



ChemLogic® CL96

96-Point Continuous Gas Monitor
User Manual

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Chapter 1 – Overview

1.1 Introduction

The DOD Technologies ChemLogic 96 (CL96) simultaneously monitors up to ninety-six locations (called *points*) for toxic and corrosive gases. The system is comprised of up to 6 individual 'Analyzers' each monitoring 16 points. 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 CL96 triggers outputs 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 sample point may be up to 400 feet (121 m) from the CL96 location. This allows operators to monitor gas concentrations in an area removed from the location where gas may actually be leaking. The CL96 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 CL96 uses DOD Technologies ChemLogic paper tape technology for fast and accurate gas detection.

See Section 7.7 for important disposal information.



WARNING : If the CL96 is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

1.2 Sampling and Monitoring

The system draws sample flow simultaneously from all installed points. Part of the sample flow is diverted across the ChemLogic tape where it is analyzed. Each 16-point analyzer exhausts through a single port.

1.3 Flow Connections

Flow connections consist of "quick-connect" ports on the top and side of the CL96 UNIT. There are ninety-six inlets, one for each monitored point, and 6 exhaust outlets, one for each analyzer.

1.4 Electrical Connections

"Knockout panels" for external electrical connections are provided on the right side of the CL96.

1.5 Theory of Operation

The system draws sample flow simultaneously from up to ninety-six points. Part of the sample flow is diverted across the ChemLogic Tape. The ChemLogic 96 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 96. The ChemLogic 96 will then report an appropriate gas concentration reading and/or a gas alarm.

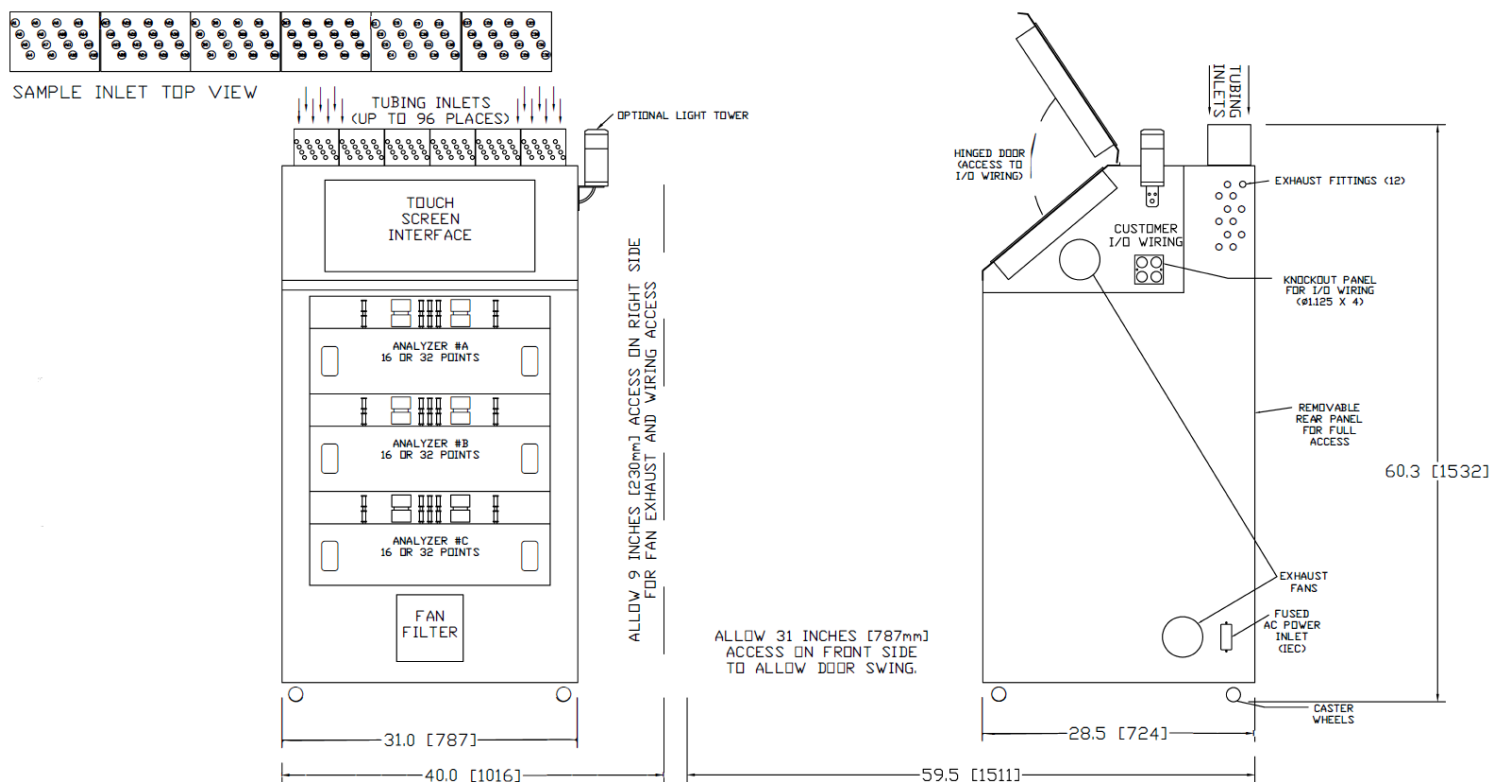
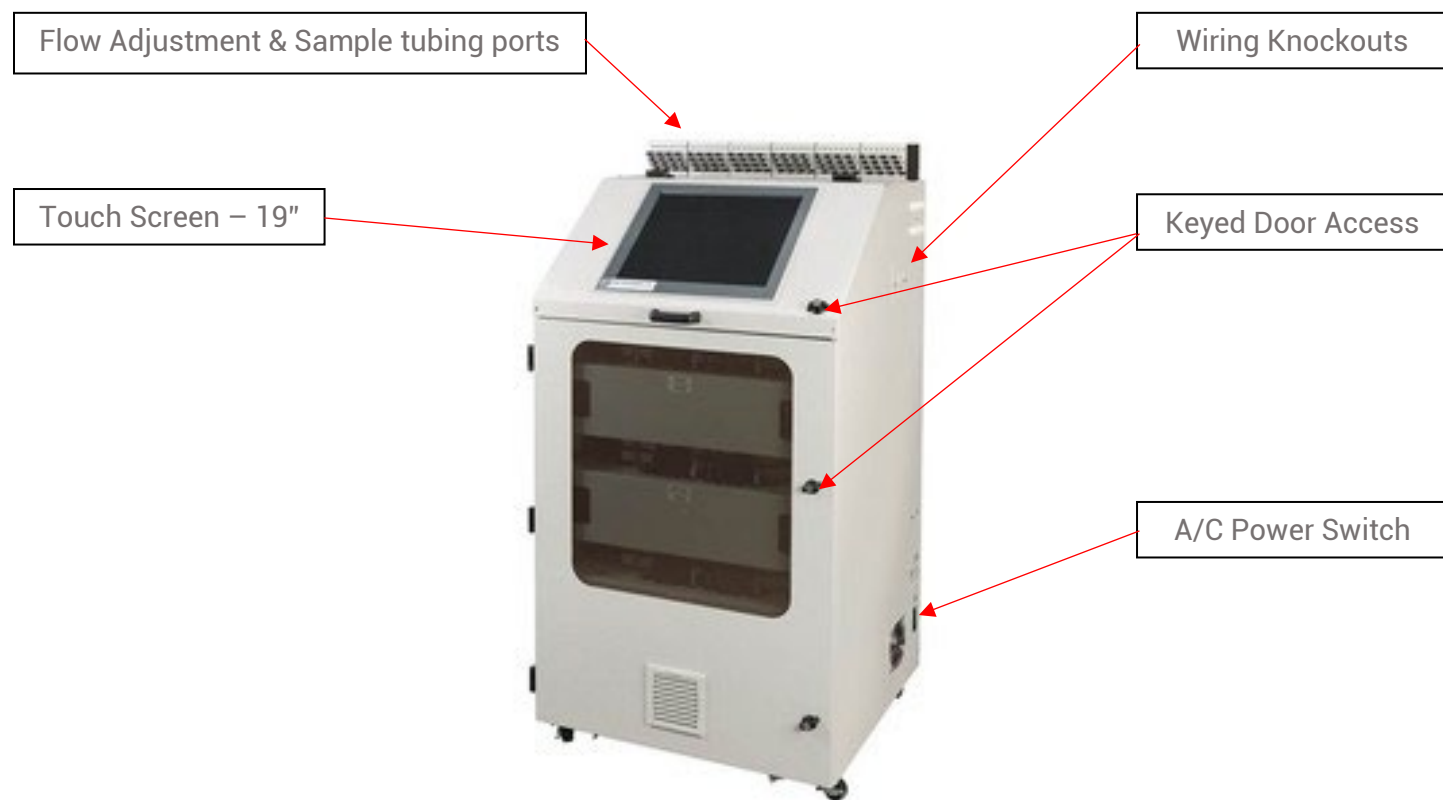
1.6 Time Weighted Average (TWA)

During analysis, the CL96 stores the TWA information every 8 hours* (referred to as a 'cycle') for each installed point. The information is written to the removable storage device for easy transfer to other systems.

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 & Dimensions



2.1.1 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.

2.1.2 Output Wiring Knockouts

Knockouts for output wiring are located on the right-side panel near the top.

2.1.3 Touch Screen Display

The CL96 uses a full color 19-inch touch panel LCD display. All menus and data entry are accomplished by touching the appropriate area of the screen – see Chapter 5 “Basic Operation”.

2.1.4 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.

2.1.5 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.

2.1.6 Flow Adjustment

Flow adjustments for all installed points are located on the top of the device. Refer to section 5.2.4 regarding flow adjustment.

2.1.7 ChemLogic Paper Tape

ChemLogic paper tapes are accessed by opening the maintenance door. Refer to section 6.3 regarding tape installation/replacement.

2.1.8 Maintenance Door

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

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

2.1.9 Take-up Reel

Empty take-up reels are inserted at the time of ChemLogic tape installation (see section 6.3). During installation, the previous take-up reel which is full is removed from CL96 and discarded. The previous ChemLogic tape reel which is now empty should then be used as the next take-up reel.

2.1.10 Tubing Connections

Sample tubing and exhaust use a quick connection system for simple installation. The sampling connections are made on the top of the CL96 while the exhaust tubing connects on the right side. See section 3.3 for information on connecting the sample and exhaust tubing. See also Appendix C for important information on transport times for gas from sampling point to the CL96.

IMPORTANT : End-of-the-Line filters or In-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 tape in the CL96. Figure 2.2 shows the internal layout with the access panel open. See section 3.5 for tape installation.



Figure 2.2

2.3 Internal Layout – Service Area

Internal access to the CL96 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 CL96 with the service door open. The door should be opened by trained service personnel (See section 6.2)



Figure 2.3



WARNING: Electric shock possible. Turn off the unit and disconnect A/C power to the unit before opening the service door

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.

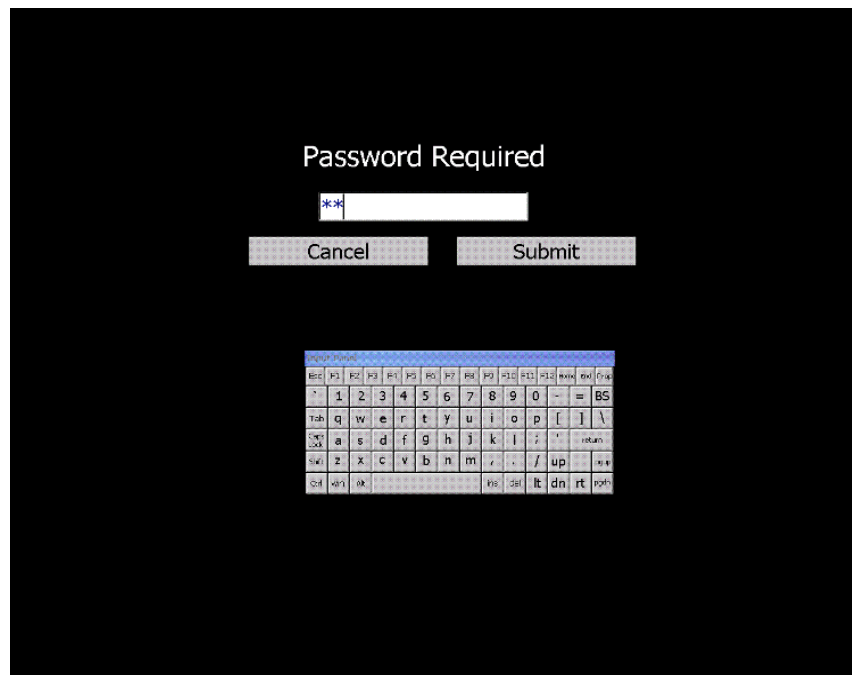


Figure 2.4

When someone attempts to access a screen that is password protected, the screen shown in figure 2.4 will appear (see important note below). Several of the setup & configuration screens of the CL96 require entry of an administrative password. Factory service screens require entry of a service password - see section 7.

IMPORTANT : Once a password is entered it remains active for up to 1 minute from 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 : The administrative password is included on a separate page shipped with your unit. It is suggested that you remove the page and keep it in a safe and secure place. If you forget or lose your password, please contact DOD Technologies, Inc. You can change the passwords on the menu in the "Setup" area – see chapter 6. See Chapter 8 for contact information.

2.5 USB Storage

The CL96 uses a removable USB drive to store historical information including concentration logging, event history, configuration information, and TWA data. USB storage drives may be purchased through DOD Technologies – see Appendix A.

