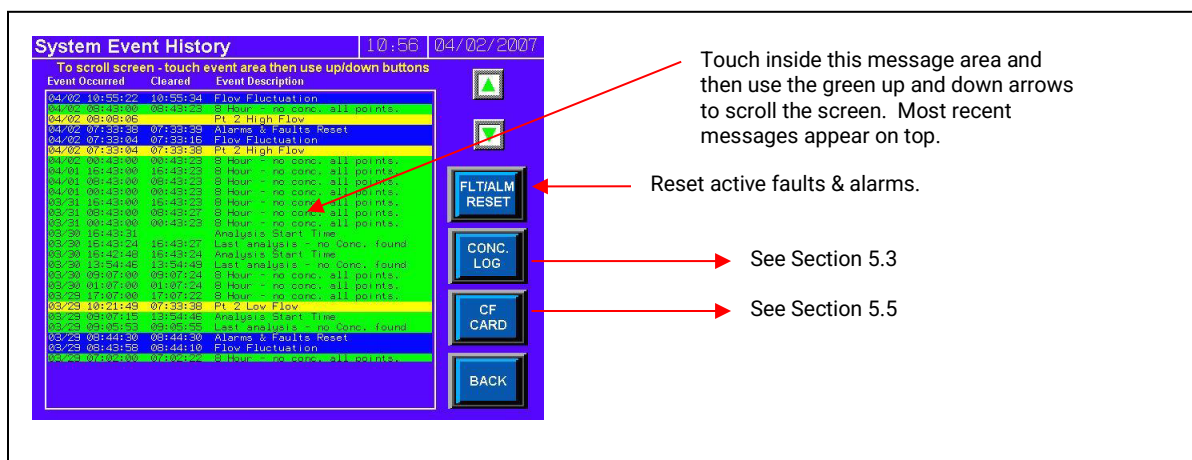


Figure 5.12

The event history is display with the most recent event/alarm at the top using the color coding listed in table 5.1.

Table 5.1

Green	Normal operation messages
Yellow	Fault messages
Blue	Informational display messages – non-critical
Orange	Critical Service messages
Red	Gas alarm messages

Touch the 'BACK' button to return to the setup menu.

5.3 Concentration Log

Touching the 'CONC LOG' button on the Event History screen (Section 5.2.9) will bring up the screen shown in Figure 5.13.

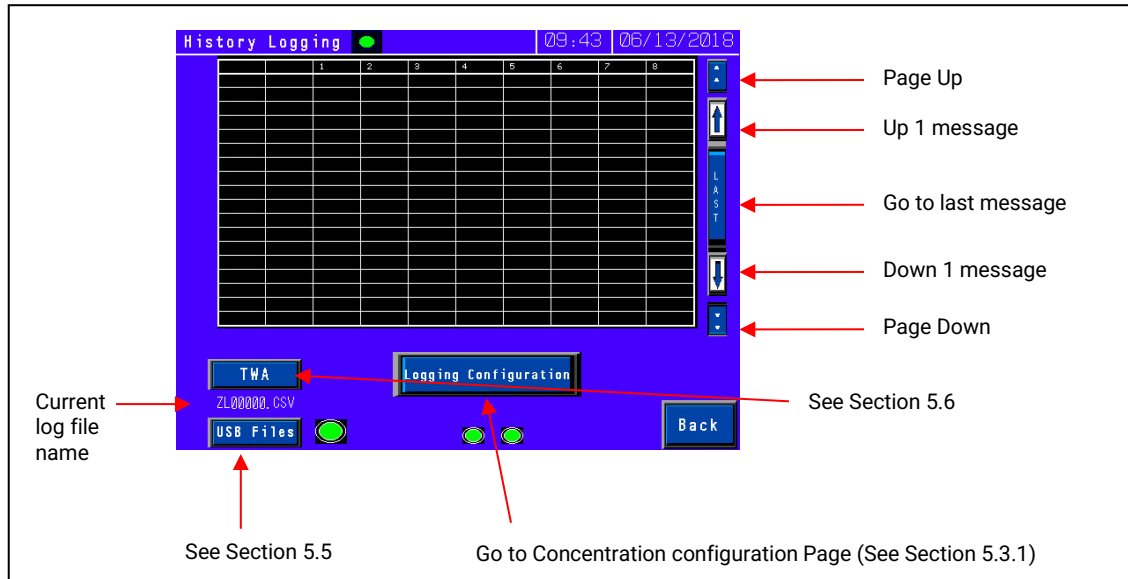


Figure 5.13

The log displays the concentration on each point when the trigger criteria is met. If you select >0 the system will log all CL4/CL8 points when any of the points have a concentration reading which is >LDL for the gas selected. (See appendix E).

The buttons on the right of the screen allow scrolling through the most recently logged readings. Touch the configuration button to set the logging parameters.

5.3.1 Concentration Configuration

Figure 5.12.b shows the concentration configuration screen. Four levels of logging are available depending on your needs.

1. Alarm Level 2 – Logging on when any channel is above alarm level 2
2. Alarm Level 1 – Logging on when any channel is above alarm level 1.
3. 0 – Logging on when any channel is above 0
4. Continuous – Logging always on (not recommended)

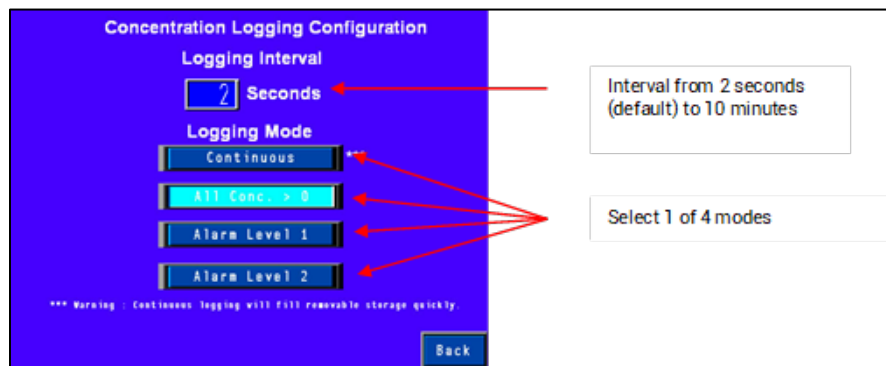


Figure 5.12b

In addition, the logging interval can be adjusted from the default of 2 seconds to a maximum of 10 minutes (600 seconds).

5.4 Analysis Mode

Figure 5.13 shows the main analysis screen which is entered either automatically during power on or by touching the 'START ANALYSIS' button on the setup screen. Figure 5.14 shows the main analysis screen with a detailed view of the information on point 3.

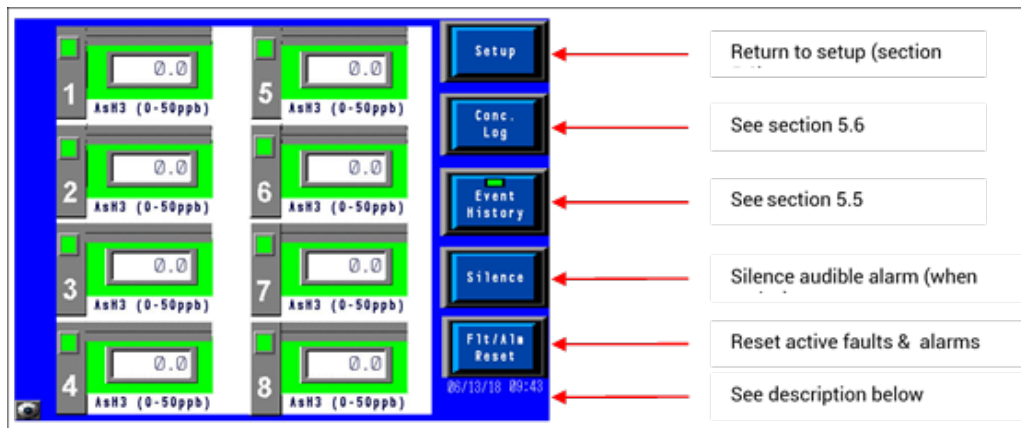


Figure 5.13

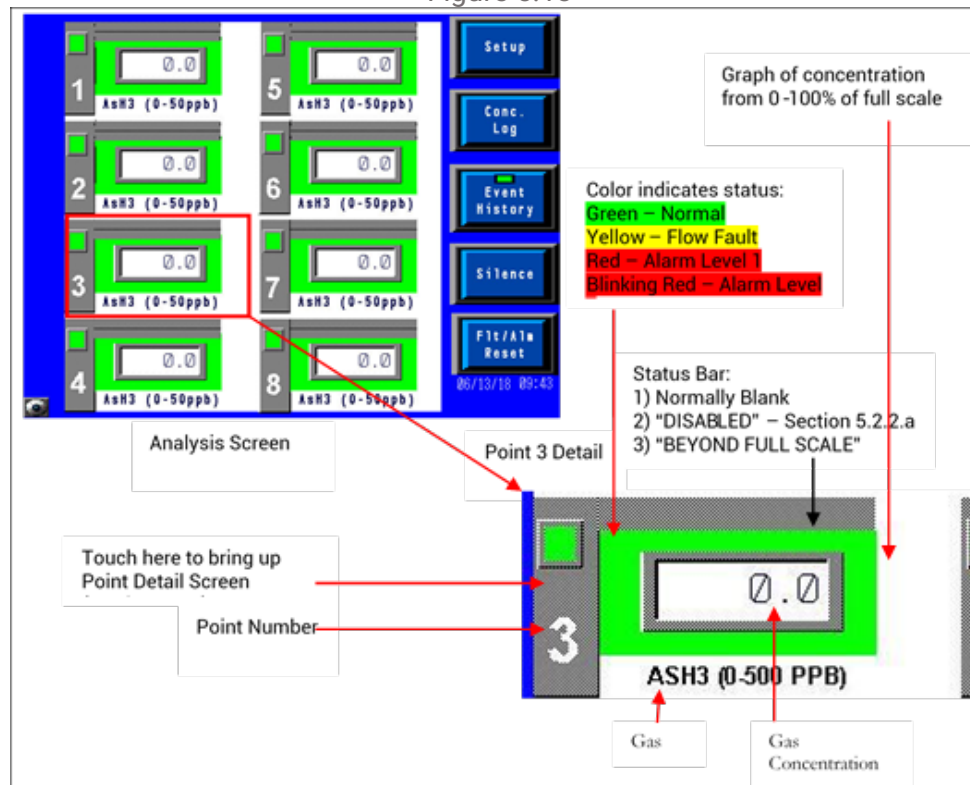


Figure 5.14

At the bottom of the analysis screen on the right side is the current date & time and a message box below it. The message box will either display the blinking message 'NO USB Memory Stick or will be blank if a USB Memory Stick is inserted in the machine. (See Section 2.5.)

To display detailed information on any point touch along the left-hand side from the point # to the square box above it which will bring up the point detail screen (Section 5.5.1).

Touch the 'BACK' button to return to the setup menu.

5.5.1 Point Detail Screen

Touching a point # on the analysis screen (Section 5.4) will bring up the point detail screen shown in Figure 5.15

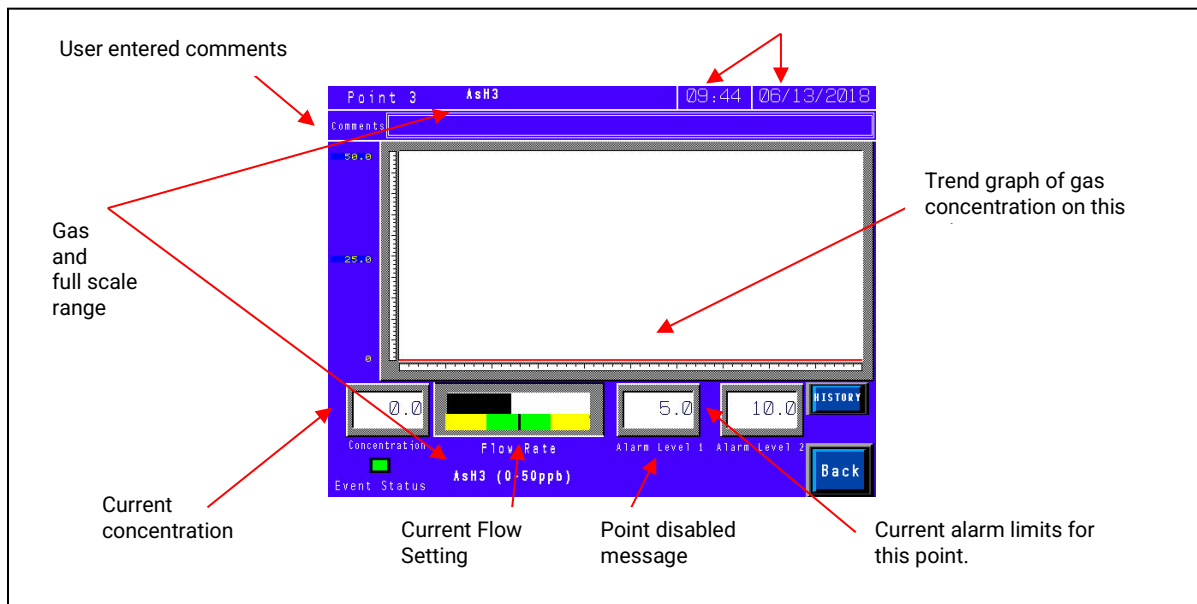


Figure 5.15

The information on the point detail screen is updated in real-time while in analysis mode. Alarm levels may be changed by touching the numeric display area for the appropriate alarm. Similarly, the comments related to this point may be edited by touching anywhere in the box displayed for comments.

NOTE: The display of the current flow may not be immediately displayed on this screen. It is recommended that the flow adjustment screen (Section 5.2.4) be used for all flow calibration.