Chapter 3 – Installation

	WARNING: Electric shock possible. Turn off the unit and disconnect A/C power to the unit before servicing.
	WARNING: If the CL96 is used in a manner not specified by the manufacturer, the protection provided by the equipment may become impaired.

3.1 Selecting a Location

The CL96 is designed for safe use under the following conditions:

- Indoor use only
- Altitude up to 2,000 m
- Temperatures 5°C - 40°C
- Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40 °C
- 110 VAC supply voltage fluctuations up to +/- 10% of the nominal voltage
- Transient Levels : Impulse withstand (overvoltage) category II of IEC 60364-4-443
- IP Rating IP2x

The CL96 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 400 ft (121 m). Using the shortest possible sample line length will reduce transport times and increase the response time of the CL96. (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 CL96 requires stable temperature and humidity levels within range to operate properly.

Do not place in a location which will expose the CL96 to moisture, dust, corrosive gas, or any unusual environmental conditions which could damage the unit and/or cause it to operate inaccurately.

3.2 Unloading / Loading & Installation

The CL96 rests on four rollers which can be locked in place and bolted to the floor if necessary.

	CAUTION: Care must be taken when loading, unloading, and moving the CL96. The CL96 is a heavy piece of equipment which could cause injury or death if not handled properly. Make sure the rollers are operating properly and only move the CL96 on a level surface.
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3.3 Sample Tubing

Sample tubing is connected to the CL96 on the top the unit. All sample tubes are 1/4" OD x 3/16" ID Teflon FEP (400 ft max length) which may be purchased from DOD Technologies, INC (See Appendix A). Fully

IMPORTANT : All sample tubing used with the CL96 must be 1/4" OD x 3/16" ID FEP Teflon. Use of any other tubing may damage the CL96 and/or cause inaccurate gas concentration readings.

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 End-of-Line Particulate Filters

End of line particulate filters must be installed on all 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 CL96. Dust that collects in the tubing or the internal system may cause sample loss and inaccurate 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 is recommended although polypropylene or Teflon may also be used. Exhaust tubing may be purchased from DOD technologies (see appendix A)

3.5 A/C Power

When connecting the A/C power to the CL96 assure that all of the following requirements are met:

- A building circuit breaker is required.
- The circuit breaker must be installed in a suitable location that is easily reached.
- The circuit breaker must be labeled as the disconnect device for the CL96.
- The circuit break must break both poles.

See system specifications in Appendix C for power requirements.



WARNING: The detachable power cord or the supply line wiring must meet the ratings specified in Appendix C under system specifications.

3.6 Output Wiring

See Appendix B for a listing of various output module connections available on the CL96.

3.6.1 Standard Output Wiring

The standard output modules included with the system require an external 24V supply connected to the CL96 to supply power for the outputs.

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.

To connect the wires to the spring-loaded output connector:

- Insert the screwdriver into the square shaped hole which will open the round hole for the wire.
- Continue to hold the screwdriver while inserting the wire into the round shaped hole.
- While holding the wire in place remove the screwdriver which closes the clamp onto the wire.
- **IMPORTANT** : Be sure the wire is inserted completely into the hole. Failure to do so could result in system failure, electrical shock.
- 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.

Chapter 4 – Setup & Configuration

4.1 Set System Date and Time

See section 6.2.e

4.2 Gas Selection

Each point on the CL96 must be setup for the appropriate gas and configured accordingly. See section 6.2.a for information on selecting the gas for each point.

4.3 Alarm Settings

See section 6.2.a for information on how to adjust the alarm settings after the gas has been selected for each point.

4.4 Output Contacts

The CL96 supports both energized and de-energized outputs 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. When the power is ON, the Power Loss relay is always in the normally high state.

When latched outputs are selected 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 CL96

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

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.

4.6 Install New Tape

See section 7.3 for installation instructions.

4.7 USB Storage

The use of USB Storage drive is required to retain historical and performance of information including events, alarms, and gas concentrations. High reliability USB Storage drives are available from DOD technologies (see Appendix A) and at most retail electronic stores. See section 7.5 for information on inserting and replacing a USB drive. See also appendix F for information on the data set stored.

4.8 Setup Complete

The CL96 is ready for gas detection and analysis.

Chapter 5 General Machine Operation

5.1 Introduction

The touch screen on the CL96 is used for all configuration and control of the unit. Analysis mode is active by default approximately 2 minutes after power on unless an operator intervenes. The machine is designed to continually monitor for gas 24/7. Various tasks can be completed while remaining in analysis including viewing faults and events, viewing Concentration history & TWA logs, checking point configuration and flow limits. Access to the help menu is also available while remaining in analysis.

Analysis is started either by:

1. Power on timeout without user intervention, approx. 2 minutes)
2. Touching the Start Analysis button for a specific analyzer on the Load Tape screen.
3. Touching the 'Analysis' button on the Main Menu which will start analysis for all installed analyzers at the same time.

Analysis will continue until one of the following occur:

1. Power loss.
2. Touching the 'Stop Analysis' button for a specific analyzer on the Load Tape screen. (password may be required)
3. Entering Setup by touching the Setup button on the main menu and entering an appropriate password which will halt analysis on all analyzers.
4. A critical machine fault which may stop an individual analyzer or the entire CL96.

5.2 General Screen Navigation



Figure 5.2.1

Figure 5.2.1 shows a portion of the main menu that appears at the top when the machine is powered on. The menu system on the CL96 allows simple access to all the functionality of the system with a simple touchscreen interface. The selected item on the menu ("Analysis" on the figure 5.2.1) will appear in slightly larger **BOLD** text with a lighter shade of gray as the background.

A few things to know about all the menus on the CL96:

- The background color of the top menu area always indicates the status of the machine and will match the color of the optional light attachment. Table 5.2 explains the colors:

Not installed
Idle (Not analyzing)
Analysis Active
Maintenance Fault
Critical fault
Gas Alarm

Table 5.2

- Table 5.2 lists the colors in priority from lowest to highest since only 1 color will be displayed at a time. For example, if any channel indicates a Gas Alarm the menu will appear red until the gas is no longer detected or the alarm is cleared. If any point has a low flow the menu will appear yellow, etc.
- On the main menu you can access any of the screens on the menu without exiting analysis except the 'Setup' button which will exit analysis and bring up the Setup sub-menu. Note that the 'Setup' button may require a password depending on the configuration of the CL96.
- Items with a down arrow next to them (such as 'History' in figure 5.2.1) indicates that the button will bring up a sub-menu of screen selections.
- When a sub-menu is selected the new menu will replace the previous menu and will always include the 'BACK' button at the start which will return to the previous menu (see figure 5.2.2).
- Note in figure 5.2.2 the background color is yellow indicating a Maintenance fault (see section xx).

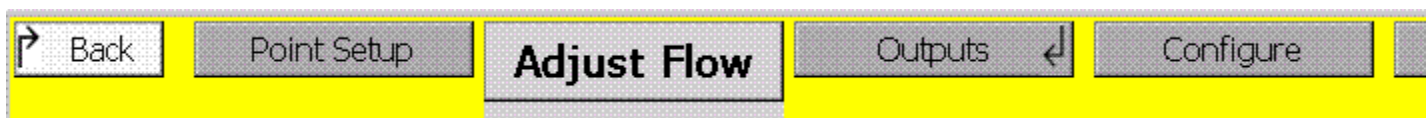


Figure 5.2.2

5.3 Initialization

When the CL96 is powered on it will begin with an initialization screen which is followed by the automatic restart screen (figure 5.3)

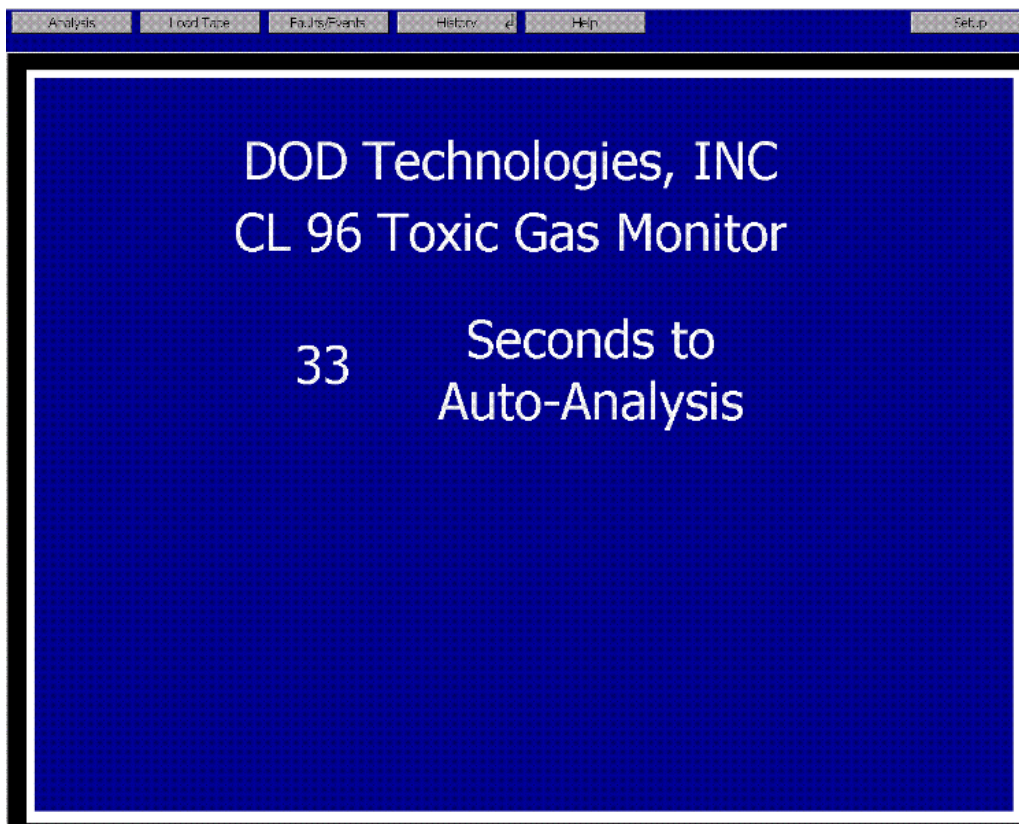


Figure 5.3

If the operator touched another menu button before the timer reaches 0 the machine will go to that screen and **WILL NOT** enter analysis (unless of course the operator touched the analysis button). If the machine should lose power at any time it will return to this screen when power is restored and automatically reenter analysis when the timeout is reached.

Chapter 6 The Main Menu

6.1 Main Menu

The main menu allows the operator to start/stop analysis and access to all information available while remaining in Analysis.

6.1.a Analysis

As the name implies, touching the 'Analysis' button will start the CL96 analysis for all active points. (see Setup in section 6.2.a). Figure 6.1.a.1 shows a 16-point system with analysis active. Note that the menu background is green indicating analysis active and all points are green indicating no flow problems or gas alarms active.

Black points indicate that the points are not installed or in-active on the CL96.

Analysis		Invert Tape		Faults/Events		History		Help		Set.p	
A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
1	0.0	2	0.0	3	0.0	4	0.0	5	0.0	6	0.0
A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
9	0.0	10	0.0	11	0.0	12	0.0	13	0.0	14	0.0
A		A		A		A		A		A	
17		18		19		20		21		22	
A		A		A		A		A		A	
25		26		27		28		29		30	
B		B		B		B		B		B	
1		2		3		4		5		6	
B		B		B		B		B		B	
9		10		11		12		13		14	
B		B		B		B		B		B	
17		18		19		20		21		22	
B		B		B		B		B		B	
25		26		27		28		29		30	
C		C		C		C		C		C	
1		2		3		4		5		6	
C		C		C		C		C		C	
9		10		11		12		13		14	
C		C		C		C		C		C	
17		18		19		20		21		22	
C		C		C		C		C		C	
25		26		27		28		29		30	

Figure 6.1.a.1

The color of each point on the analysis screen will change according to the current state of the point:

Disabled, Idle, Analyzing, Maintenance fault, or Alarm. (see colors in table 5.2)

Ex: Figure 6.1.a.2 displays which point 9 on analyzer A would look like when a full-scale reading is found while monitoring for H2SE(0-500ppb).



Figure 6.1.a.2

6.1.a.2 Point Trend Detail

Touching the gray area on any *active point on the analysis screen will display the detailed information for the selected point as shown in figure 6.1.a.3. The screen details the point #, name, location, range, alarm levels, flow level, current concentration, and a graph of the previous 15 minutes of concentration detected.

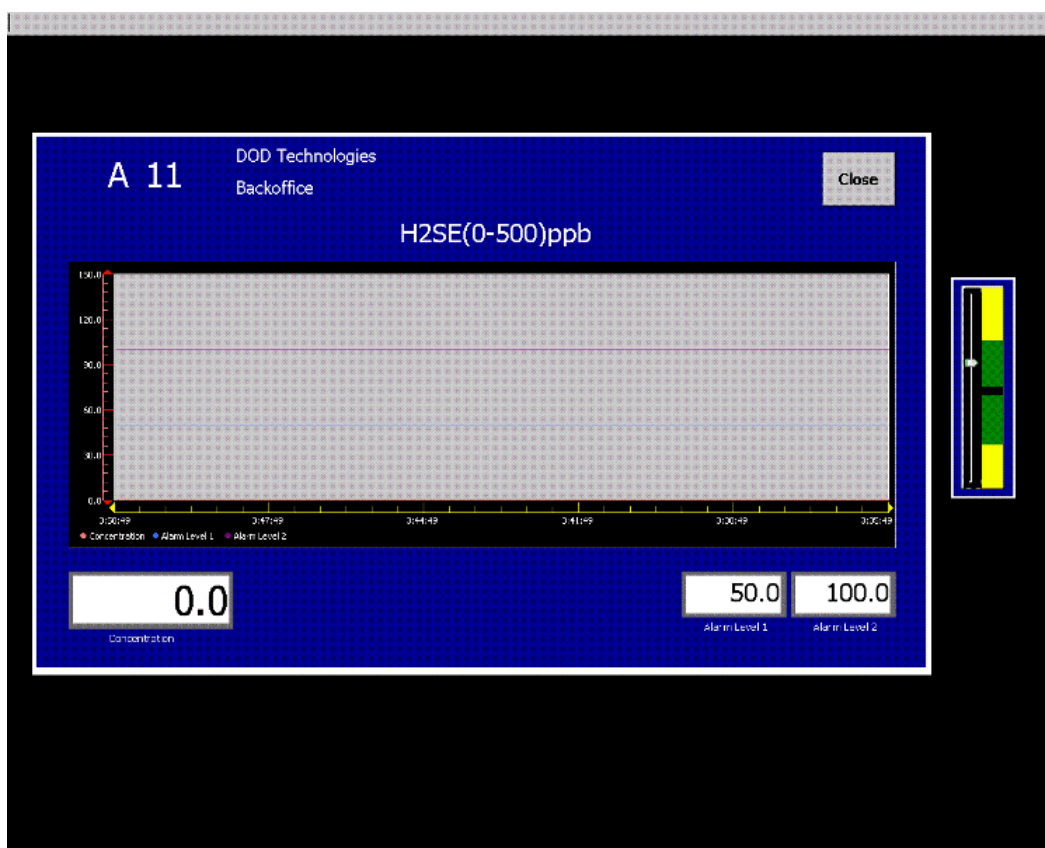


Figure 6.1.a.3

*active: any point installed and enabled on the CL96.

6.1.b Load Tape

Touching the 'Load Tape' button on the main menu will bring up the screen shown below. Note that stacked analyzers can only be operated together although each analyzer tray can be started and stopped independently. From this screen the operator can also stop analysis for an individual analyzer to allow new tape to be loaded into the system. During Analysis, the buttons for "Open Gate", "reset Counter", and "Verify Optics" are all disabled. The background color of each analyzer will match the status of the analyzer since each analyzer tray can be started / stopped independently.

When loading a new tape follow the procedure described in chapter 7.

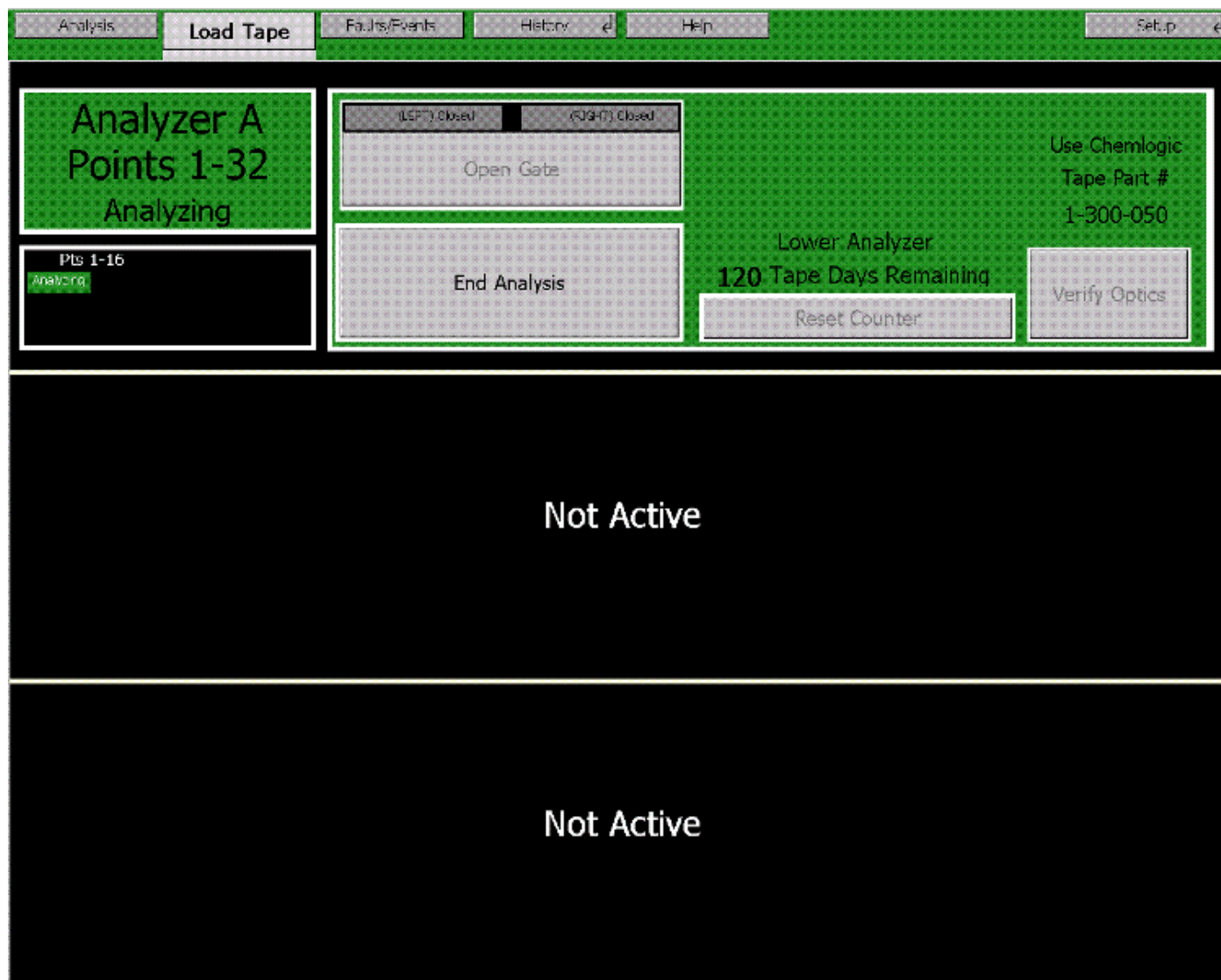


Figure 6.1.b

6.1.c Faults/Events

Touching the Faults/Events buttons on the main menu will bring up the screen shown in figure 6.1.c. Note this important difference between this screen and the fault/events screen on the 'History' sub-menu. The faults/events on the main menu shown on figure 6.1.c retains a list of the most recent events (128-256). Regardless of whether a USB drive is inserted this list will show the most recent events. Each new fault or event is added to the top of this list and also written to the USB drive (if available).

NOTE: New events may not immediately appear on the list while the screen is active. Each time the menu item is selected (from another menu) the current list is activated.

Touch the 'Fault/Alarm Reset' button to reset clear all active faults & alarms.

Analysis Load Tape Faults/Events History Help Set.p						
Date	Time	AZ	PT	Type	Event	Fault/Alarm Reset
3/4/2009	15:51:41	A	9	Set	GeneralFault	
3/4/2009	15:49:23	A		Info	Information	
3/4/2009	15:48:33			Set	Information	
3/4/2009	15:46:17			Set	Information	
3/4/2009	15:39:21	A		Info	Information	
3/4/2009	15:37:57	A		Info	Information	
3/4/2009	15:36:34			Set	Information	
3/4/2009	15:10:20			Info	Information	
3/4/2009	15:10:37			Set	Information	
3/4/2009	14:59:41			Info	Information	
3/4/2009	14:59:32			Set	Information	
3/4/2009	14:54:49			Info	Information	
3/4/2009	14:54:38			Set	Information	
3/4/2009	14:52:39			Info	Information	
3/4/2009	14:51:57			Set	Information	
3/4/2009	14:49:11			Info	Information	
3/4/2009	14:48:59			Set	Information	
3/4/2009	14:41:56			Info	Information	
3/4/2009	14:41:41			Set	Information	

Figure 6.1.c

6.1.d History

Touching the History button on the main menu will bring up the sub-menu screen shown in figure 6.6. This sub-menu gives access to the historical data stored on the USB flash drive.

IMPORTANT : The CL96 stores all historical data to the USB drive. Make sure a drive is always inserted properly (see Appendix F). If no USB drive is present none of the menu item on the history sub-menu will show any data.

6.1.d.1 History -> Concentration Log

Touching the Conc. Log button on the History Menu will bring up the screen shown below. This screen shows the concentrations recorded for each point for the data selected on the calendar.

The alarm levels are color coded as indicated by the three colors on the top of the screen:

1. < alarm level 1
2. >= alarm level 1 and < alarm level 2
3. >= alarm level 2

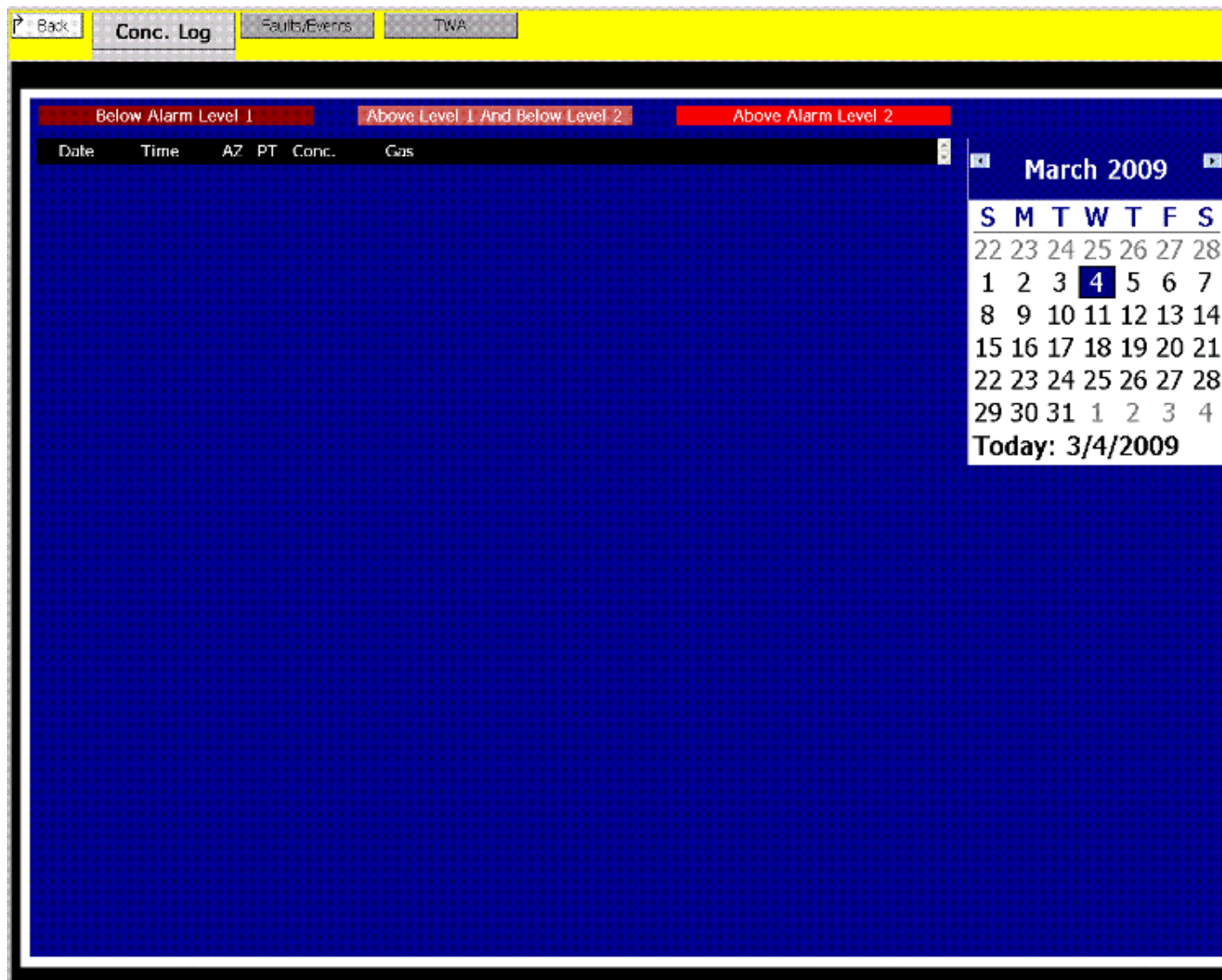


Figure 6.1.d.1

6.1.d.2 History -> Faults/Events

Touching the Faults/Events button on the History sub-menu will bring up screen show below. This screen shows only the events that occurred on the specific date selected using the calendar.