5.5 USB Memory Stick log

Figure 5.16 shows the 'CF Log' which is displayed by touching the 'CF Files' button on the concentration log (Section 5.3). This screen allows the user to browse everything contained on the USB Memory Stick currently inserted. (Note – if no USB Memory Stick is present or there is an error reading the card, the left selection screen will appear blank). To initiate the display touch 'DISP'.

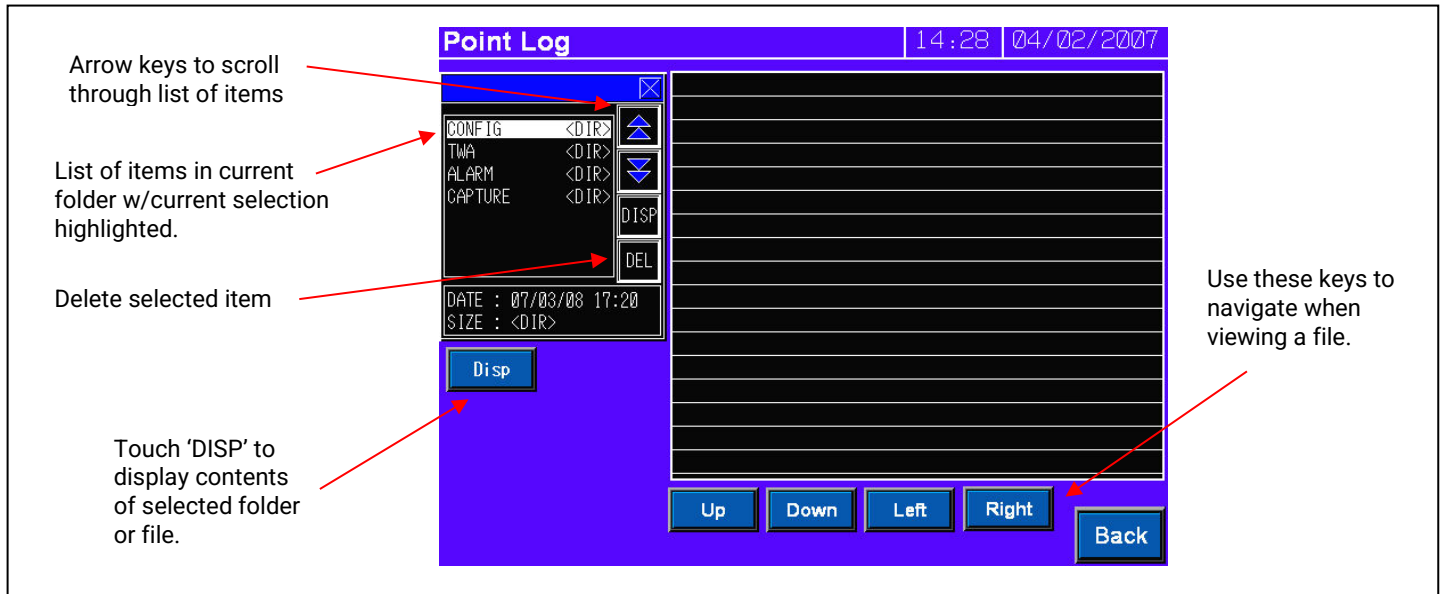


Figure 5.16

5.6 Time Weighted Average (TWA)

Touching the 'TWA' button on the concentration log screen (Section 5.3) brings up the TWA screen shown in Figure 5.17.

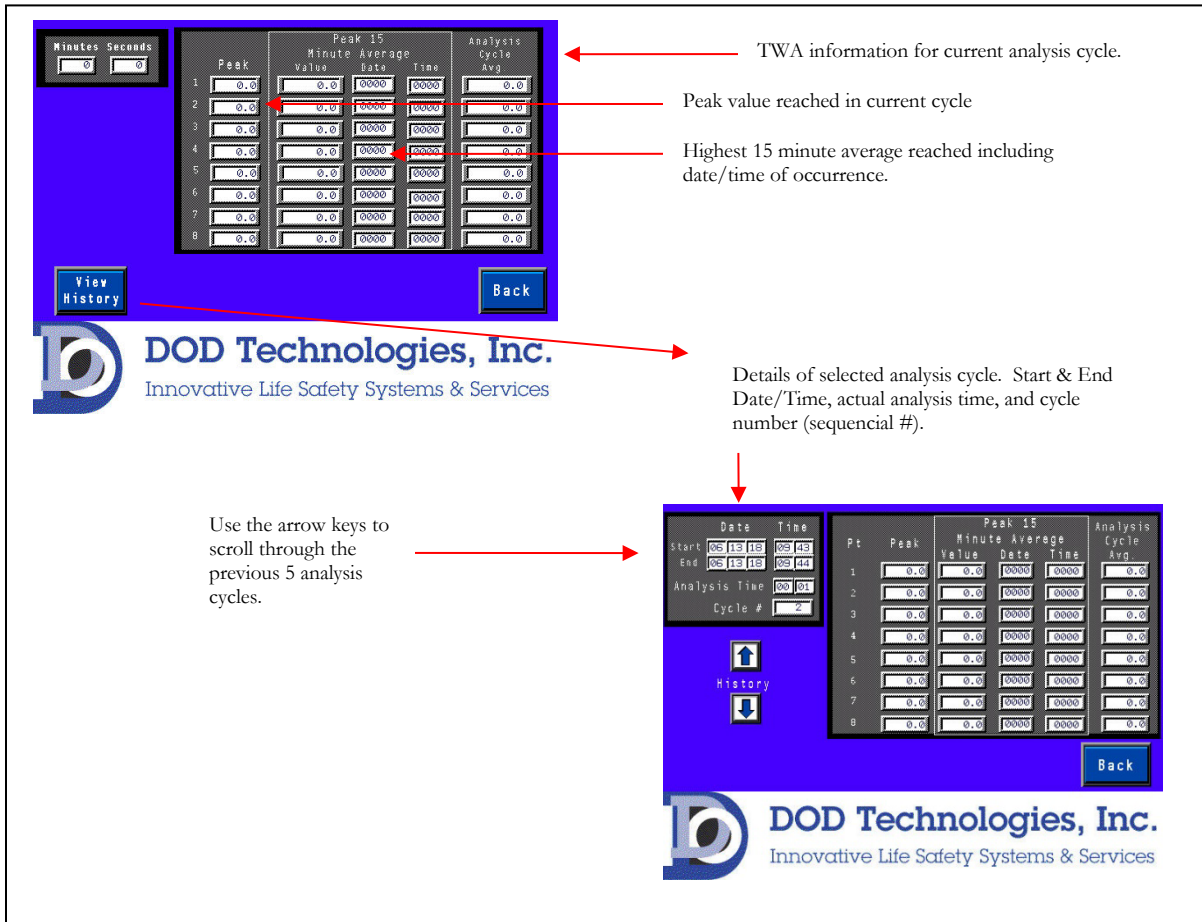


Figure 5.17

The first screen displays the current TWA information including the minutes and seconds elapsed since the cycle started. The CL4/CL8 retains the most recent 5 analysis cycles (up to 40 hours) in addition to the current cycle in memory. The previous cycles are accessed by touching the 'View History' button which brings up the screen shown in the lower right of Figure 5.17. Use the up and down arrows to review the previous 5 cycles on this screen.

Chapter 6 – Maintenance

It is recommended for complete safety that the ChemLogic® CL4/CL8 continuous gas detection system be serviced on-site every 6 months by a certified DOD Service Engineer or by submitting the unit to the manufacturer for routine maintenance. A certificate of repair should be received and kept with operation documents of the machine. Any malfunctions in the device should be reported and corrected before further use.

6.1 Maintenance Door Access

The maintenance door is used to access the ChemLogic Cassette. To open the maintenance door simply turn the maintenance door locking knob counterclockwise until it is unscrewed from the main panel. The door can then be opened.

When maintenance is complete be sure to close the maintenance door and hand tighten the maintenance door locking knob (clockwise) to secure the door.

IMPORTANT: The maintenance door should remain securely latched at all times except when servicing the ChemLogic Cassette.

6.2 Service Door Access



DANGER: Turn off the unit and unplug A/C power to the unit before opening the Service Door.

To open the door:

1. Insert the key provided into the slot and rotate counter clockwise to unlock the unit.
2. Turn the latch counterclockwise to unlatch the door.
3. Open the door for service as required.

When service is complete be sure to close the service door and secure the keyed latch to the closed position. Verify that the service door cannot be pulled open – secure the door using the key to lock the door.

IMPORTANT: The service door must remain securely latched at all times when not servicing the unit. Verify that the latch is secure and use the keyed lock to prevent unauthorized access.

6.3 ChemLogic® Cassettes

ChemLogic Cassettes have an expiration date printed on the label. Expired Cassettes should be disposed and replaced with new Cassettes to ensure proper gas concentration readings. Each ChemLogic Cassette will last for the listed number of days under normal usage. See Appendix A for ordering information.

ChemLogic® Cassette Installation Procedure

- A. From the setup menu touch the 'Load Tape' button (Section 5.2.3)
- B. Open the maintenance door. (Section 6.1)
- C. On the screen touch the 'OPEN/CLOSE GATE' button to open the gate
- D. Remove the old take-up reel by gently pulling and dispose of properly
- E. Remove the empty tape reel and install on top as the new take-up reel.
- F. Secure the new ChemLogic tape reel on the bottom as shown in Figure 6.1. The tape should be around the bottom in a clockwise direction as shown.
- G. Feed the tape as shown with the arrows in Figure 6.1.
 1. From the bottom reel
 2. Around the bottom tape guide
 3. Through the opening between the optic blocks
 4. Between the rubber roller and the capstan
 5. Around the top of the upper tape guide
 6. Fold the end of the tape and insert into the slot in the empty tape reel. Be sure the tape is wound clockwise around the take-up reel.

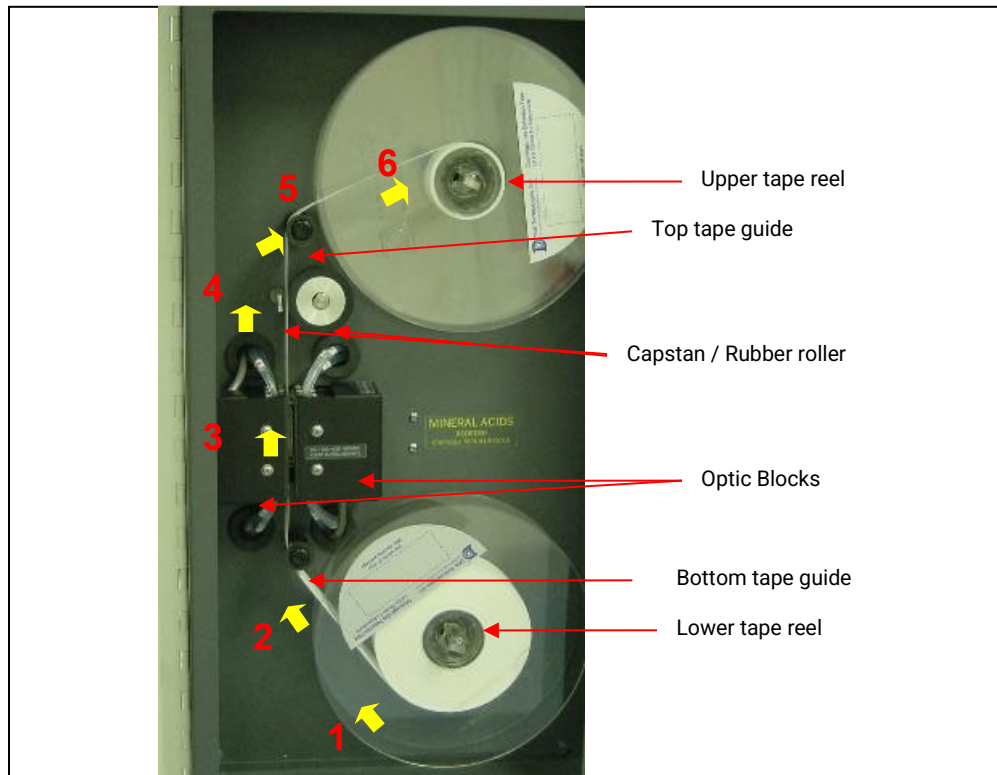


Figure 6.1

- H. Turn the upper wheel clockwise at least 2 full turns to secure the tape
- I. On the screen touch the 'OPEN/CLOSE GATE' button to close the gate
- J. On the screen touch the 'Reset Counter' button. (See Section 5.2.3)

Warning: Keep fingers clear during tape advance.

6.4 End-Of-Line Particulate Filters

End-of-line (point of detection) particulate filters which protect the CL4/CL8 from damage are required on all 4/8 points including points not being monitored. Table 6.1 details the type of filter required for each gas – see also Figure 6.2. Filters must be replaced on a regular basis as shown in the table. Filter orientation is not critical in either application.

IMPORTANT: All points require filtration to prevent dust accumulation in tubing and internal damage to the CL4/CL8. Dust that collects in the tubing or the internal system may cause sample loss and inaccurate gas concentration readings.