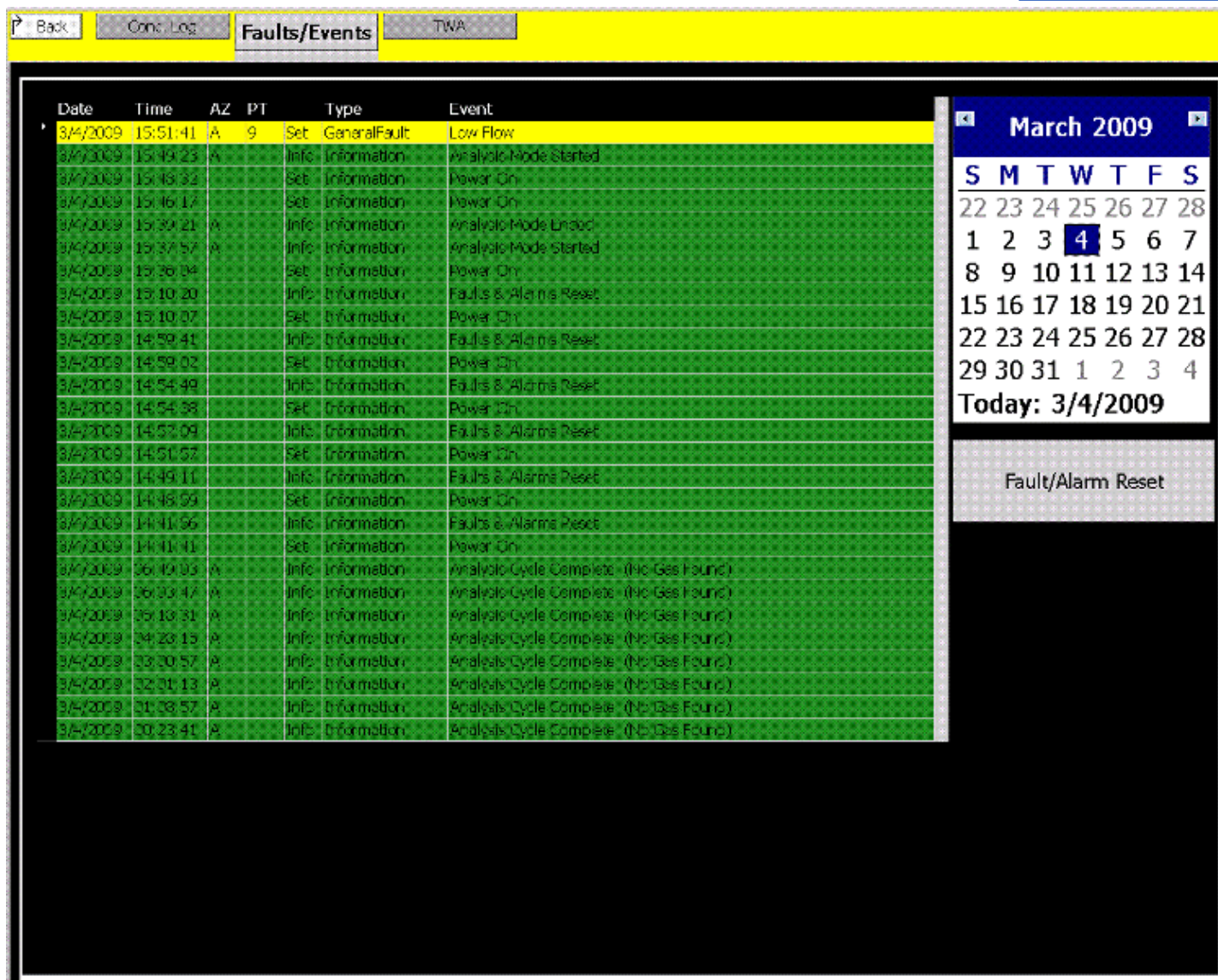


Figure 6.1.d.2

Touch the 'Fault/Alarm Reset' button to reset clear all active faults & alarms.

6.1.d.3 History -> TWA

Touching the TWA button on the main menu will bring up the sub-menu screen shown below. See Appendix XX for details on the TWA information. The operator may use the calendar to select the TWA information for each date.

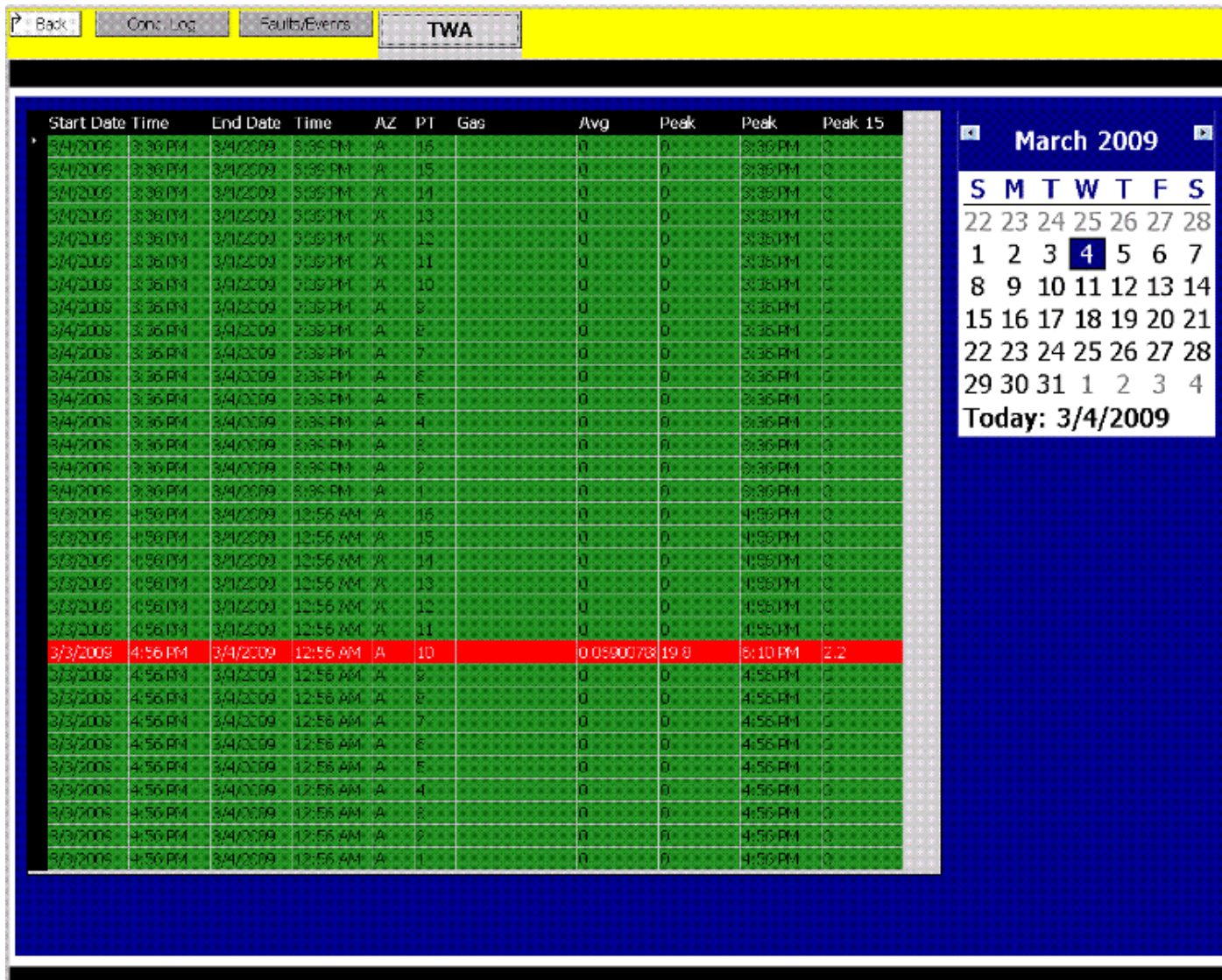


Figure 6.1.d.3

6.1.e. Help

Touching the Help button on the main menu will bring up the help screens containing his manual and additional information.

6.1.e.1 Help -> About

Touching the About button on the help menu displays the screen shown below. This screen contains the version & license information for the system.

6.1.f Setup

Pressing the Setup button while in analysis will end the analysis cycle on all installed analyzers if the proper password is entered. Touching the Setup button on the main menu will bring up the Setup sub-menu – see section 6.2 below.

6.2 Setup Sub-Menu

The setup sub-menu contains the configuration screen for the CL96 necessary for normal operation. Access to the Setup sub-menu is password protected (see section 6.2.f).

6.2.a Setup -> Point Setup

When the Point Setup button is touched the screen below appears. The buttons along the top allow selection of each analyzer that is installed (if not installed the buttons are disabled). Selecting an analyzer with the button at the top will display the configuration of the corresponding 16 points for the selected analyzer. Touching anywhere on the row for each point will bring up the screen in 6.2.a.2 which allows each point to be configured.

Back Point Setup AdjustFlow Outputs Configure Date/Time Passwords Factory									
Points A 1-16		Points A 17-32		Points B 1-16		Points B 17-32		Points C 1-16	
		Select		Select		Select		Select	
#	Enabled	K	Gas	Alarm 1	Alarm 2	Location	Name	Description	
1	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 1	DOD	
2	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 2	DOD	
3	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 3	DOD	
4	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 4	DOD	
5	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 5	DOD	
6	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 6	DOD	
7	Yes	1.02	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 7	DOD	
8	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 8	DOD	
9	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 9	DOD	
10	Yes	0.99	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 10	DOD	
11	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 11	DOD	
12	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 12	DOD	
13	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 13	DOD	
14	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 14	DOD	
15	Yes	0.99	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 15	DOD	
16	Yes	1.00	H2SE(0-500)ppb	50.0	100.0	Backoffice	Point 16	DOD	

Figure 6.2.a.1

For each point the Gas type, alarm levels, name, location, description, K Factor, and enabled/disabled may be adjusted. Note that changing the K Factor requires a high-level password.

The alarm levels will automatically be adjusted to the default levels when the gas time is changed from the drop-down menu. Alarm Level 1 must be $\geq$ LAL for the selected gas, $\leq$ Alarm Level 2, AND $\leq$ Full Scale for the selected gas. Alarm Level 2 must be $\geq$ LAL for the selected gas, $\geq$ Alarm Level 1, AND $\leq$ Full Scale for the selected gas.

IMPORTANT : When a point is disabled no gas analysis is performed.

The screenshot shows a configuration window titled "Point A-6" with the following fields and values:

- Gas: H2SE_500ppb
- Alarm Level 1: 50.0
- Alarm Level 2: 100.0
- Name: Point 6
- Location: Backoffice
- Description: DOD Technologies
- K Factor: 1
- Disabled: ☐

At the bottom of the window are two buttons: "Update" and "Cancel". Below the configuration window is a numeric keypad with function keys (Esc, F1-F12, Ctrl, Alt, Tab, Caps Lock, Shift, Ctrl) and a numeric keypad (0-9, *, /, =, BS, and a numeric keypad with 0-9, *, /, =, BS).

Figure 6.2.a.2

6.2.b Setup -Adjust Flow

When the Adjust Flow, button is touched the screen below appears. The buttons along the top allow selection of each analyzer that is installed (if not installed the buttons are disabled). Touch the button for the analyzer once to turn on the pump for that analyzer or touch the same button again to turn off the pump. When the button is touched the flow levels for those 16 points are displayed below and may be adjusted with the corresponding flow control valves on the top of the machine. Only 1 analyzer may be selected at a time.

IMPORTANT : Although only 16 points can be adjusted at a time, both pumps for the analyzer tray are active at the same time (if 32 points are installed).

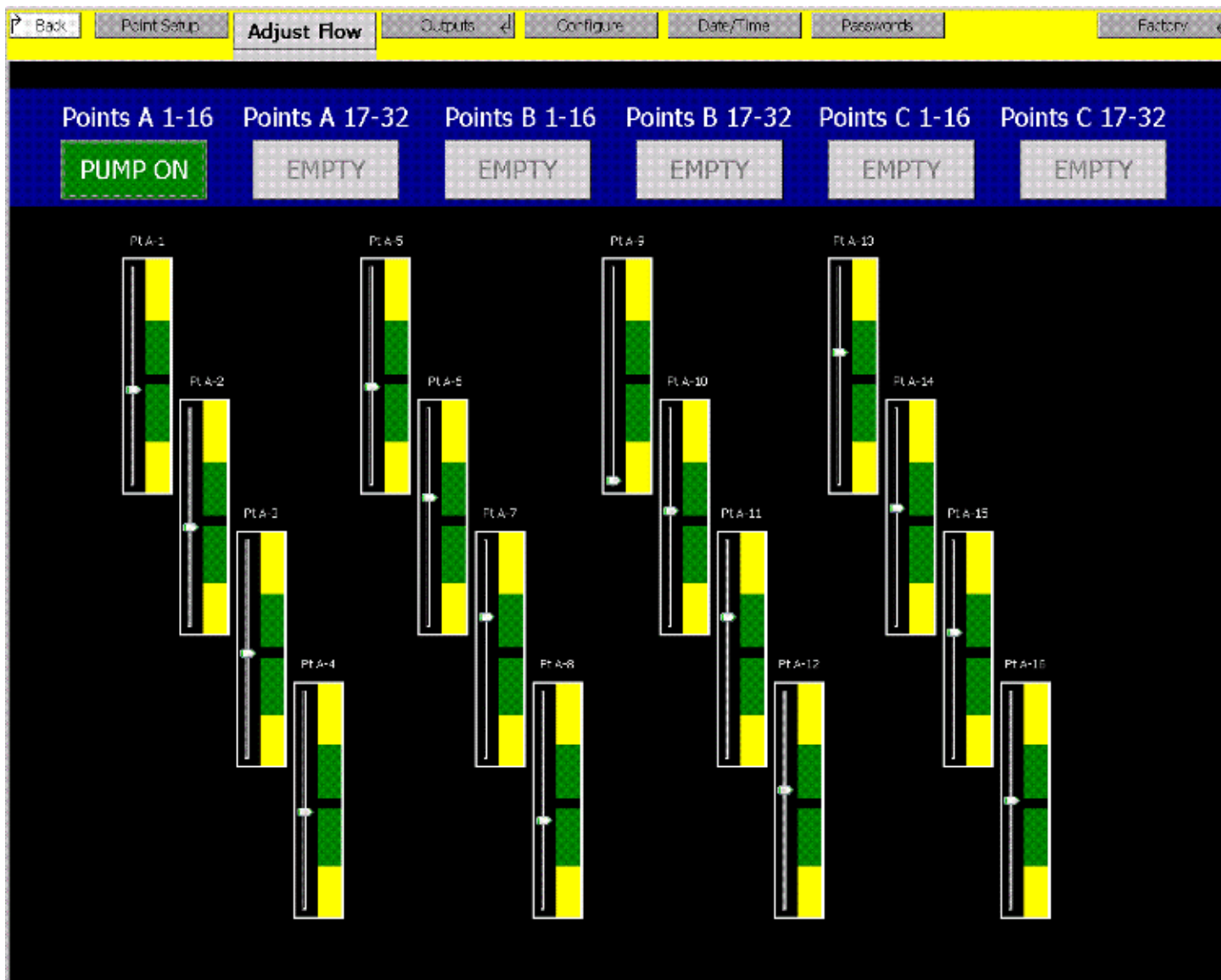


Figure 6.2.b

NOTE : There may be a slight delay between the time the control valve is turned and the update reading the CL96. Adjust the knob slowly and wait a few seconds to verify the level indicated on the unit is accurate.