Table 6.1

Gas	Description	Suggested Replacement	DOD Filter Part #
AsH ₃	Arsine	6 Months	780248
B ₂ H ₆	Diborane	6 Months	780248
GeH ₄	Germane	6 Months	780248
H ₂ SE	Hydrogen Selenide	6 Months	780248
PH ₃	Phosphine	6 Months	780248
SiH ₄	Silane	6 Months	780248
TBA	Tertiary-Butyl-Arsine	6 Months	780248
H ₂ S	Hydrogen Sulfide	6 Months	780248
HCL	Hydrogen Chloride	1 Month (membrane)	60009 (Housing) 60010 (membrane) OR 2-800-013
HF	Hydrogen Fluoride	1 Month (membrane)	60009 (Housing) 60010 (membrane) OR 2-800-013
BF ₃	Boron Trifluoride	1 Month (membrane)	60009 (Housing) 60010 (membrane) OR 2-800-013
HBR	Hydrogen Bromide	1 Month (membrane)	60009 (Housing) 60010 (membrane) OR 2-800-013
COCL ₂	Phosgene	6 Months	780248

		
<p>Mineral Acids Filter</p> <p>Part Numbers: Blue Housing: 60009 Filter Membrane: 60010</p>	<p>Hydrides & Phosgene Filter</p> <p>Part Number: 780248</p>	<p>Mineral Acids Disposable Filter</p> <p>Part Number 2-800-013</p>

Figure 6.2

6.5 Flow Adjustment

Each channel should be adjusted whenever a new ChemLogic® Cassette or particulate filter is installed. See Section 5.2.4

6.6 USB Memory Stick Replacement

It is highly recommended to keep a USB Memory Stick inserted in the unit at all times. The lower right corner of the analysis screen will show when a card is properly inserted (see Section 5.4) To insert or replace a USB Memory Stick, follow these steps:

- 1) Locate USB slot on middle center of the HMI. It is marked USB.
- 2) Removal:
 - a) Pull USB Memory Stick straight down
- 3) Insertion:

- a) Push the USB Memory Stick straight up ensuring the USB Memory Stick and slot are aligned properly.

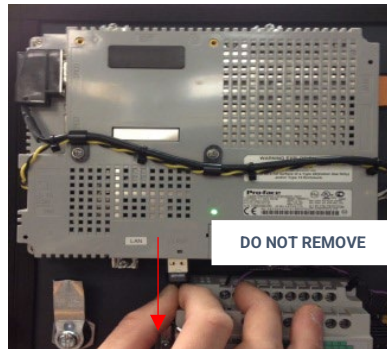
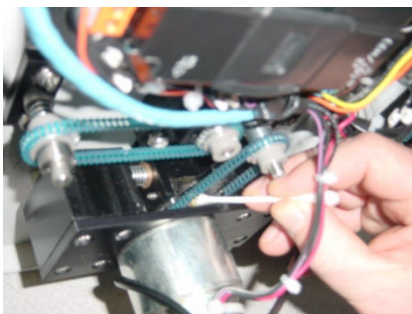


Figure 6.3

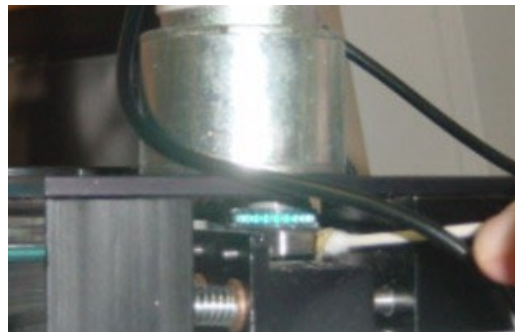
Section 5.5 describes viewing the files stored on the USB Memory Stick on the touch screen. Appendix F details the data stored on the USB Memory Stick and how to access it on a personal computer.

6.7 Apply Grease

The cam attached to the gate motor should be greased every 6 months to prevent wear. Apply a small amount of number 2 type petroleum or synthetic grease (such as McMaster Carr #1378K27) to the rounded portion of the cam. – See Figure 6.4



Top of gate mechanism



Bottom of gate mechanism

Figure 6.4 -Grease may be applied either from the top of the gate mechanism or the bottom.

6.8 Fuse Replacement

The system power is fused with a 2 amp fast-acting (5x20mm) fuse.

Chapter 7 – Service & Support

For information on service and support contact DOD Technologies via the means below.

For Permanent Discontinuation:

Discontinued units can be returned for recycling. Please contact DOD Technologies to discuss and arrange the safe return of your equipment.

Phone Support

M-F 8:30am – 5pm (Central Time Zone)

815.788.5200

Service Center

675 Industrial Drive Bldg. A.

Cary, IL 60013

Visit Our Website

DODtec.com

Appendix A – Accessories / Spare Parts

Filters & Tubing

Part #	Description
780248	Particulate Filter for Non-Corrosives (Phosgene & Hydrides)
2-800-007	Duct Mounting Kit for 1/4" Sample Line Tubing
2-800-013	Particulate Filter for Corrosive Gases (Mineral Acids)
2-800-008	KIT Duct Mounting Kit for 3/8" Tubing
2-500-502	47mm Teflon Membranes (Pack of 10) - use with P/N 60009
2-500-052	Pyrolyzer Freon Filter
60009	Filter Housing for Teflon Membranes (Mineral Acids)
2-100-503	Filter for H ₂ S Scrubber
60010	47mm Teflon Membranes (Pack of 100) - use with P/N 60009
14249	250 ft. FEP Teflon Tubing (3/16 ID x 1/4 OD)
77347	500 ft. FEP Teflon Tubing (3/16 ID x 1/4 OD)
48423	Tubing FEP 1/4 OD x 3/16 ID x 1000'
2-400-004	Tubing Exhaust 3/8 x 1/4 Polypropylene, 25' max

Options & Accessories

Part #	Description
2-200-010	4 – Color LED light with horn
2-500-999-2	CL8 14-Pin Mating Connector
2-100-A23	CL8 Encoder Assembly Option
2-500-505	CL8 Dual Pump Option (230VAC)
2-500-028	CL8 Secondary Enclosure (NEMA4X with Cooler & Heater)
2-500-023	CL8 Z Purge with Form C Contact Closure (Class I Div 1)
2-500-015	CL8 NEMA 4X Stainless Steel Enclosure
2-500-051	CL8 Pyrolyzer Option

Spare Parts

Part #	Description
9-200-004	Fuse 2A 5X20 Fast Acting (5V distribution)
2-200-013	Relay Socket
2-200-108	Relay 24VDC Lighted CL8
2-300-010	Drive Belt 94 Links CL8 - Capstan to Drive M
2-100-A77	CL8 Regulator Assy 12VDC 3A
2-300-004	Gear 24 Teeth Take-Up
2-100-A26	Micro Switch Assembly Field Upgrade
2-100-A31	Assy PCB CL8 Interconnect
2-300-003	Drive Roller 1-1/2"OD
2-200-006	Power Entry Module
2-200-012	Power Supply 5VDC 1.5Amp DIN
2-100-A06	CL8 Sample Inlet Manifold Assy
2-100-A13	CL1/CL8 Tape Advance Assembly
2-200-011	Power Supply 24VDC 120W DIN
2-100-A39	CL8 PUMP ASSY - TYPE B - 115 VAC - Side Port
2-800-A14-8	Assembly Transducer PCB (new style)
2-100-A40	CL8 PUMP ASSY - TYPE B - 230 VAC - Side Port
2-100-A42	CL8 PUMP ASSY - TYPE A - 230 VAC
2-200-002	Module 16 in 16 sink out
2-200-003	Module 32 in/out Sink
2-100-A02	PCB Assembly CL8 Transducer
2-100-A12	CL1 & CL8 Gate Open Assy with Cam
2-100-A07	CL8 Needle Valve flow (with needle valves)
2-500-019	CL8 Optics Block Assembly with Software
2-200-001	Graphic Logic Controller - 24 VDC
2-300-001	Drive Belt 113 Links CL8, CL96
2-200-107	Fan Pyrolyzer
2-200-095	15 VDC Power Supply
2-100-A03-8	CL8 Optic Block Assembly with Software
2-200-090	4-Point Pyrolyzer Assembly
2-200-080	Module 2 Channel 4-20mA
2-300-005	Needle Valve Manifold Mount
2-200-091	Pyrolyzer Control PCB with Photodiode
2-200-092	Pyrolyzer Oven (includes filament, quartz tube, and teflon block)
780248	Particulate Filter for Non-Corrosives (Phosgene & Hydrides)
2-100-A29	Assy One-way Bearing with Block \$28
780249	End of Line Particulate Filter (1.44 OD x 4.61 Long)
2-800-013	Particulate Filter for Corrosive Gases (Mineral Acids)
2-100-A73	Assy CL8 exhaust tubing upgrade (Pump tubing)
2-500-502	47mm Teflon Membranes (Pack of 10) - use with P/N 60009
2-200-238	Type B Pump Rebuild Kit
2-100-A05	Assy CL8 Tubing Harness (Incl. tubes to/from optics & transducer)
60009	Filter Housing for Teflon Membranes (Mineral Acids)
60010	47mm Teflon Membranes (Pack of 100) - use with P/N 60009

Appendix B – I/O Connection Detail

B.1 Standard Output Relay Module

Description	Output
Point 1 Alarm Level 1	0
Point 1 Alarm Level 2	1
Point 2 Alarm Level 1	2
Point 2 Alarm Level 2	3
Point 3 Alarm Level 1	4
Point 3 Alarm Level 2	5
Point 4 Alarm Level 1	6
Point 4 Alarm Level 2	7
Point 5 Alarm Level 1	8
Point 5 Alarm Level 2	9
Point 6 Alarm Level 1	10
Point 6 Alarm Level 2	11
Point 7 Alarm Level 1	12
Point 7 Alarm Level 2	13
Point 8 Alarm Level 1	14
Point 8 Alarm Level 2	15
Critical Fault	16
Watchdog	17
Power On	18
Analysis Mode	19
General Fault	20
Gas Alarm Level 1	21
Gas Alarm Level 2	22
Critical Fault (*)	23
General Fault (*)	24
Gas Alarm Level 1 (*)	25
Gas Alarm Level 2 (*)	26
Blue Light	27
Audible Alarm	28
Green Light	29
Orange Light	30
Red Light	31

(*) Can be Energized / De-Energized

Output Relay Connector

0	1	Output
2	3	
4	5	
6	7	
8	9	
10	11	
12	13	
14	15	
V1 +	V1 -	
16	17	
18	19	
20	21	
22	23	
24	25	
26	27	
28	29	
30	31	
V2 +	V2 -	

Connect 24 Volt supply to V1 +/- and V2 +/- (See Connector diagram.)

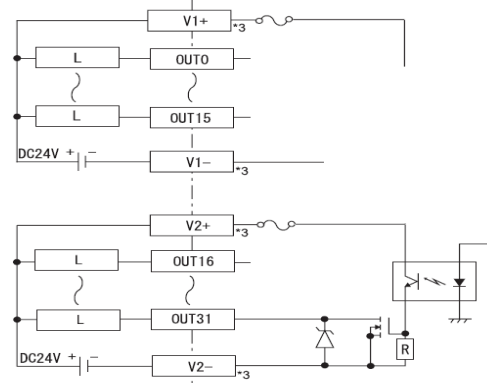
Outputs 0-15 use common ground (V1 -)

Outputs 16-31 use common ground (V2 -)

0.2 Amp per output max current

Outputs 0-15 Max current 1.6A

Outputs 16-31 Max current 1.6A

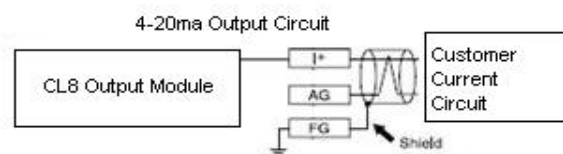


B.2 4 to 20mA Module (2 Points per Module) (PN: 2-500-011)

TR+	SLD	+24V		V1+	I1+	V2+	I2+
TR-	0V		FG	AG1	FG	AG2	FG

Labeled connector on each 4 to 20ma Module.

IMPORTANT: Use only connections above shown in grey. Other connections are pre-wired in the CL4/CL8.



4-20 ma Output Circuit Wiring.

Description	Module	Connection	Symbol
Point 1 4 to 20 ma	1	I1+	I+
	1	AG1	AG
	1	FG	FG
Point 2 4 to 20 ma	1	I2+	I+
	1	AG2	AG
	1	FG	FG
Point 3 4 to 20 ma	2	I3+	I+
	2	AG1	AG
	2	FG	FG
Point 4 4 to 20 ma	2	I4+	I+
	2	AG2	AG
	2	FG	FG
Point 5 4 to 20 ma	3	I1+	I+
	3	AG1	AG
	3	FG	FG
Point 6 4 to 20 ma	3	I2+	I+
	3	AG2	AG
	3	FG	FG
Point 7 4 to 20 ma	4	I3+	I+
	4	AG1	AG
	4	FG	FG
Point 8 4 to 20 ma	4	I4+	I+
	4	AG2	AG
	4	FG	FG

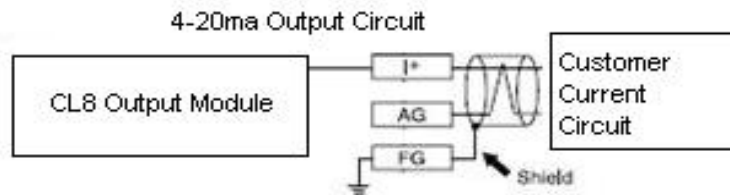
Module	Address
Module 1	6
Module 2	8
Module 3	10
Module 4	12

B.2.1 4 to 20mA Module (4 Points per Module) (PN: 2-500-011)

TR+	SLD	+24V	AG1	V2+	I2+	V3+	I3+	AG4	FG*
TR-	0V	V1+	I1+	AG2	FG*	AG3	V4+	I4+	GND

Labeled connector on each 4 to 20ma Module. *Each 'FG' terminal may be used for 2 points.

IMPORTANT: Use only connections above shown in grey. Other connections are pre-wired in the CL4/CL8.



4-20 ma Output Circuit Wiring.

Description	Module	Connection	Symbol
Point 1 4 to 20 ma	1	I1+	I+
	1	AG1	AG
	1	FG*	FG
Point 2 4 to 20 ma	1	I2+	I+
	1	AG2	AG
	1	FG*	FG
Point 3 4 to 20 ma	1	I3+	I+
	1	AG3	AG
	1	FG*	FG
Point 4 4 to 20 ma	1	I4+	I+
	1	AG4	AG
	1	FG*	FG
Point 5 4 to 20 ma	2	I1+	I+
	2	AG1	AG
	2	FG*	FG
Point 6 4 to 20 ma	2	I2+	I+
	2	AG2	AG
	2	FG*	FG
Point 7 4 to 20 ma	2	I3+	I+
	2	AG3	AG
	2	FG*	FG
Point 8 4 to 20 ma	2	I4+	I+
	2	AG4	AG
	2	FG*	FG

Module	Address
Module 1	9
Module 2	D

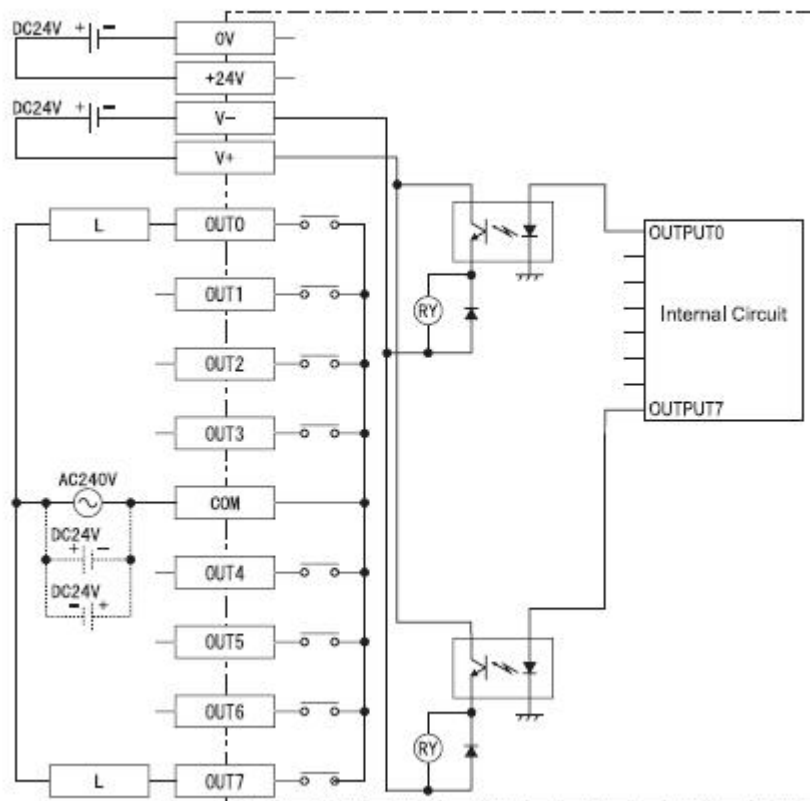
B.3 8-Point Module (PN: 2-500-012)

TR+	SLD	+24V	V+					COM				
TR-	0V	V-			0	1	2	3	4	5	6	7

Labeled connector on each 8 Point Relay Module. See drawing below.

IMPORTANT: Use only connections above shown in grey. Other connections are pre-wired in the CL8.

Module	Address
8 Point Relay Module	7



B.4 Optional Mechanical Relays

Description	Output
Point 1 Alarm Level 1	0
Point 1 Alarm Level 2	1
Point 2 Alarm Level 1	2
Point 2 Alarm Level 2	3
Point 3 Alarm Level 1	4
Point 3 Alarm Level 2	5
Point 4 Alarm Level 1	6
Point 4 Alarm Level 2	7
Point 5 Alarm Level 1	8
Point 5 Alarm Level 2	9
Point 6 Alarm Level 1	10
Point 6 Alarm Level 2	11
Point 7 Alarm Level 1	12
Point 7 Alarm Level 2	13
Point 8 Alarm Level 1	14
Point 8 Alarm Level 2	15
Critical Fault (Fault)	16
SPARE (UNUSED)	17
Power On	18
Analysis Mode (Out of Analysis)	19
General Fault (Maintenance)	20
Gas Alarm Level 1	21
Gas Alarm Level 2	22

NOTES

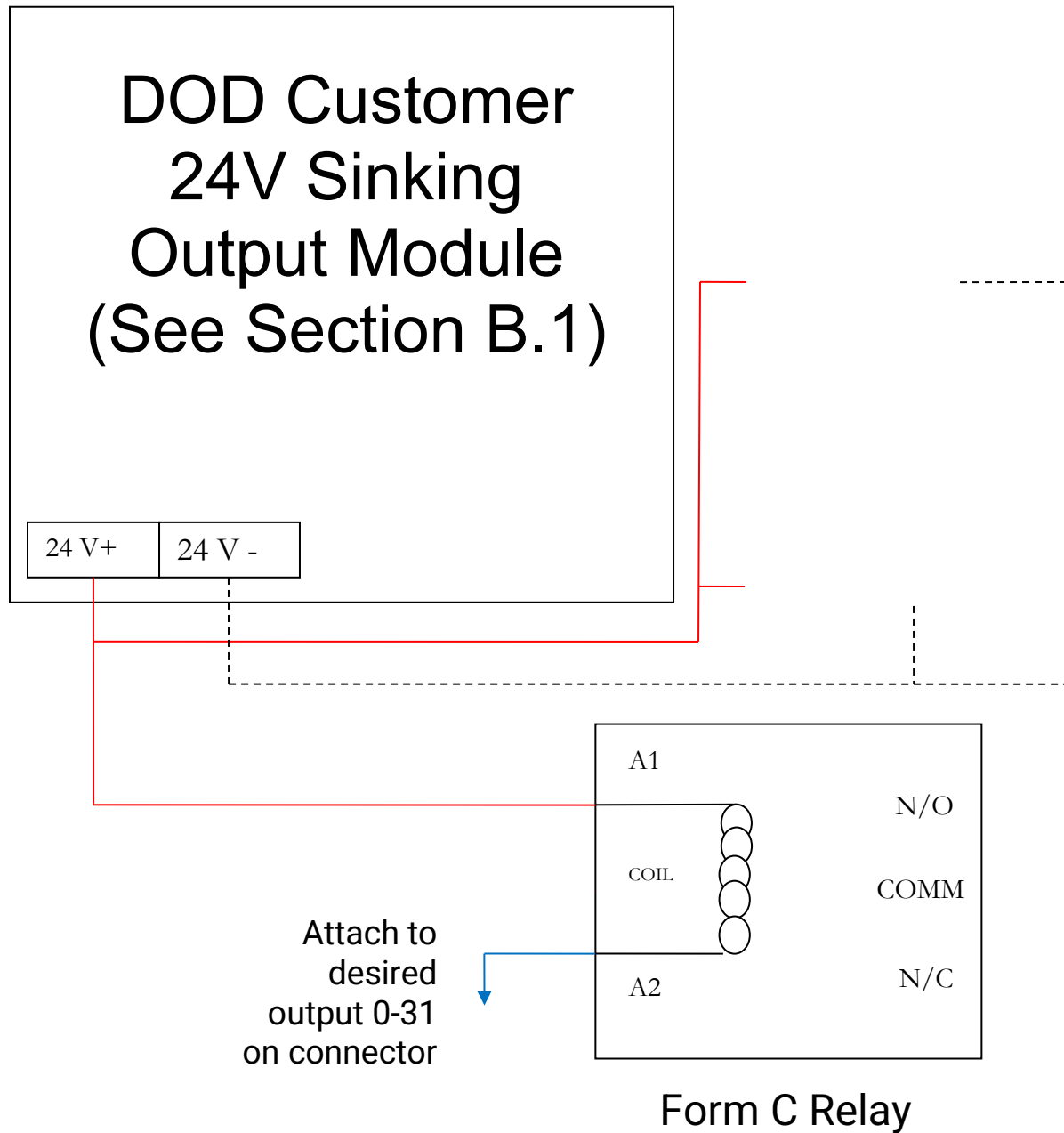
240 VAC max per relay

Xx Amps max current per relay

B.4.1 Optional Mechanical Relay Wiring

Below is a typical wiring diagram to connect a Form C Relay to any of the sinking outputs described in Appendix B.1 Note: You must connect 24V + to both V1+ / V2+ AND connect 24V- to both V1-/ V2- on the connector as shown below.

0	1	Output
2	3	
4	5	
6	7	
8	9	
10	11	
12	13	
14	15	
V1 +	V1 -	
16	17	
18	19	
20	21	
22	23	
24	25	
26	27	
28	29	
30	31	
V2 +	V2 -	



B.5 OPC Interface (PN: 2-500-501)

Use the RJ-45 connector pictured below to connect the CL4/CL8 to the I/P:network when the optional OPC Interface (OPC I/F) is specified. The connector is located on the inside of the machine next to the top DIN-rail.



Appendix C – System Specifications

Physical Dimensions	
Height	20"
Width	20"
Depth	11.3"
Weight	Approx. 65 lbs.
Tubing	
Exhaust Line (1)	3/8" OD x 1/4" ID polyethylene, polypropylene or Teflon (25 ft. max length)
Sample Lines (8)	1/4" OD x 3/16" ID Teflon FEP tubing (300 ft. max length)
Power	
A/C Power	(100-120 VAC, 50/60 HZ) (220/240 VAC, 50/60 HZ)
Standard Output Relays	
Rated Output Voltage	DC 24V
Rated Output Voltage Range	DC 20.4V - 28.8V
Maximum Load Voltage	0.2A/Connection (1.6A maximum pts 0-15 & pts 16)
Output Protection	None
Operation / Environment	
Operating Temperature	40°F to 104°F / 4°C to 40°C
Relative Humidity	Should not exceed 50% at max temperature of 104°F (40°C). Higher RH is permitted at lower temperatures (i.e. 90% at 20°C)
Altitude	Capable at altitudes up to 3,280 ft. (1000m) above mean sea level
Operating Noise	Maximum noise level for this equipment was less than 70db(A)
Transport	
Transport Times	Approx. 36 Seconds at 250 ft. 18 seconds at 125 ft.

Appendix D – System Event Messages

COLOR CODING	
RED	Gas Alarm
ORANGE	Service Fault (critical)
YELLOW	Maintenance (non-critical)
BLUE	Information Message
GREEN	Status (during analysis)

Event Code	Message	Corrective Action
30000	System Communication Failure	Service required
30001	All Points Are Disabled	Enable 1 or more points – Sections 4.2.a
30002	Low flow multiple points	Check pump, gate, or adjust flow
30003	Gate Close Fault	Gate home switch stuck or gate not moving
30004	Gate open Fault	Check gate home switch and/or mechanism
30005	High background Fault	Check/replace tape
30006	I/O Failure - Check wiring	Check RS-485 wiring
30007	No Gas Family Selected	Service required
30008	Pump failure	Check pump wiring/flow
30009	Tape Advance Fault	Tape switch not activated before timeout
30010	Optic 1 Communication Error	Check Wiring or Optic 1
30011	Optic 2 Communication Error	Check Wiring or Optic 2
30012	High Background Tape Advance Fault	Check/replace tape
30013	LED Failure Optic 1	Possible Tape alignment problem
30014	Warning : Default values restored	Reconfigure & Calibrate
30015	Pump Timeout Error	Pump failure or system problem
30016	Tape Advance Problem	Service required
30017	Optic 1 LED Failure	Service required
30018	Optic 2 LED Failure	Service required
30019	Optic Supply Voltage Failure	Service required
30020	Optic reference validation fault	Service required
30021	LED Failure Optic 2	Service required
30022	Complete Optic Low Flow all Pt 1-4	Check gate closure
30023	Complete Optic Low Flow all Pt 5-8	Check gate closure
30024	LED Calibration error	
50000	Chemlogic tape supply low	Change Tape
50001	Pt X High Flow	Flow Adjustment - Section 4.2.d
50009	Pt X Low Flow	Flow Adjustment - Section 4.2.d
60000	8 Hour - conc. detected	
60010	Last analysis - Conc. detected	
60011	Alarms & Faults Reset	
60012	Error Transferring TWA/Analysis Summary	
60013	Flow Fluctuation	
60014	Maximum # of Ref fluctuations	

60015	LED Fluctuation fault	
60016	Temperature fluctuation - O1	
60017	Temperature fluctuation - O2	
60018	K Factor - all pts = 1.000	
60019	K Factor - some pts <> 1.000	
60020	Reference fluctuation point X	
60028	Power UP Time	
60029	PT X Disabled	
60030	Tape Counter Reset	
60031	Simulation Mode	
60032	Simulation Enabled Point 1	
70000	DIAGNOSTIC STATUS OK	
70001	8 Hour - no conc. all points.	
70002	Analysis Start Time	
70003	Last analysis - no Conc. found	