6.2.C Setup -> Outputs

When the Point Setup button is touched the Outputs, Sub-Menu appears as described below. The outputs screen allows calibration & viewing of all output modules installed on the CL96.

6.2.c.1 Setup -> Outputs -> Test Faults

When the Test Faults button is touched the screen below is displayed. This same screen is used to test the 24V output models and/or the relay contact if installed. For each installed analyzer, the touch button allows the operator to toggle the outputs active/inactive. Depending on the system setting for Energize/De-energized relays the output is set accordingly. On the left side of each analyzer tray display is a box which is colored appropriately for the selected faults. Below that is another box that shows which outputs are 'active'.

In figure 6.2.c.1 below both the critical fault for points 1-16 and general fault on points 17-32 are selected. Since the critical fault is higher priority the color of the box is orange (see table 5.2). If energized relays have previously been setup on the unit then the critical fault relay for analyzer A1 would not be off while the Alarm Level 1, Alarm Level 2, and general fault relays for analyzer A1 would be on.

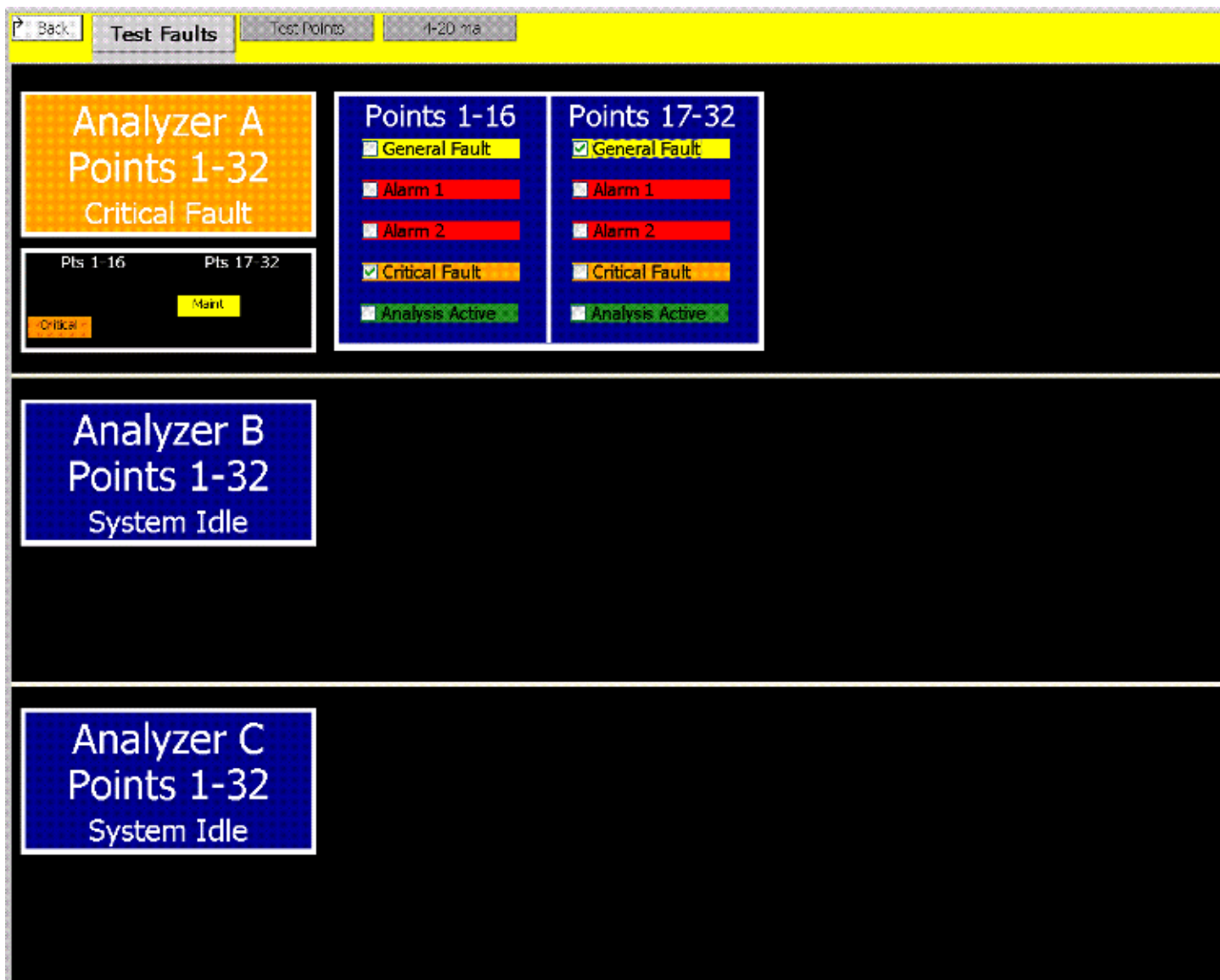


Figure 6.2.c.1

6.2.c.2 Setup -> Outputs -> Test Points

When the Test Points button is touched the screen below is displayed. The buttons along the top allow selections of each analyzer that is installed (if not installed the button are disabled). The same screen is used to test the 24V output modules and/or the relay contacts if installed. For each installed point, the touch buttons allow the operator to toggle the outputs active/in-active. Depending on the system setting for the Energized/De-energized relays the output is set accordingly.

In figure 6.2.c.2 below, several of the point alarms have been selected for analyzer A1.



Figure 6.2.c.2

6.2.d Setup -> Outputs -> Configure

When the Configure button is touched the screen below is displayed. Each of the blocks on the screen are described below.

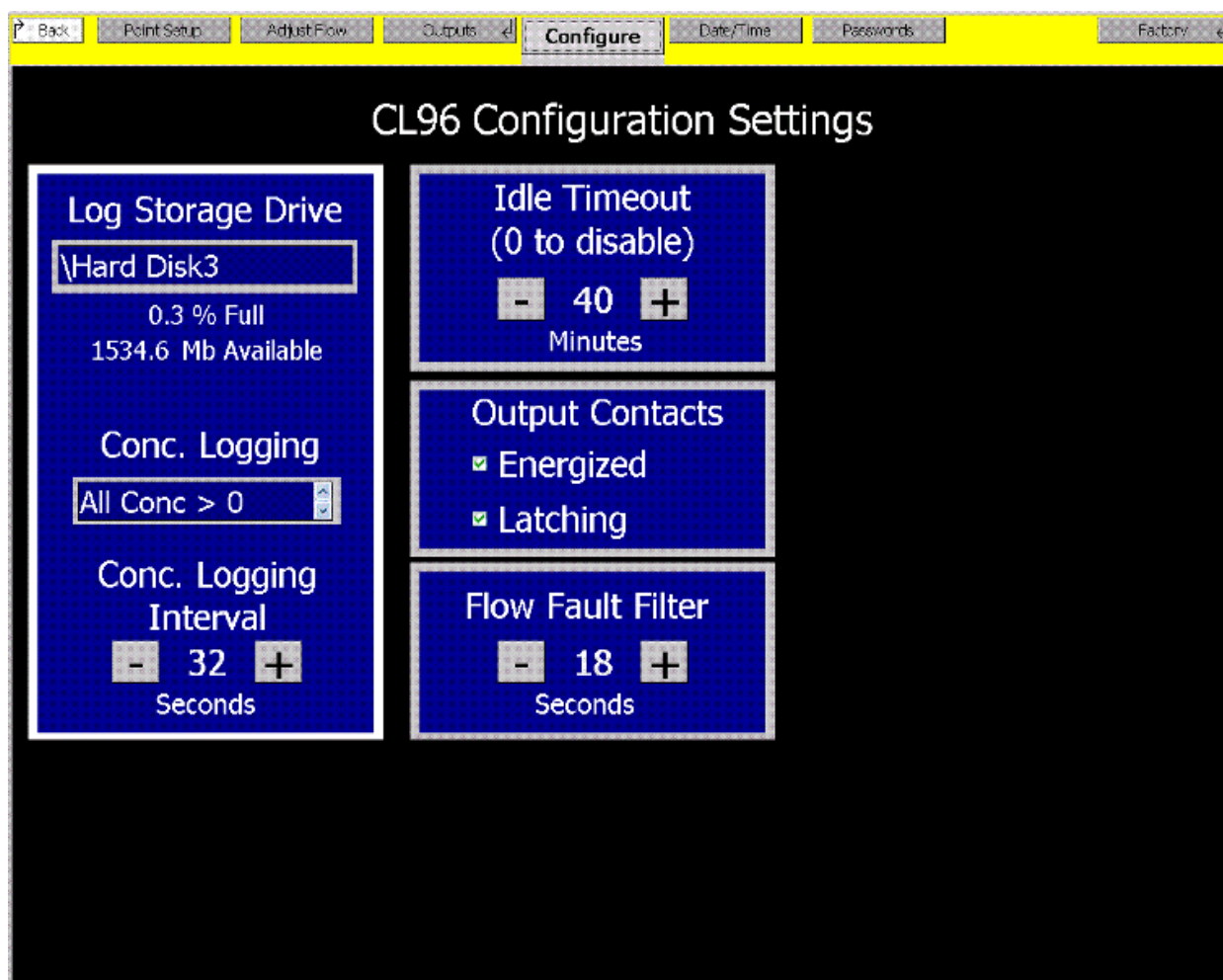


Figure 6.2.d

Logging Configuration

Three components make up the logging configuration of the system: Where to log, what to log, and how often to log. The drop-down list at the top will contain the available USB storage drives installed. Below the selected drive is the information on the space available for logging.

IMPORTANT : Hard Disk 1 and Hard Disk 2 are reserved for use by the CL96 system. Each USB drive installed in the USB Hub will be sequentially named beginning with Hard Disk 3.

The drop-down list for Conc. Logging gives the operator the three available choices for what concentration data should be logged:

1. All concentrations
2. Those above Alarm Level 1
3. Those above Alarm Level 2.

Only points where gas is detected are logged to the disk. An appropriate event message is always written to the event log when gas exceeds alarm level 1 or 2 on a per point basis.

The third component of the Logging Configuration is the logging interval. The value entered here determine how often the concentration is logged to the storage drive. Use the + and – keys to adjust the value from 4 to 120 seconds in 4 second increments.

Idle Timeout

The idle timeout box allows adjustment of the time a critical fault will be issued if any installed analyzer is left out of analysis. Setting the value to = disables the fault from occurring. Use the + and – keys to adjust the value from 0-45 minutes.

Output Contact

Energized relays determine the normal state of the relays/outputs. When energized is selected the faults, general alarm levels, and point outputs will all be energized under normal conditions. When a fault or alarm occurs, the outputs will become de-energized. The opposite occurs when this checkbox is not selected.

Selecting Latching faults causes faults to remain active until the 'Reset Faults/Events' button is pressed to acknowledge the problem.

NOTE : Flow faults are not affected by the latching faults option. Flow faults will never be latched on the CL96 but will always be recorded in the event log when they occur and are cleared. See below for flow fault filter.

Flow Fault Filter

The flow fault filter setting determines the minimum time to filter a flow fault (either high or low flow). For example: putting this setting to 30 seconds would require a continuous low flow for 30 seconds before a fault is set AND another continuous 30 second period of corrected flow before the flow is cleared.

6.2.e Setup -> Outputs -> Date Time

When the Date/Time button is touched the below is displayed. After adjusting the correct date and time on the screen be sure to touch the 'Set' button to save the settings.

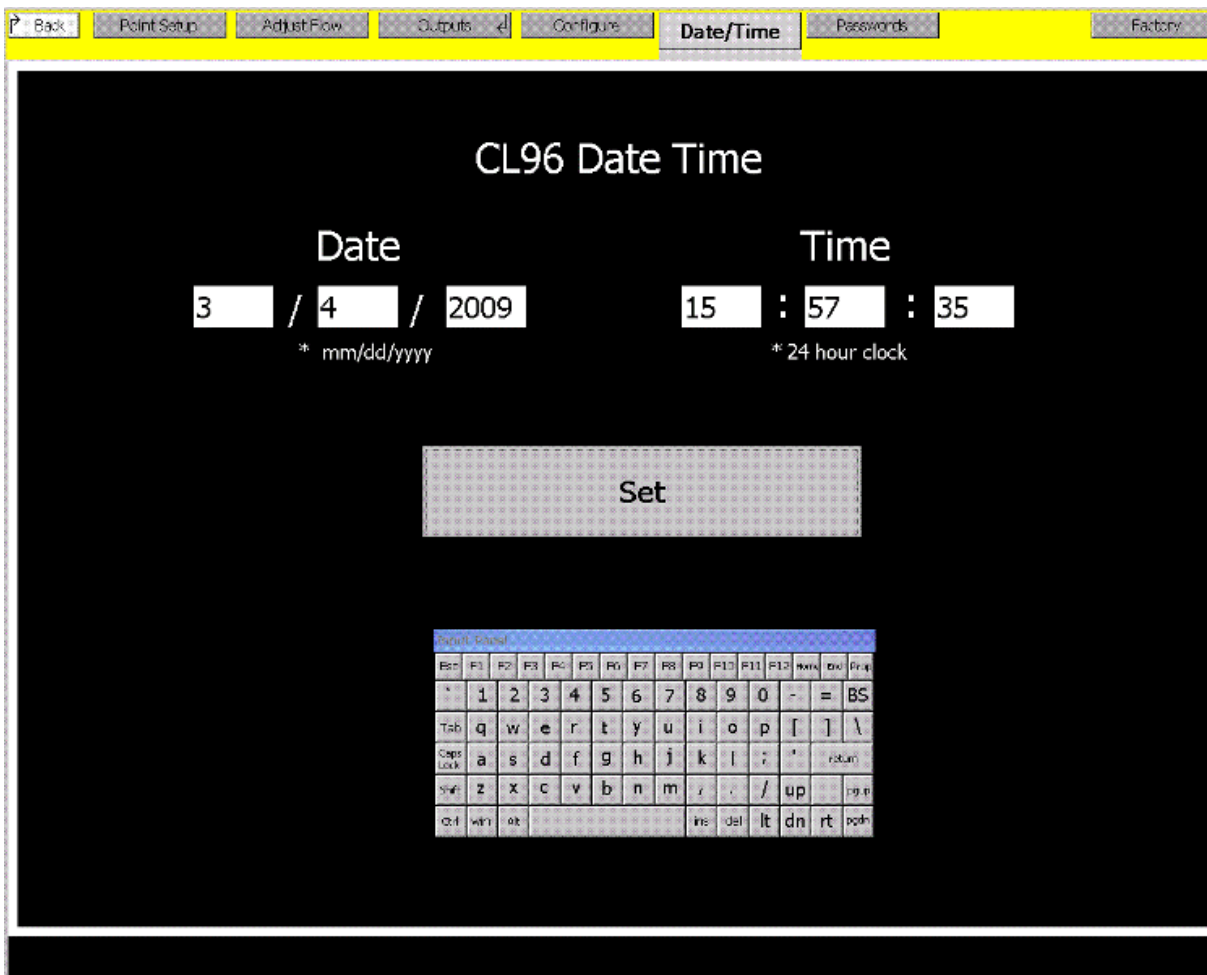


Figure 6.2.e

6.2.f Setup-> Outputs -> Passwords

When the Passwords button the password entry screen will be displayed. Note that the Administrator password is required to access the screen.

Chapter 7 Maintenance and Disposal



DANGER: Disconnect power before servicing

7.1 Return the CL96 to a safe state after service

Before returning the CL96 to service after maintenance or perform verify the following checks:

- Verify all A/C power connections are secured properly.
- Check all ground wire connections are secured properly to each panel on the unit.
- Verify each analyzer tray is installed on the rails and connected properly.
- Check tubing connections on both sides of each pump.
- Verify all sample tubing and exhaust tubing connections on the unit.

7.2 Maintenance Door Access

The maintenance door is used to access the ChemLogic® tape. Two keyed latches secure the door. Turn both latches with the keys to open the maintenance door and be sure to secure both latches when closing the door.

IMPORTANT : The maintenance door should remain closed and latched except when servicing the ChemLogic® tape.

7.3 Control Panel Door.



WARNING : Turn off and remove power from the system prior to opening the control panel door.

To open the control panel door:

- Insert the key provided into the slot and rotate counter clockwise to unlock the door.
- Turn the latch counterclockwise to unlatch the door.
- Lift the control panel access door until it locks (listen for click)
- The door should remain in the up position until the lock is released.

When service is completed 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 control panel access door should remain closed and latched except when servicing the system.

7.4 ChemLogic® Paper tape

The ChemLogic® paper tape has an expiration date printed on the label. Expired tape should be disposed of and replaced with new tape to assure proper gas concentration readings. Each DOD ChemLogic® tape cartridge for the CL96 will last for 120 days under normal usage. See Appendix A for ordering information.

7.5 ChemLogic® Paper tape Installation Procedure

1. From the main menu touch the 'Load Tape' button (section xxx)
2. Open the maintenance door. (section 7.1)
3. On the screen touch the 'OPEN/CLOSE GATE' button to open up the gate
4. (For 32-point systems only) Remove the upper take-up reel by gently pulling.
5. Remove the lower take-up reel by gently pulling and dispose properly.
6. (For 32-point systems only) Remove the upper empty tape reel.
7. Remove the lower empty tape reel and install as the new lower take-up reel.
8. (for 32-point systems only) Install the empty reel as the new upper take up reel.
9. Secure the new lower ChemLogic® tape on the bottom take up reel. The tape should be around the bottom in a clockwise direction as shown.
10. Feed the tape as shown with the arrows in figure 7.1.
 - a. From the lower tape reel
 - b. Around the bottom tape guide
 - c. Through the opening between the right-side optic blocks
 - d. Between the middle tape guides
 - e. Through the opening between the left side optic blocks
 - f. Between the rubber roller and the capstan
 - g. Around the tape guide on to the take-up reel
 - h. 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.
 - i. Turn the take-up at least 2 full turns to secure the tape.
 - j. (for 32-point systems only) Repeat these steps for the upper tape.
11. On the screen touch the 'OPEN/CLOSE GATE' button to close the gate
12. On the screen touch the 'Reset Counter' button. (See section 6.2.c)
13. On the screen touch the 'Verify Optics' button to calibrate the optics systems .



WARNING : Keep fingers clear of the gate system while touching the open/close gate button.

7.6 End of line particulate filters

End of line (point detection particulate filters which protect the CL96 from damage are required on all points including points not being monitored. Table 7.1 details the type of filter required for each gas. 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 CL96. Dust that collects in the tubing or the internal system may cause sample loss and inaccurate gas concentration readings.

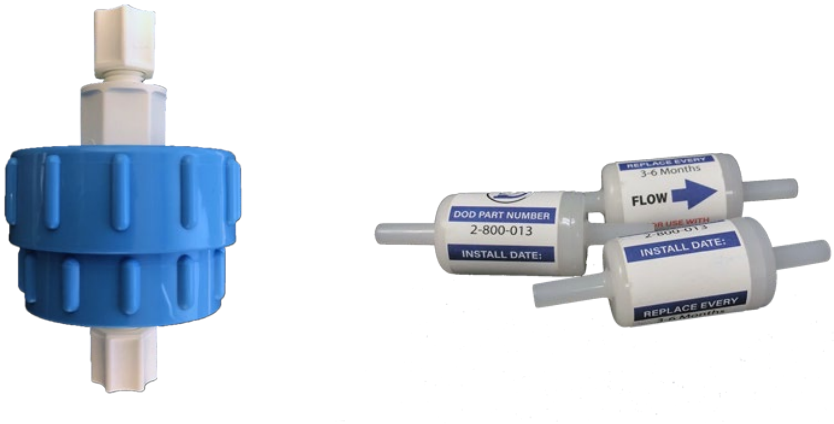
Corrosive Use	Non-Corrosive Use
 Part Numbers: Blue Housing: 60009 Filter Membrane: 60010 OR Part Number 2-800-013	 Part Number: 780248
Mineral Acids Chlorine Oxidizers (Excluding NO₂) Ammonia/Amines SO₂	Hydrides Phosgene NO₂

Table 7.1

7.7 Flow Adjustment

Each channel should be adjusted whenever a new ChemLogic® tape or particulate filter is installed. See section 6.2.b.

7.8 USB Storage Drive Replacement

It is highly recommended to keep a USB flash drive inserted in the unit at all times. A general fault is issued anytime a USB drive is not inserted or full. To insert or replace a USB drive follow this steps.

1. Exit analysis
2. Go to the USB Drive removal screen on the main menu under History.
3. Touch the 'remove' button to halt writing to the disk.
4. Follow the procedures from section 7.2 to open the control panel access door.
5. Remove the USB drive from the system and replace with new drive.
6. Wait 5 seconds for the system to initialize.
7. Close and latch the control panel access door.

Appendix F details the data stored on the CF card and how to access it on a personal computer.

7.6 Fuse Replacement

The system is protected with a 6-amp fast acting (5X20mm) fuse.



DANGER: Warning : Turn off and remove power from the system prior to servicing the fuse.

7.7 Equipment Disposal



RECYCLING WASTE ELECTRICAL & ELECTRONIC EQUIPMENT (WEEE)

European Models with Option Part#2-800-002 must be disposed of at a designated collection point. Contact our European Representative for WEEE Directive disposal arrangements.

Chapter 8 Services & Support

For services and support of your CL96 contact DOD Technologies, INC.

Phone Support

Monday-Friday 8:00-17:00 (Central Time Zone)
8.15.788.5200

Service Center

DOD Technologies, INC.
675 Industrial Drive. Building A
Cary, IL 60013

Email or Visit our Website

solutions@dodtec.com

DODtec.com

DOD Technologies, Europe

Contact: Blaise Champagne
Email: blaise.champagne@dodtec.com
Phone: +1 (713) 899-6532

Appendix A – Accessories

For ordering information

DOD Technologies, Inc. Sales
M-F Monday-Friday 8:00-17:00 (Central Time Zone)
815.788.5200

DOD Part #	Description
14249	250 ft. roll of 1/4" X 3/16" FEP Teflon tubing
2-500-500	1000 ft. roll of 1/4" X 3/16" FEP Teflon tubing
1-300-050	ChemLogic Tape – Hydrides (120 days)
1-400-050	ChemLogic Tape – Mineral Acids (120 days)
1-500-050	ChemLogic Tape – Chlorine (120 days)
780248	Disposable noncorrosive end of line filters – Hydrides & Phosgene
	1 required for each point of detection
60009	Filter housing for use with Teflon membranes for Mineral Acid detection
	1 requires for each point of detection
60010	Teflon Membranes – 100 pieces – 47mm
	(replacement membrane for use with part #60009)

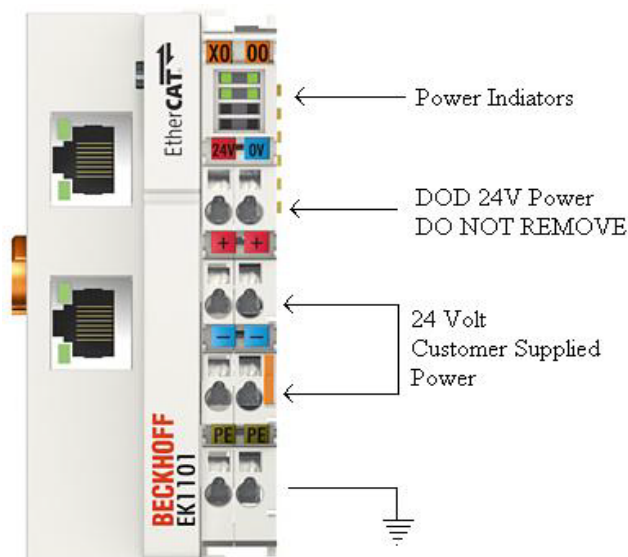


DANGER: Disconnect power before servicing

Appendix B I/O Connection Detail

B.1 EK1101 Coupler

Each analyzer tray (16 or 32 point) has its own output module section, and each section is coupled together with an EK1101 module. Two different power sources are used for the module. Power to operate the module itself is supplied by the CL96 power and prewired by DOD Technologies. – do NOT remove. Power for all outputs must be supplied by the customer on pins 6 and 7.



B.2 Standard Output Module (24 V Sinking)

		Pts 1-16						Pts 17-32 (Optional)					
		Bus Connector	CL96 General	Analyzer 1 General	Points 1-4	Points 5-8	Points 9-12	Points 13-16	Analyzer 2 General	Points 17-20	Points 21-24	Points 25-28	Points 29-32
Part #		EK1101	EL2088	EL2088	EL2088	EL2088	EL2088	EL2088	EL2088	EL2088	EL2088	EL2088	EL2088
See Note #			1	2	3	3	3	3	2	3	3	3	3

Note 1 - CL 96 General Outputs

Output #	Description
1	Critical
2	General
3	Alarm 1
4	Alarm 2
5	Analysis Active
6	Watchdog
7	Power On
8	

Note 2 - Analyzer General

Output #	Description
1	Critical
2	General
3	Alarm 1
4	Alarm 2
5	Analysis Active
6	Watchdog
7	Power On
8	

Note 3 - Point outputs **

Output #	Description
1	Pt X Alarm 1
2	Pt X Alarm 2
3	Pt (X+1) Alarm 1
4	Pt (X+1) Alarm 2
5	Pt (X+2) Alarm 1
6	Pt (X+2) Alarm 2
7	Pt (X+3) Alarm 1
8	Pt (X+3) Alarm 2

** For each module X = the lowest Point #

Figure B.2.1

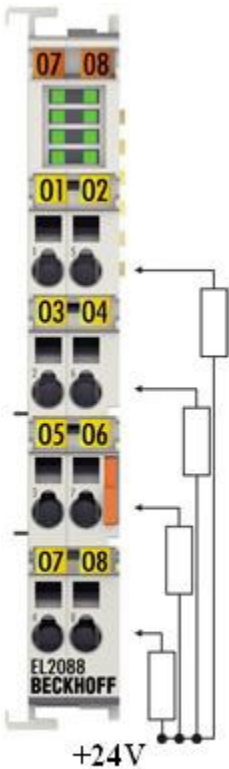


Figure B.2.2

B.3 Optional Output Relays

Pts 1-16																Pts 17-32 (Optional)							
Bus Connector	CL96 General(A)	CL96 General(B)	Analyzer 1 General(A)	Analyzer 1 General(B)	Points 1-2	Points 3-4	Points 5-6	Points 7-8	Points 9-10	Points 11-12	Points 13-14	Points 15-16	Analyzer 2 General(A)	Analyzer 2 General(B)	Points 17-18	Point 19-20	Points 21-22	Points 23-24	Points 25-26	Points 27-28	Points 29-30	Points 31-32	
Part #	EK1101	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	EL2624	
See Note #		1	2	3	4	5	5	5	5	5	5	5	3	4	5	5	5	5	5	5	5	5	