Appendix E – Gas Specifications

Family	Gas	Range	LDL	Full Scale	Alarm Level 1 Default	Alarm Level 2 Default	Tape Part #
120 Day Ammonia	NH3	NH3(0-75)ppm	1.2	75	25	50	1-700-012
120 Day Hydrides	AsH3	AsH3(0-500)ppb	5.4	500	50	100	1-300-012
120 Day Hydrides	B2H6	B2H6(0-1000)ppb	6.0	1000	100	200	1-300-012
120 Day Hydrides	PH3	PH3(0-1500)ppb	4.9	1500	300	600	1-300-012
120 Day Hydrides	SiH4	SiH4(0-50)ppm	0.2	50	5	10	1-300-012
120 Day Hydrides	H2S	H2S(0-20)ppm	0.2	20	10	20	1-300-012
120 Day Hydrides	H2S	H2S(0-5)ppm	0.1	5	0.5	1	1-300-012
120 Day Hydrides	SiH4	SiH4(0-50)ppm	0.2	50	5	10	1-300-012
120 Day Phosgene	COCl2	COCl2(0-1000)ppb	8.9	1000	100	200	1-200-012
120 Day Phosgene	COCl2	COCl2(0-300)ppb	3.9	300	100	200	1-200-012
120 Day Phosgene	COCl2	COCl2(0-3250)ppb	8.8	3250	100	200	1-200-012
120 Day Phosgene	COCl2	COCl2(0-5000)ppb	8.8	5000	100	200	1-200-012
120 Mineral Acids	HCL	HCL(0-15)ppm	0.2	15	5	10	1-400-012
120 Mineral Acids	HF	HF(0-10)ppm	0.2	10	3	6	1-400-012
120 Mineral Acids	BF3	BF3(0-3200)ppb	72.2	3200	1000	2000	1-400-012
120 Mineral Acids	HBR	HBR(0-20)ppm	0.2	20	3	6	1-400-012
60 Day Hydrides	AsH3	AsH3(0-500)ppb	4.7	500	50	100	1-300-010
60 Day Hydrides	B2H6	B2H6(0-1000)ppb	31.5	1000	100	200	1-300-010
60 Day Hydrides	PH3	PH3(0-1500)ppb	8.4	1500	300	600	1-300-010
60 Day Hydrides	SiH4	SiH4(0-50)ppm	0.7	50	5	10	1-300-010
60 Day Hydrides	H2S	H2S(0-25)ppm	0.1	25	10	20	1-300-010
60 Day Mineral Acids	HCL	HCL(0-15)ppm	0.2	15	5	10	1-400-010
60 Day Mineral Acids	HF	HF(0-10)ppm	0.3	10	3	6	1-400-010
60 Day Mineral Acids	BF3	BF3(0-3200)ppb	72.1	3200	1000	2000	1-400-010
60 Day Mineral Acids	HBR	HBR(0-20)ppm	0.2	20	3	6	1-400-010
60 Day Phosgene	COCl2	COCl2(0-1000)ppb	8.9	1000	100	200	1-200-010
60 Day Phosgene	COCl2	COCl2(0-4000)ppb	8.9	4000	100	200	1-200-010
Acetic Acid	Acetic Acid	Acetic Acid(0-50) ppb	0.7	50	10	20	1-490-010
Bromine	Br2	Br2(0-1000)ppb	68.8	1000	100	200	1-490-062
Chlorine	CL2	CL2(0-2000)ppb	6.9	2000	500	1000	1-500-010
COS	COS	COS(0-20)ppm	0.9	20	5	10	1-300-062
HCN	HCN	HCN(0-2500)ppb	298.2	2500	500	1000	1-800-010
Hydrazine	N2H4	N2H4(0-500)ppb	4.3	500	5	10	1-D11-010
Low Level Chlorine	CL2	CL2(0-30)ppb	1.0	30	5	10	1-500-014
Low Level Hydrides	H2Se	H2Se(0-500)ppb	5.1	500	50	100	1-300-012
Low Level Hydrides	AsH3	AsH3(0-50)ppb	0.9	50	5	10	1-300-012
Low Level Hydrides	GeH4	GeH4(0-2000)ppb	62.1	2000	200	400	1-300-012

Low Level Hydrides	PH3	PH3(0-300)ppb	4.8	300	50	100	1-300-012
MIC	MIC	MIC(0-100)ppm	3.7	100	10	20	1-600-010
NO2	NO2	NO2(0-100)ppm	0.3	100	3	6	1-600-511
Oxidizers	CL2	CL2(0-3200)ppb	50.1	3200	500	1000	1-550-010
Oxidizers	NO2	NO2(0-30)ppm	1.3	30	3	6	1-550-010
Oxidizers	F2	F2(0-3200)ppb	105.6	3200	1000	2000	1-550-010
Pyrolyzer - M/A	C5F8	C5F8(0-15)ppm	0.5	15	2	4	1-400-014
Pyrolyzer - M/A	NF3	NF3(0-15)ppm	0.5	15	2	4	1-400-014
Velcorin	DMDC	DMDC(0-200)ppb	8.8	200	40	80	1-200-030

Appendix F – USB Memory Stick Data

To ensure that historical and performance information is stored properly be sure to insert a USB Memory Stick in the proper slot at all times. See Section 6.6 for installation instructions.

The USB Memory Stick stores all information in standard comma-separated values (*.CSV) format for easy access with any computer. Remove the USB Memory Stick from the CL4/CL8 as described in Section 6.6 and transfer the files to your personal computer*. The files are best viewed with programs that convert CSV format to rows and columns (Microsoft Excel, OpenOffice, etc) but could be viewed with any standard text editor.

Figure B.1 below shows the folders and files found on the USB Memory Stick depending on the configuration or your CL4/CL8 and the use of the USB Memory Stick.

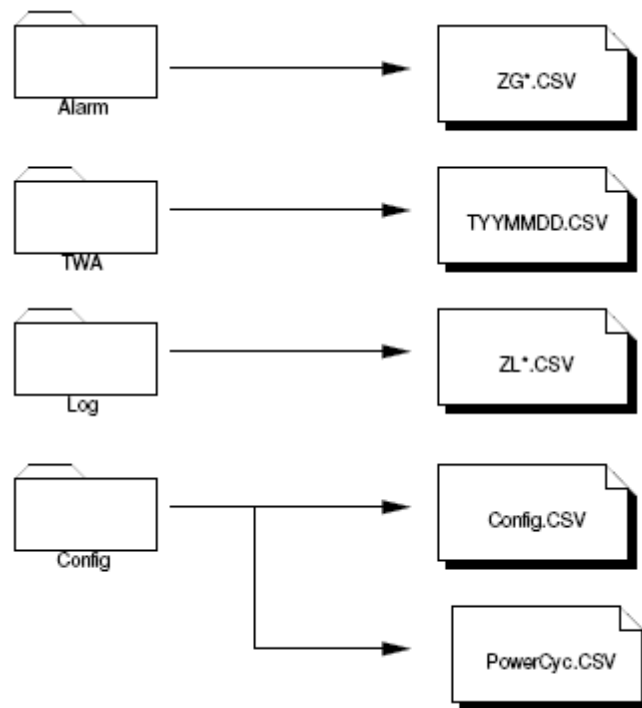


Figure B.1

F.1 Alarm & Event files (ZG*.CSV)

A portion of a typical event file when viewed with a spreadsheet program is shown below. Since the messages are written in reverse chronological order the recovery time shown is above the time of occurrence of the message.

NOTE : The columns labeled 'Acknowledge Time', 'No. of Occ', and 'Acc Time' are for DOD use only.

Trigger Date	Trigger Time	Message(s)	Acknowledge Time	Recovery Time	No. of occ.	Acc. time	Level
11/7/2006	17:32:00	8 Hour - no conc. all points.			36	0:14:17	7
		8 Hour - no conc. all points.		9:32:20	36	0:14:17	7
11/7/2006	9:32:00	8 Hour - no conc. all points.			36	0:14:17	7
		8 Hour - no conc. all points.		1:32:21	36	0:14:17	7
11/7/2006	1:32:00	8 Hour - no conc. all points.			36	0:14:17	7
		8 Hour - no conc. all points.		17:32:32	36	0:14:17	7
11/6/2006	17:32:00	8 Hour - no conc. all points.			36	0:14:17	7
11/6/2006	9:32:01	Analysis Start Time			13	35:13:06	7

F.2 TWA Data Logs (TYMMDD.CSV)

The time weighted average information is stored on the USB Memory Stick in the TWA folder. A new file is started each day (named with the year, month, and day) for easy retrieval. Below is a sample of one cycle stored in a file.

DOD Technologies INC												
http://www.dodtec.com												
Analysis Cycle 4												
Start Date/Time 4/11/2007 22:58												
End Date/Time 4/12/2007 6:58												
Analysis Time 8:00												
Point		1	2	3	4	5	6	7	8			
Gas	AsH3	AsH3	AsH3	AsH3	AsH3	AsH3	AsH3	AsH3	AsH3			
Avg Conc.		0	0	0	0	0	0	0	0			
Peak Conc.		0	0	0	0	0	0	0	0			
Peak 15 Min Avg. Conc.		0	0	0	0	0	0	0	0			
Peak 15 Min Avg. Date		0	0	0	0	0	0	0	0			
Peak 15 Min Avg. Time		0	0	0	0	0	0	0	0			

F.3 Concentration Log Files (ZL*.CSV)

When gas is detected a log file is written to the USB Memory Stick (if installed) based on the configuration settings – see Section 4.5. Below is a sample of the file format stored on the USB Memory Stick - all 4/8 points are logged regardless of where the gas is detected.

Date	Time	1	2	3	4	5	6	7	8
07/03/09	07:26:11 PM	0	0	1.2	0	0	0	0	0
07/03/09	07:26:13 PM	0	0	1.2	0	0	0	0	0
07/03/10	12:19:40 AM	0	0	1.2	0	0	0	0	0
07/03/10	12:19:42 AM	0	0	1.2	0	0	0	0	0
07/03/10	12:19:44 AM	0	0	1.6	0	0	0	0	0
07/03/10	12:19:46 AM	0	0	1.6	0	0	0	0	0
07/03/10	12:19:48 AM	0	0	2	0	0	0	0	0

F.4 Config File

A configuration file is created on the USB Memory Stick each time the ChemLogic CL4/CL8 is powered on. The config file stores basic information about the machine including version information, serial number, customer name (if entered), etc. All of the information is stored in CSV format for easy viewing.

Appendix G – ChemLogic® Cassettes

ChemLogic Cassettes are designed for use in colorimetric-based gas monitoring systems. Since this is a particular end-use function and does not release or result in exposure to hazardous chemicals under normal use Material Safety Data Sheets (MSDS) are not required.

ChemLogic Cassettes are non-toxic and require no special precautions for protection.

However, contact with skin may cause the cassette to react, change color, and no longer be useful in your gas monitoring system. We therefore recommend that rubber gloves be worn at all times while handling including removal and installation. Always wash hands as a precaution after handling ChemLogic Cassettes.

Appendix H – Optic Block Cleaning Procedure

The CL4/CL8 may require periodic cleaning of the optics block when the instrument is used in environments with a high level of airborne particulate or a “High Background” Fault has been reported.

There are two methods for cleaning the optics. One is a basic cleaning using canned air and the other is a more in-depth cleaning that requires the fiber optics to be cleaned with alcohol.

In most cases, the basic cleaning will be enough to clear an optics fault and return the DAC to normal operating levels.

H.1 Basic Optics Cleaning

- 1) Exit analysis mode and go to the load tape screen.
- 2) Open the gate and remove the tape.
- 3) Remove the optic block covers and the four screws holding in the optic blocks. (Figure 1)



Figure 1



Figure 2

- 4) Pull block towards you until the pins holding the block in are loose (Figure 2)
- 5) Without removing any tubes, turn block so the bottom is facing out. (Figure 3)



Figure 3

- 6) Using canned air, blow out the channels on the block with high DAC values (Figure 3)
- 7) Re-Install the blocks and close the gate.
- 8) Press just below the top left corner in the load tape screen until the enter password screen appears. (Figure 4)



Figure 4



Figure 5

- 9) Enter 1225 for the password then press "Enter".
- 10) You should see the calibrate optics screen (Figure 5), then make sure the gate is closed and press "Calibrate".
- 11) If the DAC values are 140 or below you are done. Go to "Main Menu" and clear the original faults and re-enter analysis.
- 12) If the DAV values are not lower than 140, follow the advanced cleaning instructions below.