Note 1 - CL 96 General Outputs(A)

Relay #	Description
1	Critical Fault
2	General Fault
3	Alarm Level 1
4	Alarm Level 2

Note 2 - CL 96 General Outputs(B)

Relay #	Description
1	Analysis Active
2	Watchdog
3	Power On
4	

Note 3 - Analyzer X General(A)

Relay #	Description
1	Critical Fault
2	General Fault
3	Alarm Level 1
4	Alarm Level 2

Note 4 - Analyzer X General(B)

Relay #	Description
1	Analysis Active
2	Watchdog
3	Power On
4	

Note 5 - Point Alarms

Relay #	Description
1	Pt X Alarm 1
2	Pt X Alarm 2
3	Pt (X+1) Alarm 1
4	Pt (X+1) Alarm 2

Figure B.3.1

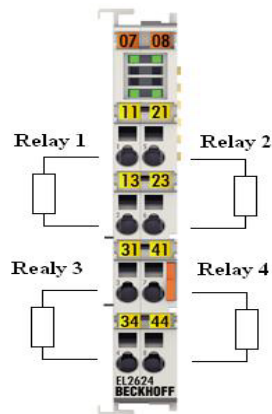


Figure B.3.2

B.4 Optional 4-20 Outputs

		Pts 1-16				Pts 17-32				
	Bus Connector	Kbus Conv	Points 1-4	Points 5-8	Points 9-12	Points 13-16	Points 17-20	Points 21-24	Points 25-28	Points 29-32
Part #	EK1101	BK1250*	KL4414	KL4414	KL4414	KL4414	KL4414	KL4414	KL4414	KL4414
* Required 24V power supply connection on BK1250										

Figure B.4.1

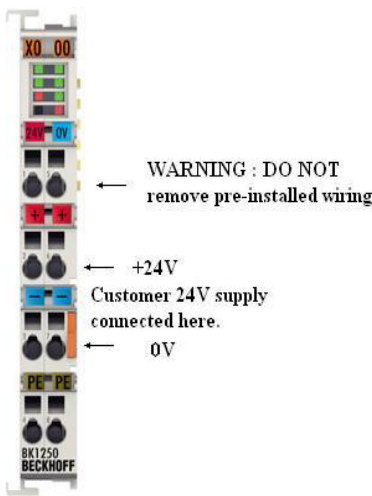


Figure B.4.2

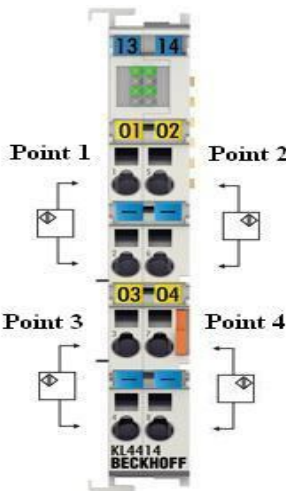


Figure B.4.3

Repeat for each module – Points 5-8, 9-12, etc.

Appendix C System Specifications

The CL96 is designed for safe use under the following conditions

- Indoor use only
- Altitude up to 2,000 m
- Temperature 5°C - 40 °C
- Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.
- A/C power as specified below with +/- 10% of the nominal voltage
- Transient Levels: Impulse withstand (overvoltage) category II of IEC 60364-4-443



WARNING :The detachable power cord or the supply line wiring must meet the rating specified below .

CL96 System Specification

Height: 59" (+10" for tubing)

Width: 31" (+9 for wiring)

Depth: 28.5 "

Weight: 450pbs. (fully loaded), (Max shipping weight 600lbs)

A/C Power:

(North American Models)
120V ~ 60 Hz ~ 3 A

(European Models with Option Part #2-800-002)
230V~ 50 Hz ~ 3A

IP Rating: IP2x

IK Code: IK08 (European Models with Option Part #2-800-002)

Appendix D - System Event Message

Level	Text	Analyzer	Point	Description
Alarm	"Alarm Level 1 "	Yes	Yes	Gas alarm level 1 on specified analyzer/point
Alarm	"Alarm Level 2 "	Yes	Yes	Gas alarm level 2 on specified analyzer/point
CriticalFault	"Cannot get background values "	Yes		Communication failure with 1 or more optic blocks
CriticalFault	"High Background "	Yes	Yes	Tape empty or too dark to read correctly
CriticalFault	"PLC Comm Error "			Critical communication fault in PLC
CriticalFault	"Optic Calibration required "	Yes		Optic need calibration - see manual
CriticalFault	"Gas Configuration Error "			Gas File data missing or invalid
CriticalFault	"Low Flow - Verify Tray Insertion"	Yes	Yes	Multiple point low flow, check analyzer tray inserted properly
CriticalFault	"Modbus Comm Failure "			Failure reading data internally
CriticalFault	"Optic Block Comm Failure "			Failure reading data from 1 or more optic blocks
CriticalFault	"Flow Block Comm Failure "			Failure reading data from 1 or more transducer blocks
CriticalFault	"Gate Open Fault "	Yes		Gate did not open before timeout
CriticalFault	"Gate Close Fault "	Yes		Gate did not close before timeout
CriticalFault	"Setting DAC to preset values "	Yes		Failure writing to optic blocks
CriticalFault	"System Fault"			Critical system fault - contact DOD Technologies
CriticalFault	"Block Below Minimum Voltage"			Power supply low - contact DOD Technologies
CriticalFault	"Output module failure or not installed"	Yes		Output modules missing or fault
CriticalFault	"Retentive Memory Error"			Critical internal memory error, event log or conc history fault
CriticalFault	"Idle Timeout (System) "			Idle timeout for all active analyzers on system
Analyzing	"Analysis Mode "	Yes		Analysis mode started/stopped as specified
Analyzing	"TWA Cycle Complete "	Yes	Yes	Written every 8 hours or when analysis mode ends
GeneralFault	"Low Flow "	Yes	Yes	Low flow on specified analyzer/point
GeneralFault	"High Flow "	Yes	Yes	High flow on specified analyzer/point
GeneralFault	"Idle Timeout (Analyzer) "	Yes		Idle timeout fault
GeneralFault	"ChemLogic tape low "	Yes		Less than 3 days of tape remaining on specified analyzer.
GeneralFault	"Logging write error - verify disk inserted : "			USB Logging disk full, missing, or error writing to disk
GeneralFault	"Custom Output Module Failure"			Failure communicating with custom module installation
Information	"No event file found for selected date "			Machine was not operating or different USB disk inserted
Information	"Starting new log file "			New data file log started for specified date
Information	"Power On "			Machine was powered on at date/time specified
Information	"Faults & Alarms Reset "			Fault Reset button was pressed by operator
Information	"Optic Calibrated "	Yes		Optic calibration complete
Information	"Flow Offsets Reset "			Flow offsets reset by technician
Information	"Point configuration updated/saved "	Yes		Configuration saved/updated for specified analyzer
Information	"Machine configuration updated/saved"			Machine configuration saved/updated
Information	"Simulation Mode"			Simulation mode started/stopped
Information	"Passwords updated"			Passwords were changed
Information	"Multi-Point configuration change"	Yes	Yes	Multiple points were updated simultaneously
Information	"Previous machine settings restored."			Default settings restored
Information	"ChemLogic tape days counter reset "	Yes		Operator reset the tape counter manually
Information	"Optics Auto Adjusted"	Yes		Optics were adjusted by system
Information	"Optic Point Needs Cleaning"	Yes		Clean optics at earliest possible date

Appendix E - Gas Specs

Name	Gas	Gas Family	Calibration PN2	TLV	Full Scale	LDL	Units	ChemLogic Cassette PN
Ammonia	NH3	Ammonia	2-800-405	25	75	1.2	ppm	1-700-050
Ammonia	NH3	Ammonia	2-800-405	25	150	1.2	ppm	1-700-050
Arsenic Pentafluoride [^]	AsF5 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Arsenic Trichloride ^{^^}	AsHCl3 (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Arsenic Trifluoride [^]	AsF3 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Arsine	AsH3	Hydrides	2-800-401	5	500	2.2	ppb	1-300-050
Arsine	AsH3	Hydrides (LL)	2-800-406	5	50	0.3	ppb	1-300-050
Boron Tribromide ^{^^^}	BBr3 (HBr)	MA-SG	2-800-409	2	20	0.1	ppm	1-420-150
Boron Trichloride ^{^^}	BCl3 (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Boron Trifluoride	BF3	MA-SG	2-800-409	100	3,200	89	ppb	1-420-150
Boron Trifluoride	BF3	MA-SG	2-800-409	100	10,000	89	ppb	1-420-150
Bromine	Br2	Bromine	2-800-407	100	1,000	68.8	ppb	1-490-050
Carbonyl Sulfide	COS	COS	2-800-412	5	20	0.9	ppm	1-300-085
Carbonyl Fluoride [^]	COF2 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Chlorine	Cl2	Chlorine-SG	2-800-414	100	5,000	44.6	ppb	1-560-150
Chlorine	Cl2	Oxidizers	2-800-408	100	3,200	50.1	ppb	1-550-050
Chlorine	Cl2	Chlorine-SG	2-800-414	100	2,000	6.9	ppb	1-560-150
Chlorine Trifluoride [^]	ClF3 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Diborane	B2H6	Hydrides	2-800-401	100	1,000	6	ppb	1-300-050
Dichlorosilane ^{^^}	SiH2Cl2 (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Fluorine	F2	Oxidizers	2-800-408	100	3,200	49.8	ppb	1-550-050
Fluorine	F2	Oxidizers	2-800-408	100	10,000	60	ppb	1-550-050
Fluorine (SG)	F2	Chlorine-SG	2-800-414	100	10,000	41.6	ppb	1-560-150
Fluorine (SG)	F2	Chlorine-SG	2-800-414	100	1,000	41.6	ppb	1-560-150

Fluorosilicic acid [^]	H ₂ SiF ₆ (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Germane	GeH ₄	Hydrides	2-800-401	200	2,000	62.1	ppb	1-300-050
Germane	GeH ₄	Hydrides (LL)	2-800-406	200	2,000	62.1	ppb	1-300-050
Germanium Tetrafluoride [^]	GeF ₄ (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Hexachlorodisilane ^{^^}	SiCl ₂ (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Hexafluorocyclobutene ^{**}	C ₄ F ₆	Pyro	2-800-415	5	40	1.5	ppm	1-420-150
Hydrogen Chloride	HCl	MA-SG	2-800-409	2	15	0.1	ppm	1-420-150
Hydrogen Chloride	HCl	MA-SG	2-800-409	2	20	0.1	ppm	1-420-150
Hydrogen Bromide	HBr	MA-SG	2-800-409	2	20	0.1	ppm	1-420-150
Hydrogen Fluoride	HF	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Hydrogen Fluoride	HF	MA-SG	2-800-409	0.5	20	0.2	ppm	1-420-150
Hydrogen Selenide	H ₂ Se	Hydrides (LL)	2-800-406	50	500	5.1	ppb	1-300-050
Hydrogen Sulfide	H ₂ S	Hydrides	2-800-401	1	20	0.2	ppm	1-300-050
Nitric Acid	HNO ₃	MA-SG	2-800-409	2,000	5,000	187.5	ppb	1-420-150
Nitrogen Dioxide	NO ₂	Oxidizers	2-800-408	0.2	30	1.3	ppm	1-550-050
Nitrogen Trifluoride ^{**}	NF ₃	Pyro	2-800-415	10	50	1	ppm	1-420-150
Phenyl Trichlorosilane ^{^^}	SiCl ₃ Ph (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Phosgene	COCl ₂	Phosgene	2-800-404	100	5,000	8.8	ppb	1-200-050
Phosgene	COCl ₂	Phosgene	2-800-404	100	3,250	8.8	ppb	1-200-050
Phosgene	COCl ₂	Phosgene	2-800-404	100	300	3.9	ppb	1-200-050
Phosphine	PH ₃	Hydrides	2-800-401	50	1,500	4.9	ppb	1-300-050
Phosphine	PH ₃	Hydrides	2-800-401	50	3,000	4.9	ppb	1-300-050
Phosphorus Oxychloride ^{^^}	POCl ₃ (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Phosphorus Pentachloride ^{^^}	PCl ₅ (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Phosphorus Pentafluoride [^]	PF ₅ (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Phosphorus Tribromide ^{^^^}	PBr ₃ (HBr)	MA-SG	2-800-409	2	20	0.1	ppm	1-420-150
Phosphorus Trichloride ^{^^}	PCl ₃ (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150

Phosphorus Trifluoride [^]	PF3 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Silane	SiH4	Hydrides	2-800-401	5	50	0.2	ppm	1-300-050
Silane	SiH4	Hydrides	2-800-401	5,000	15,000	40	ppb	1-300-050
Silicon Tetrachloride ^{^^}	SiCl4 (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Sulfur Dioxide	SO2	SO2		250	2,500	19.3	ppb	1-810-050
Sulfur Tetrafluoride [^]	SF4 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Sulfuric Acid	H2SO4	MA-SG	2-800-409	50	3,200	97.1	ppb	1-420-150
Tetrakis(dimethylamido)titanium	TDMAT	Ammonia	2-800-405	2	10	0.1	ppm	1-700-050
Tertiary Butyl Arsine	TBA	Hydrides	2-800-401	91	500	12	ppb	1-300-050
Tetrafluorosilane [^]	SiF4 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150
Titanium Tetrachloride ^{^^}	TiCl4 (HCl)	MA-SG	2-800-409	2	15	0.1	ppm	1-420-150
Tin Tetrachloride ^{^^}	SnCl4 (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Trichlorosilane ^{^^}	SiHCl3 (HCl)	MA-SG	2-800-409	2	15	0.2	ppm	1-420-150
Tungsten Hexafluoride [^]	WF6 (HF)	MA-SG	2-800-409	0.5	10	0.2	ppm	1-420-150

* Additional ranges may be available and are subject to change. Please see specific product brochure or contact DOD Technologies.