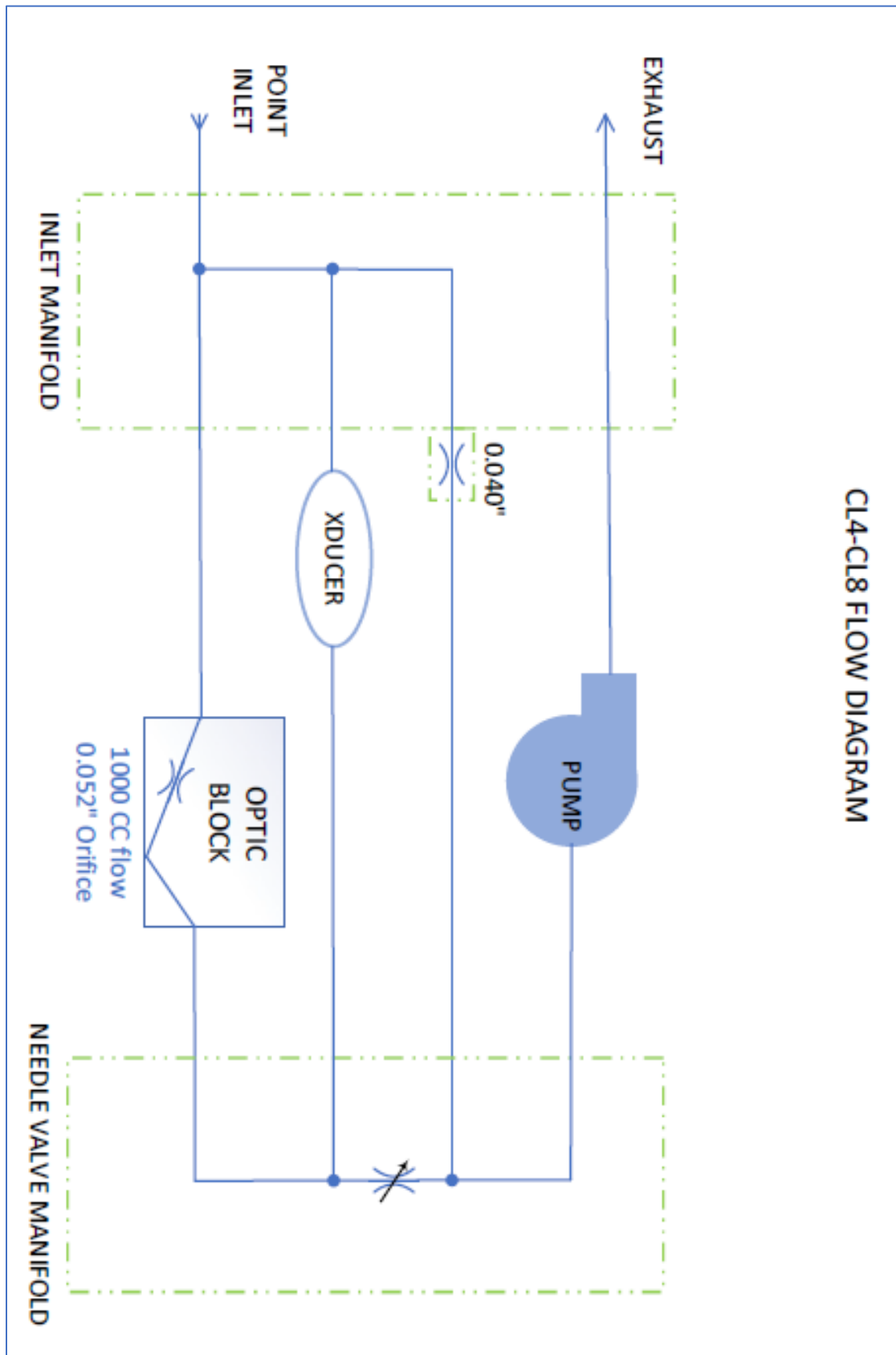
H.2 Advanced Optics Cleaning

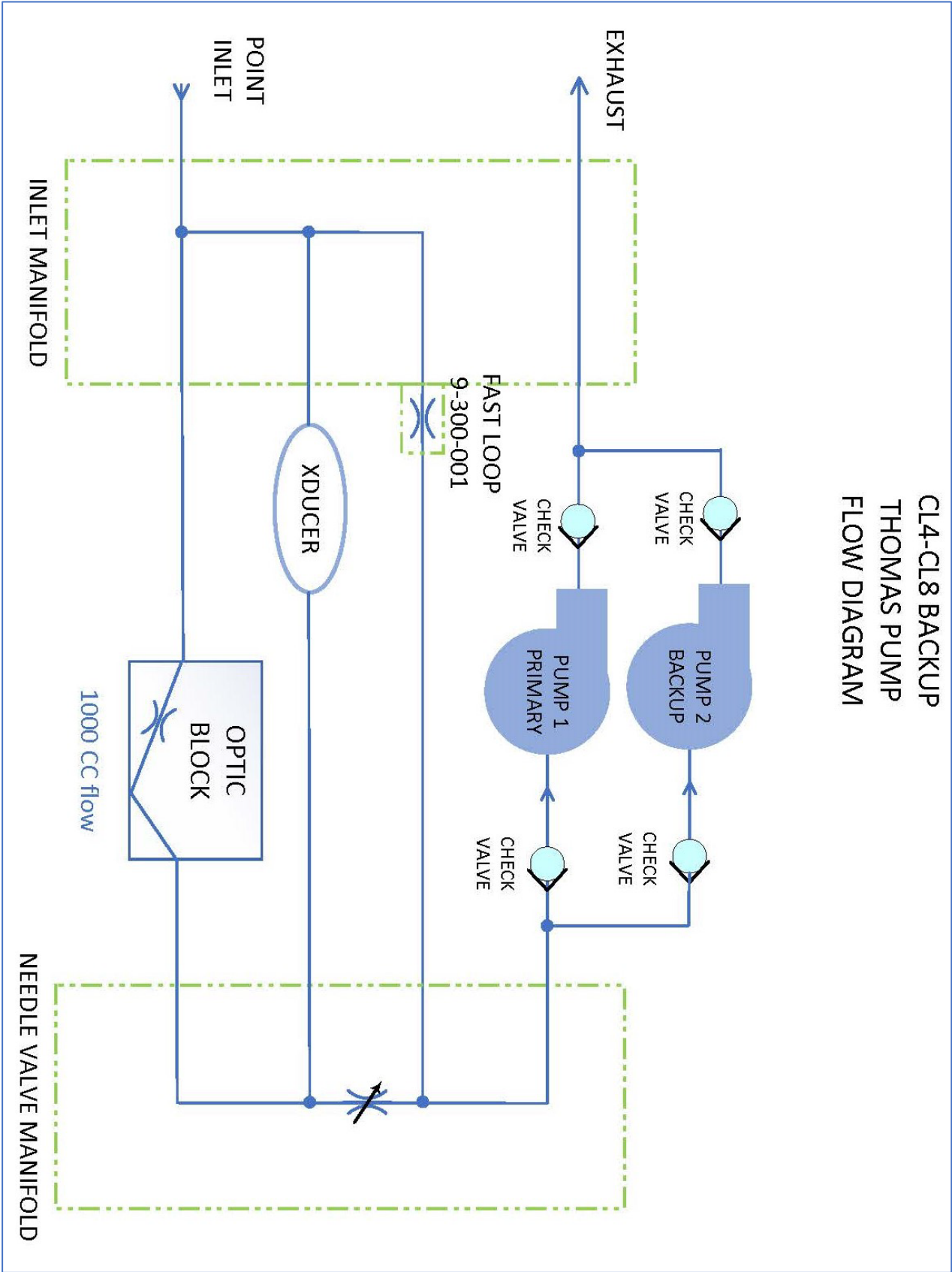
- 1) Repeat above steps 1-5.
- 2) Using a cotton swab and alcohol (you may have to trim the cotton swab to fit) clean each channel that has a DAC above 140. (Figure 6)



Figure 6

- 3) Repeat above steps 7-11
- 4) If the DAC values still have not improved contact CL4/CL8 technical support at (815)-788-5200





Appendix J – Pyrolyzer Operation

J.1 Overview

The DOD Technologies ChemLogic® CL4/CL8 Pyrolyzer option uses two four-point pyrolyzers enclosed in a separate housing the same size & shape as the CL4/CL8. The pyrolyzer has its own power cord, on/off switch, and exhaust fan as shown in Figure 1.

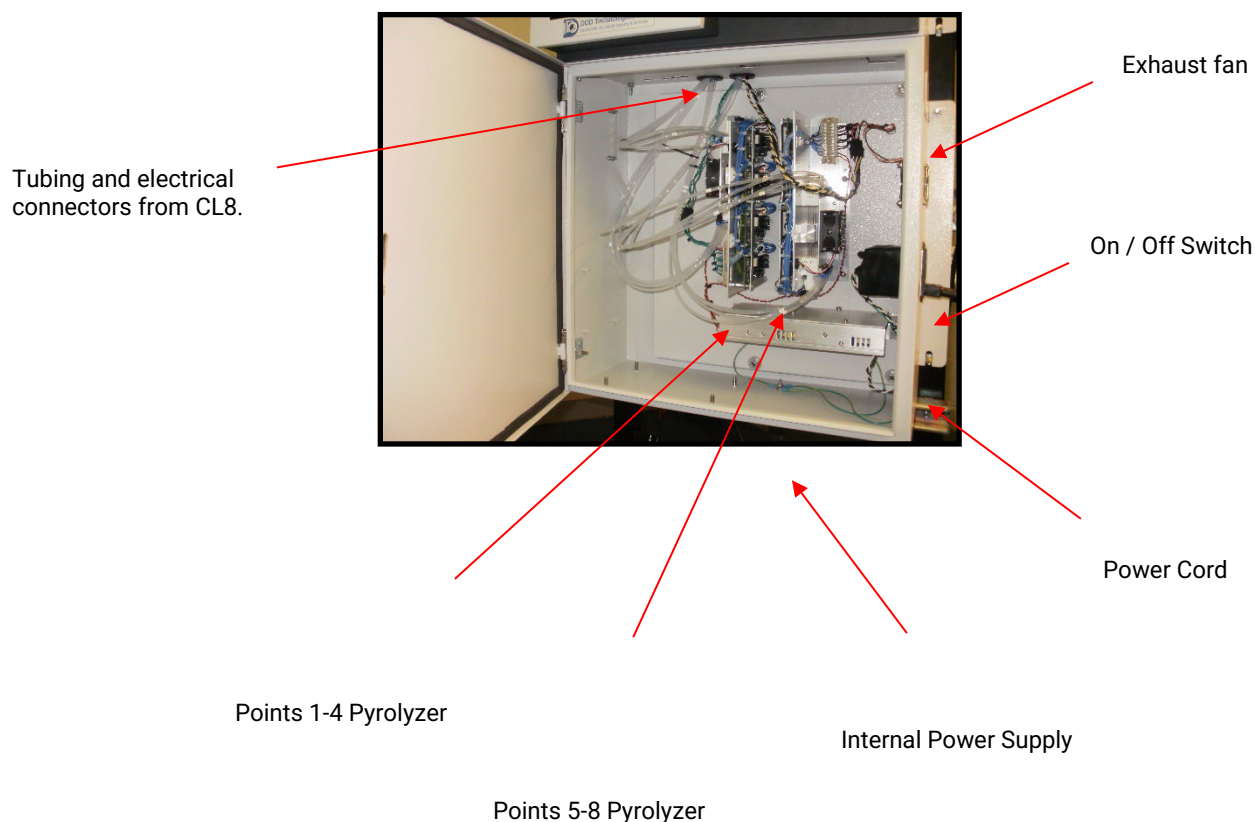


Figure 1

WARNING: To provide adequate cooling of the unit provide a minimum of 6" of clearance on both sides of the Pyrolyzer unit for proper air circulation. Do not block the exhaust fan.

J1.1 Pyrolyzer Installation Diagram

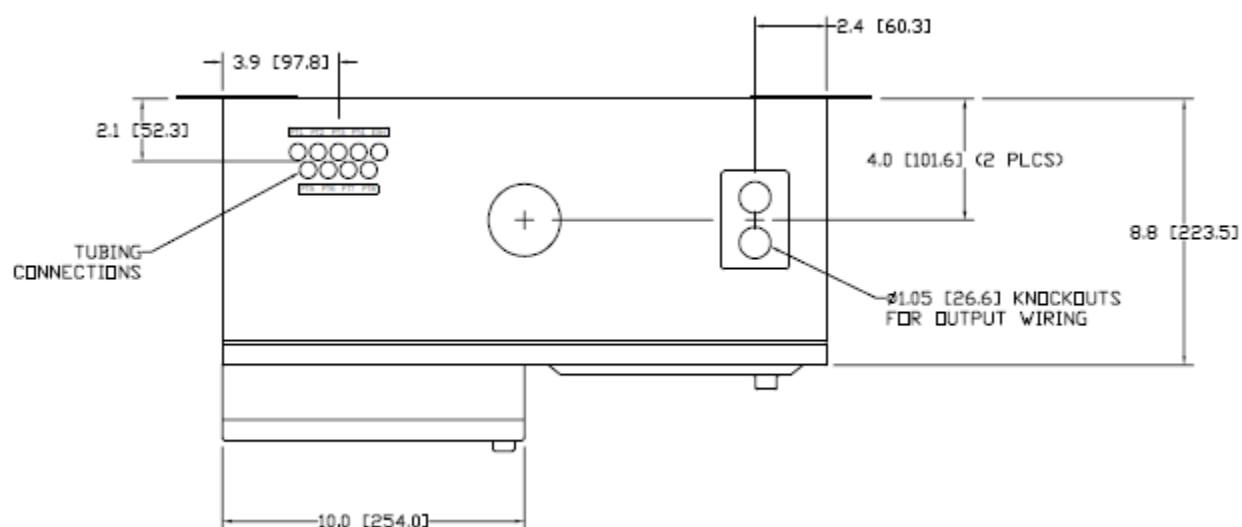
CL8 Operating Voltage: 110/115VAC (+/-10) 50/60 Hz <1.0 Amps;
230VAC (+/-10) 50/60 Hz <0.5 Amps

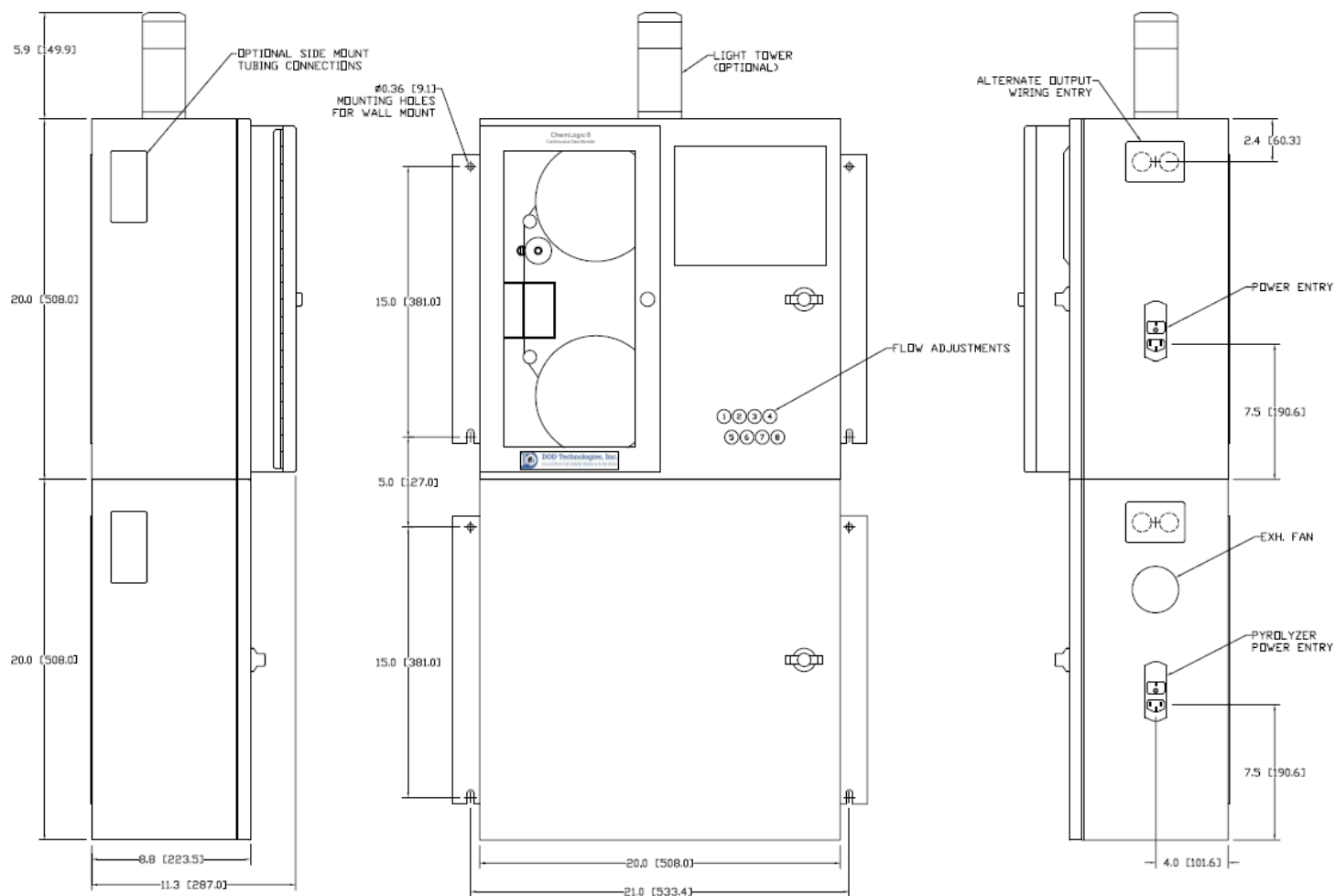
Pyrolyzer Operating Voltage: 110/115VAC (+/-10) 50/60 Hz <2.0 Amps;
230VAC (+/-10) 50/60 Hz <1.3 Amps

Sample Tubing Points 1-8 FEP Teflon: 1/4" OD x 3/16" ID x 300' (91 mtrs)

Exhaust Tubing Polyethylene: 3/8" OD x 1/4" ID x 25' (7.5 mtrs)

Please allow 4' minimum spacing (left and right side) to allow door swing and power plug clearance

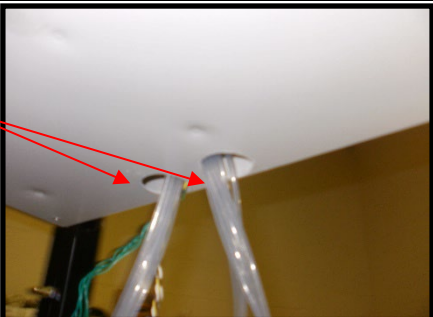
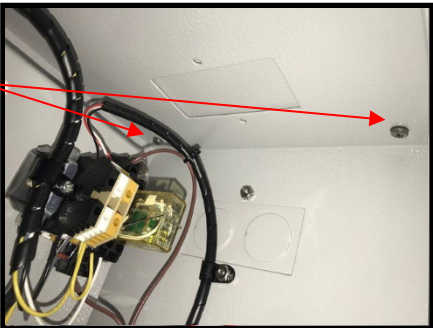
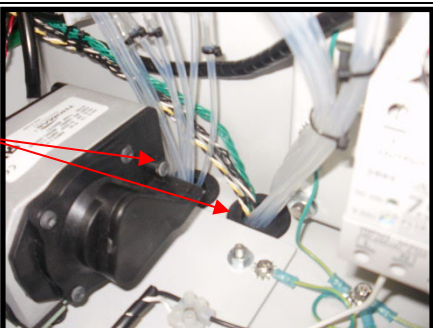
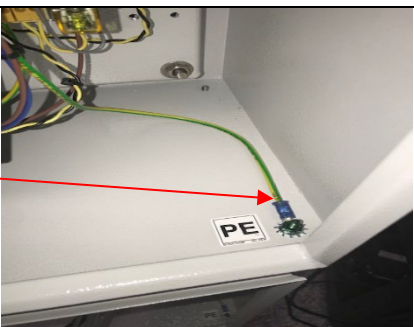




J.2 Installation

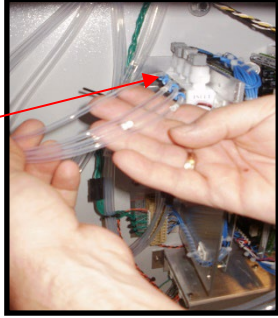
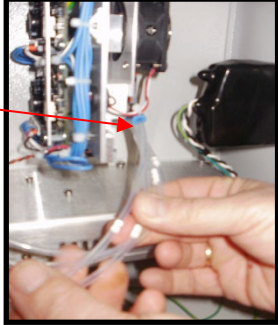
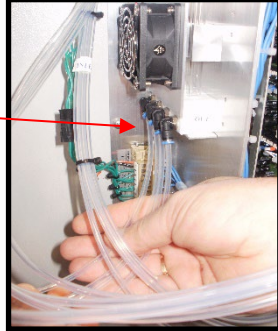
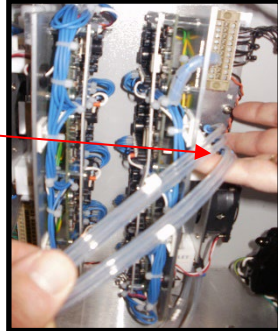
J.2.1 Mounting

WARNING: The doors on the CL4/CL8 unit and the pyrolyzer are heavy and can tip the units when opening if they are not permanently mounted. Care must be taken when assembling the two units together before mounting.

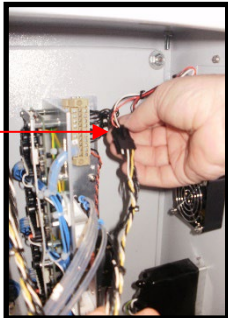
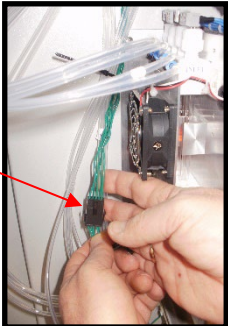
<p>Carefully feed wiring and tubing bundles from the bottom of CL4/CL8 into corresponding holes on top of the pyrolyzer. Make sure the grommets are attached over the bundles inside the CL4/CL8.</p>	<p>Wiring & Tubing bundles exit holes on bottom of CL4/CL8 unit.</p> 
<p>Place CL4/CL8 unit on top of pyrolyzer. Align units properly and make sure wires & tubing are not pinched. Securely tighten screws from inside pyrolyzer.</p>	<p>From inside the Pyrolyzer unit insert and tighten four (4) 8/32" screws at the top and tighten to secure unit to CL8 using pre-tapped holes.</p> 
<p>Press the Grommets into the hole to cover the metal edges of both the CL4/CL8 and the pyrolyzer. Check the Grommet from above and below to assure they are properly seated</p>	<p>Grommets seated properly.</p> 
	<p>Reattach the Protective Earth (PE) ground wire inside the CL8 cabinet</p> 

J.2.2 Tubing

NOTE : The two bundles of tubing labeled 'inlet' and 'out' each contain 8 tubes which must be attached to the pyrolyzers. The left pyrolyzer is points 1-4 and the right side is points 5-8. The pyrolyzers are mounted opposite so the inlet and out tubes are opposite each other on each unit.

<p>First carefully attach inlet tubes 1-4 to the top connectors of the left pyrolyzer.</p>	<p>Using the labels on the tubing connect the inlet tubes to points 1 thru 4. Point 1 is in the top-left-back sequentially thru point 4 in the top-left-front.. Fully insert the tubes securely in to the Pyrolyzer fitting.</p> 
<p>Now repeat the procedure for the inlet of points 5-8 on the bottom of the right pyrolyzer.</p>	<p>Point 5 is in the bottom-right-back sequentially thru point 8 in the bottom-right-front. Fully insert the tubes securely in to the pyrolyzer fitting.</p> 
<p>Connect the outlet tubes for points 1-4 to the bottom of the left pyrolyzer.</p>	<p>Point 1 is in the bottom-left-back sequentially thru point 4 in the bottom-left-front.</p> 
<p>Connect the outlet tubes for points 5-8 to the top of the right pyrolyzer.</p>	<p>Point 5 is in the top-right-back sequentially thru point 8 in the top-right-front.</p> 

J.2.3 Wiring

<p>The pyrolyzer and fan power connector contains the yellow, black, & white wires.</p>	<div data-bbox="628 319 901 470" data-label="Text"> <p>Connect the pyrolyzer and fan power connector as shown.</p> </div> 
<p>The pyrolyzer output connector contains all green wires.</p>	<div data-bbox="673 667 924 852" data-label="Text"> <p>Connect the pyrolyzer output/status connector as shown.</p> </div> 

J.3 Operation

Be sure both the pyrolyzer and the CL8 are powered on before operation. See the CL8 user’s manual for operation of the CL8 unit. No special configuration is necessary for the pyrolyzer option after the gas tables are loaded at the factory.

J.3.1 Filters

End-of-line filters are recommended for all sample tubing on the CL4/CL8.

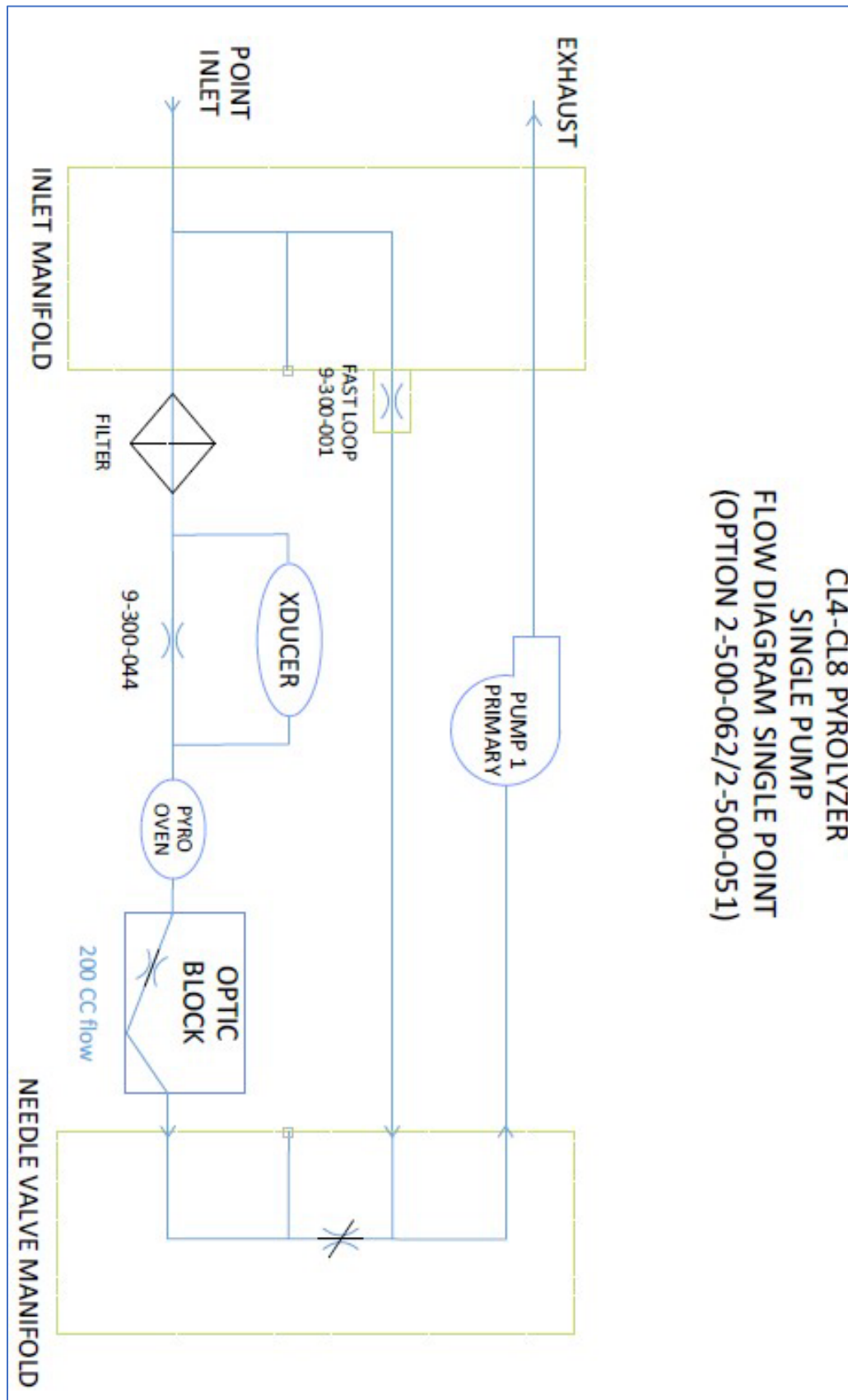
J.3.2 Error Messages

The pyrolyzer option includes several event log messages in addition to the standard CL4/CL8 event messages – see Figure 3 below.

<p><u>Message</u></p>	<p><u>Corrective Action</u></p>
<p>Pyro Encl Fan Fault</p>	<p>Repair/replace pyrolyzer enclosure exhaust fan.</p>
<p>Pyrolyzer fault Point X</p>	<p>Repair/replace the element for the specified point***</p>

Figure 3

***In addition to the enclosure exhaust fan, each pyrolyzer assembly has its own exhaust fan. When a pyrolyzer fan fails all four points of the assembly will issue a fault message simultaneously. When the four messages appear together check the pyrolyzer fan for proper operation.



Appendix K – Data Communication

The CL4/CL8 is capable of supporting multiple communication protocols. For additional information or assistance, please contact DOD Technologies.

K.1 – Modbus/TCP

MODBUS/TCP data contains concentrations, alarm levels, and gas types for all 8 points in addition to machine fault, general alarm, and misc bit indicators. Alarm Levels and Concentration are passed as unsigned integers. The actual concentration on the point is the value divided by 10. For example if the value read for the concentration is 34 – the actual concentration is 3.4 * For CL4 ignore all data for points 5-8.

Default Slave ID: 1 Total Size: 44 Words

4x MODBUS Address	Format	Size	Description
2000	Numeric	16 Bit (Word)	Version
2001	BCD	16 Bit (Word)	Month
2002	BCD	16 Bit (Word)	Day
2003	BCD	16 Bit (Word)	Year
2004	BCD	16 Bit (Word)	Time
2005	Numeric	16 Bit (Word)	Heartbeat Seconds
2006	Numeric	16 Bit (Word)	Tape Days Remaining
2007	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 1
2008	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 2
2009	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 3
2010	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 4
2011	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 5
2012	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 6
2013	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 7
2014	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 8
2015	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 1
2016	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 2
2017	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 3
2018	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 4
2019	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 5
2020	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 6
2021	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 7
2022	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 8
2023	Numeric *	16 Bit (Word)	Concentration – Pt 1
2024	Numeric *	16 Bit (Word)	Concentration – Pt 2
2025	Numeric *	16 Bit (Word)	Concentration – Pt 3
2026	Numeric *	16 Bit (Word)	Concentration – Pt 4
2027	Numeric *	16 Bit (Word)	Concentration – Pt 5
2028	Numeric *	16 Bit (Word)	Concentration – Pt 6
2029	Numeric *	16 Bit (Word)	Concentration – Pt 7
2030	Numeric *	16 Bit (Word)	Concentration – Pt 8
2031	Numeric	16 Bit (Word)	Gas Type – Pt 1

2032	Numeric	16 Bit (Word)	Gas Type – Pt 2
2033	Numeric	16 Bit (Word)	Gas Type – Pt 3
2034	Numeric	16 Bit (Word)	Gas Type – Pt 4
2035	Numeric	16 Bit (Word)	Gas Type – Pt 5
2036	Numeric	16 Bit (Word)	Gas Type – Pt 6
2037	Numeric	16 Bit (Word)	Gas Type – Pt 7
2038	Numeric	16 Bit (Word)	Gas Type – Pt 8

2039	Bit Array	16 Bits	Bit 0 – Watchdog Bit 1- Analyzing Bit 2 – Audible Bit 3 – Light:Blue Bit 4 – CF/USB Valid Bit 5 – Critical Fault Bit 6 – General Gas Alarm Level 1 Bit 7 – General Gas Alarm Level 2 Bit 8 – General Fault Bit 9 – Light:Green Bit 10 – Light:Orange Bit 11 – Power Bit 12 – Light Red Bit 13 - 15 Undefined
2040	Bit Array	16 Bits	Alarm Level 1 on Points : Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
2041	Bit Array	16 Bits	Alarm Level 2 on Points : Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
2042	Bit Array	16 Bits	Points Enabled: Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
2043	Bit Array	16 Bits	Flow Fault On Points:

			Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
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Gas ID	Range Label
100	AsH3(0-500)ppb
101	B2H6(0-1000)ppb
104	PH3(0-1500)ppb
105	SiH4(0-50)ppm
108	H2S(0-25)ppm
115	COCl2(0-1000)ppb
116	COCl2(0-4000)ppb
129	AceticAcid(0-50)ppb
131	AsH3(0-500)ppb
132	B2H6(0-1000)ppb
133	PH3(0-1500)ppb
134	MIC(0-10)ppm
136	H2S(0-20)ppm
139	NH3(0-75)ppm
140	DMDC(0-500)ppb
201	SG_HCL(0-15)ppm
202	SG_HF(0-10)ppm
203	SG_BF3(0-3200)ppb
204	SG_HBR(0-20)ppm
303	SG_H2Se(0-500)ppb
309	HCL(0-15)ppm
310	HF(0-10)ppm
311	BF3(0-3200)ppb
312	HBR(0-20)ppm
319	AsH3(0-50)ppb
320	HCL(0-15)ppm
321	HF(0-10)ppm
322	BF3(0-3200)ppb
323	HBR(0-20)ppm
330	COCl2(0-1000)ppb
331	COCl2(0-300)ppb

Gas ID	Range Label
332	COCl2(0-3250)ppb
337	CL2(0-5000)ppb
339	CL2(0-3200)ppb
340	C5F8(0-15)ppm
341	Br2(0-1000)ppb
342	MIC(0-100)ppm
344	N2H4(0-500)ppb
345	NO2(0-30)ppm
346	F2(0-3200)ppb
350	NF3(0-20)ppm
351	NF3(0-20)ppm
353	HCN(0-2500)ppb
354	COS(0-20)ppm
356	NO2(0-100)ppm
357	PH3(0-300)ppb
358	H2S(0-5)ppm
359	CL2(0-30)ppb
403	SbH3(0-500)ppb
404	CL2(0-2000)ppb
405	SiH4(0-50)ppm
406	NF3(0-15)ppm
408	COCl2(0-5000)ppb
417	PH3(0-3000)ppb
422	NH3(0-150)ppm
429	C4F6(0-40)ppm
435	SG_CL2(0-5000)ppb
436	SG_CL2(0-2000)ppb
438	HCL(0-3250)ppb
441	SiH4(0-15000)ppb
444	F2(0-3200)ppb

K.2 – Ethernet/IP

The following table defines the data provided for CL8 Ethernet/IP Option 2-500-504. Use SLC_TYPE_READ command to read the AB SLC addresses in the table.

The Digi IAP Ethernet/IP to Modbus/RTU converter comes preconfigured from the factory. If not configured, consult DOD/Digi instructions to set up the converter.

4x MODBUS Address	AB SLC5000 Notation	Format	Size	Description
2000	N29:1999	Numeric	16 Bit (Word)	Version
2001	N30:00	BCD	16 Bit (Word)	Month
2002	N30:01	BCD	16 Bit (Word)	Day
2003	N30:02	BCD	16 Bit (Word)	Year
2004	N30:03	BCD	16 Bit (Word)	Time
2005	N30:04	Numeric	16 Bit (Word)	Heartbeat Seconds
2006	N30:05	Numeric	16 Bit (Word)	Tape Days Remaining
2007	N30:06	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 1
2008	N30:07	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 2
2009	N30:08	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 3
2010	N30:09	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 4
2011	N30:10	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 5
2012	N30:11	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 6
2013	N30:12	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 7
2014	N30:13	Numeric *	16 Bit (Word)	Alarm Level 1 – Pt 8
2015	N30:14	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 1
2016	N30:15	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 2
2017	N30:16	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 3
2018	N30:17	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 4
2019	N30:18	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 5
2020	N30:19	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 6
2021	N30:20	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 7
2022	N30:21	Numeric *	16 Bit (Word)	Alarm Level 2 – Pt 8
2023	N30:22	Numeric *	16 Bit (Word)	Concentration – Pt 1
2024	N30:23	Numeric *	16 Bit (Word)	Concentration – Pt 2
2025	N30:24	Numeric *	16 Bit (Word)	Concentration – Pt 3
2026	N30:25	Numeric *	16 Bit (Word)	Concentration – Pt 4
2027	N30:26	Numeric *	16 Bit (Word)	Concentration – Pt 5
2028	N30:27	Numeric *	16 Bit (Word)	Concentration – Pt 6
2029	N30:28	Numeric *	16 Bit (Word)	Concentration – Pt 7
2030	N30:29	Numeric *	16 Bit (Word)	Concentration – Pt 8
2031	N30:30	Numeric	16 Bit (Word)	Gas Type – Pt 1
2032	N30:31	Numeric	16 Bit (Word)	Gas Type – Pt 2
2033	N30:32	Numeric	16 Bit (Word)	Gas Type – Pt 3
2034	N30:33	Numeric	16 Bit (Word)	Gas Type – Pt 4
2035	N30:34	Numeric	16 Bit (Word)	Gas Type – Pt 5
2036	N30:35	Numeric	16 Bit (Word)	Gas Type – Pt 6

2037	N30:36	Numeric	16 Bit (Word)	Gas Type – Pt 7
2038	N30:37	Numeric	16 Bit (Word)	Gas Type – Pt 8
				Bit 0 – Watchdog Bit 1- Analyzing Bit 2 – Audible Bit 3 – Light:Blue Bit 4 – CF/USB Valid Bit 5 – Critical Fault Bit 6 – General Gas Alarm Level 1 Bit 7 – General Gas Alarm Level 2 Bit 8 – General Fault Bit 9 – Light:Green Bit 10 – Light:Orange Bit 11 – Power Bit 12 – Light Red Bit 13 - 15 Undefined
2039	N30:38	Bit Array	16 Bits	
				Alarm Level 1 on Points : Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
2040	N30:39	Bit Array	16 Bits	
				Alarm Level 2 on Points : Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
2041	N30:40	Bit Array	16 Bits	
				Points Enabled: Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5 Bit 5 – Pt 6 Bit 6 – Pt 7 Bit 7 – Pt 8 Bits 8-15 Undefined
2042	N30:41	Bit Array	16 Bits	
				Flow Fault On Points: Bit 0 – Pt 1 Bit 1 – Pt 2 Bit 2 – Pt 3 Bit 3 – Pt 4 Bit 4 – Pt 5
2043	N30:42	Bit Array	16 Bits	

Bit 5 – Pt 6
 Bit 6 – Pt 7
 Bit 7 – Pt 8
 Bits 8-15 Undefined

- Alarm Levels and Concentration are passed as unsigned integers. The actual concentration on the point is the value divided by 10. For example, if the value read for the concentration is 34 – the actual concentration is 3.4.

K.3 – ControlNet

The following information is available on the ControlNet interface.

CL8 Faults/Alarms (Discrete Outputs)

Token	Description	Type
Machine Critical Fault	Machine has critical fault	Boolean
Machine Maintenance Fault	Machine has a maintenance issue	Boolean
Machine Gas Alarm 1	Level 1 Gas Alarm at Least 1 Machine Point	Boolean
Machine Gas Alarm 2	Level 2 Gas Alarm at Least 1 Machine Point	Boolean
Power On	Power is on to Analyzer	Boolean

For Each Point

- Concentration
- Alarm Level 1 & 2
- Alarm Active Indicators (1 & 2)
- Enabled
- Gas Type
- Flow Fault

Token	Description	Type
Concentration	Current concentration for point (X 10)**	16 Bit Unsigned
Alarm Level 1	Current Alarm Level 1 for point (X 10)**	16 Bit Unsigned
Alarm Level 2	Current Alarm Level 2 for point (X 10)**	16 Bit Unsigned
Alarm 1 Active	Level 1 Gas Alarm active	Boolean
Alarm 2 Active	Level 2 Gas Alarm active	Boolean
Enabled	Point Enabled(1)/Disabled(0)	Boolean
FlowFault	Point High Flow or Low Flow	Boolean
Gas Type	Code indicating Current Gas	16 Bit Unsigned

** Concentration levels are actual concentration multiplied by 10 as unsigned integer.

Example : An actual concentration of 2.7 is passed as 27 in the Profibus/Slave interface

Size: 240 Bytes (120 Words)

PARAMETER DATA							
Gateway							
Name	Element size (bytes)	Elements	Class	Instance	Attribute	Relative address	Access
Status	2	1	A2h	256	5	0 .. 1	R
Control	2	1	A2h	257	5	0 .. 1	RW
Live-List	1	8	A2h	258	5	0 .. 7	R
Exceptions	1	64	A2h	259	5	0 .. 63	R
Transaction status	1	64	A2h	260	5	0 .. 63	R
CL8							
Name	Element size (bytes)	Elements	Class	Instance	Attribute	Relative address	Access
CL8_Faults	2	1	A2h	266	5	0 .. 1	R
Concentration_X10	2	8	A2h	267	5	0 .. 15	R
GasType	2	8	A2h	268	5	0 .. 15	R
AlarmLevel1	2	8	A2h	269	5	0 .. 15	R
AlarmLevel2	2	8	A2h	270	5	0 .. 15	R
Alarm1	2	1	A2h	271	5	0 .. 1	R
Alarm2	2	1	A2h	272	5	0 .. 1	R
Enabled	2	1	A2h	273	5	0 .. 1	R
PtFlowFault	2	1	A2h	274	5	0 .. 1	R
SerialNumber	2	8	A2h	275	5	0 .. 15	R
WatchdogSeconds	2	1	A2h	276	5	0 .. 1	R

The Fault/Alarms are indicated as follows:

- Bit 0 - Critical Fault
- Bit 1 - General Fault
- Bit 2 - Alarm Level 1
- Bit 3 - Alarm Level 2
- Bit 4 - Analysis Active
- Bit 5 - Power

For Analyzer A, B, and C the lower 8 bits (0-7) are for the lower analyzer and the upper 8 bits (8-15) are for the upper analyzer. For the CL4/CL8 Fault/Alarms the alarms indicate the status of the entire machine. See Appendix B for details on the I/O indicators. The bits for Alarm Level 1, Alarm Level 2, and all Fault/Alarms may be affected by the "Energized Faults/Alarms" setting of the CL4/CL8.