** Requires pyrolyzer option for detection

[^] Compounds which hydrolyze to HF

^{^^} Compounds which hydrolyze to HCl

^{^^^} Compounds which hydrolyze to HBr

MA-SG = Mineral Acid SG

Hydrides (LL) = Hydrides (Low-Level Arsine)

Appendix F – Hard Wire Connection (Optional)



WARNING: The detachable power cord or the supply line wiring must meet the rating specified below .

When the hard wired option is specified the installation must be done by a qualified electrician.

IMPORTANT: When installing A/C voltage to the CL96 for the hard wire connection read carefully:

- A switch or circuit-breaker shall be included in the building installation.
- It shall be in close proximity to the equipment and within easy reach of the OPERATOR.
- It shall be marked as the disconnecting point for the CL96 equipment.

When the Hard-Wire option is specified the A/C power must be provided by the customer to the FILTER which is located on the right side of the unit inside the back cabinet. After disconnecting all power to the CL96 remove the back cabinet which will reveal the A/C filter shown in figure 1.

NOTE THE A/C FILTER IS MOUNTED UPSIDE DOWN IN THE CL96

- Connect A/C power to the screw terminals numbered 1 & 2
- Screw # 1 is Line and Screw #2 is neutral
- Connect the ground wire to the terminal as shown in Figure 2
- Replace the protective plastic cover over the screws

Make sure the wires are tightened properly and the protective plastic covers are replaced over the screws.



Figure 1



Figure 2

Appendix G – External Output Cabinets (Optional)



WARNING :Disconnect power before servicing.

Many of the I/O options for the CL96 are packaged in external cabinets which can be located remotely or mounted on the side of or nearby the CL96 cabinet. This section describes mounting (G.1), A/C Power (G.2), connecting to the CL96 (G.3), and external wiring (G.4) to the various outputs available for the CL96.

G.1 Mounting the External Cabinet

Before mounting the cabinet, be sure to read through sections G.2, G.3 and G.4 to understand and design your wiring requirements for A/C power to the unit and wiring to the I/O modules. It may be necessary to drill the opening for the wiring before mounting depending on the location selected for each cabinet.

All optional cabinet(s) must be firmly mounted before wiring.

G.1.1 Remote mounting

If the cabinet is to be mounted externally use the enclosed mounting brackets to secure the cabinet at the desired location.

G.1.2 Direct mounting on the CL96

If specified at time of purchase the CL96 cabinet can be pre-drilled for easy mounting of the remote cabinet on the side. The CL96 cabinet will have four (4) bolts mounted on the side for each (max 2) cabinets that mount on the side panel. – See figure G.1.1.

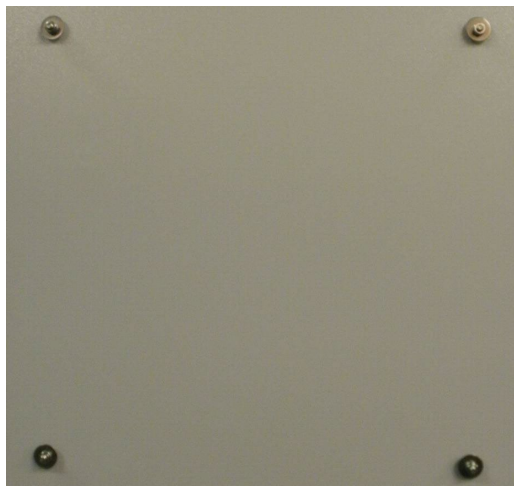


Figure G.1.1

Remove the nut and lock washer from each of the four bolts, mount the external cabinets onto the four bolts using the attached bracket then replace the lock washers and nuts. Tighten the nuts to secure the cabinet to the side of the CL96 panel.

G.2 Connecting A/C Power to the External Cabinet

All optional external cabinets contain their own DC Voltage power supply. The cabinets are delivered with a power cable and a liquid tight cord grip which may be used to power the unit as described below.

IMPOTANT: When installing A/C power to the Analog Output cabinet read carefully:

- Installation of A/C power to the cabinet must be done by a qualified electrician.
- A switch or circuit breaker shall be included in the building installation.
- It shall be in close proximity to the Analog Output Cabinet and within easy reach of the OPERATOR.
- It shall be marked as the disconnecting point for the Analog Output cabinet equipment.

Be sure to follow all safety precautions and disconnect all electrical power of both the CL96 and the external output cabinet before servicing.

G.2.1 Installing the liquid tight cord grip (DOD Part #2-9400-523)

- Drill a 7/8" hole in the side of the cabinet at the desired location
- Using the liquid tight cord grip (DOD Part #2-9400-523)
- Unscrew the cord grip cap
- Unscrew the inside nut (leave the fixed nut on the fitting)
- Place the included O-ring over the threads on the inside portion of the fitting so that it sits inside the fixed nut – see figure G.2.1.



Figure G.2.1

- Insert the threads through the hole from the outside into the cabinet and replace the nut on the inside as shown in figure G.2.2 – tighten securely.



Figure G.2.2

G.2.2 Installing the A/C Power Cable

- Insert the exposed wires of the power cord through the hole in the fitting from the outside and then into the cord grip cap as shown in figure G.2.3.

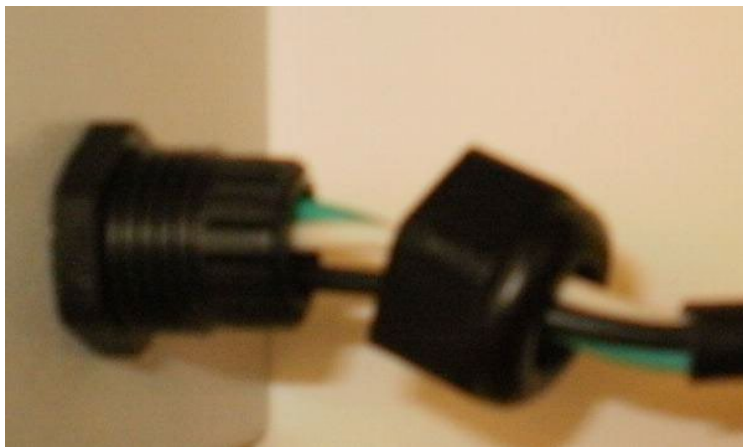


Figure G.2.3

- Pull the appropriate length of cord inside the cabinet to allow the shielded portion of the cable to reach the power filter.
- Tighten the cord grip cap shown in Figure G.2.3 back onto the fitting securely to hold the cord in place.

G.2.3 Attaching the A/C Power inside the cabinet

- See Figure G.2.4 below for reference
- Pull down lightly on the plastic cover on the Power Filter exposing screw connections #1 and #2.
- Attach the Neutral/White wire to the Power Filter at the label for Screw #2, tighten securely.

- Attach the LineBlack wire to the Power Filter at the label for Screw #1, tighten securely.
- Push the plastic cover back into place on the Power Filter over screws connections #1 and #2.
- Locate the Protective Earth (PE) Ground stud as shown in figure G.2.4.



Figure G.2.4

- Remove the top nut from the PE ground stud
- Leave the star washer on the bottom of the ground stud touching the cabinet, then place the ring terminal from the green wire over the star washer.
- Replace the nut on top of the ring terminal and tighten securely.
- NOTE: Do not attach any wires other than the Green ground wire from the A/C power cord to the PE Ground terminal.

G.3 Connecting to the CL96



Warning: DO not use the A/C power opening to bring any other wires into the Analog Output Cabinet. Analog wiring and the ethernet cable must be brought into the cabinet through a separate opening per customer design.

Drill a second hole in the side of the external cabinet at the desired location. Bring the shielded ethernet cable into the cabinet through the hole and connect as described below.

G.3.1 Connecting to the CL96 with Ethernet Cable

All external cabinets connect to the CL96 with a shielded RJ45 cable (sold separately).

- Attach one end of the cable to the CL96. Depending on the configuration of your machine the connection point will vary. Contact DOD if you are not sure where to plug the ethernet cable.
- Attach the other end of the cable to the top connector on the EK1101 module as shown in Figure G6.
- Multiple external cabinets can be daisy-chained using the bottom RJ-45 connector as a starting point for the second shielded cable.



Figure G.3.1

G.4 Wiring Output Modules

G.4.1 Analog (4-20 ma) Output Wiring

See Appendix B.4 for information on wiring to analog output modules.

G.4.2 Beckhoff Form A Relays

See Appendix B.3 for information on wiring to Beckhoff Relay Modules.

G.4.3 Form C Relay Wiring

The form C relay modules (blue) are labeled inside the external cabinet as shown below.

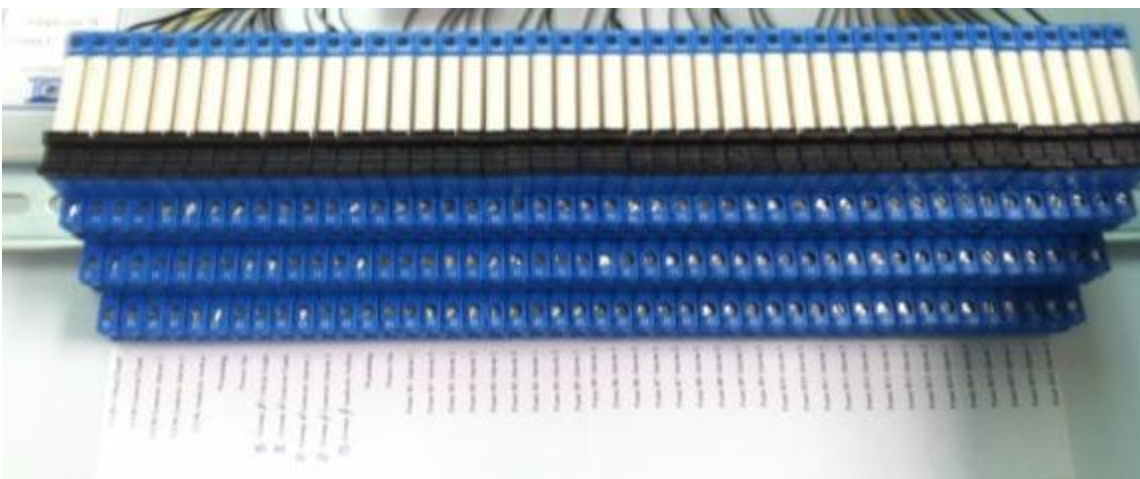


Figure G.4.1

Note: 32 point analyzers will have another 32 relays for points 17-32. Each of the relays has a normally open and a normally closed connection along with a common. Figure G.4.2 below shows the order of the relays as labeled inside the cabinet.

C L 9 6 C r i t i c a l F a u l t	C L 9 6 G e n e r a l F a r m 1 2	C L 9 6 G e n e r a l A r m 2	C L 9 6 G e n e r a l A c t i v e 1	C L 9 6 G e n e r a l A c t i v e 2	W a t c h d o g O n	P o w e r O n	G r o u p A C r i t i c a l F a u l t	G r o u p A G e n e r a l F a r m 1	G r o u p A G e n e r a l A r m 2	G r o u p A G e n e r a l A c t i v e	W a t c h d o g O n	P o w e r O n	P o i n t A 1	P o i n t A 1	P o i n t A 2	P o i n t A 2	P o i n t A 3	P o i n t A 3	P o i n t A 4	P o i n t A 4	P o i n t A 5	P o i n t A 5	P o i n t A 6	P o i n t A 6	P o i n t A 7	P o i n t A 7	P o i n t A 8	P o i n t A 8	P o i n t A 9	P o i n t A 9	P o i n t A 10	P o i n t A 10	P o i n t A 11	P o i n t A 11	P o i n t A 12	P o i n t A 12	P o i n t A 13	P o i n t A 13	P o i n t A 14	P o i n t A 14	P o i n t A 15	P o i n t A 15	P o i n t A 16	P o i n t A 16	P o i n t A 17	P o i n t A 17	P o i n t A 18	P o i n t A 18	P o i n t A 19	P o i n t A 19	P o i n t A 20	P o i n t A 20	P o i n t A 21	P o i n t A 21	P o i n t A 22	P o i n t A 22	P o i n t A 23	P o i n t A 23	P o i n t A 24	P o i n t A 24	P o i n t A 25	P o i n t A 25	P o i n t A 26	P o i n t A 26	P o i n t A 27	P o i n t A 27	P o i n t A 28	P o i n t A 28	P o i n t A 29	P o i n t A 29	P o i n t A 30	P o i n t A 30	P o i n t A 31	P o i n t A 31	P o i n t A 32	P o i n t A 32	P o i n t A 33	P o i n t A 33	P o i n t A 34	P o i n t A 34	P o i n t A 35	P o i n t A 35	P o i n t A 36	P o i n t A 36	P o i n t A 37	P o i n t A 37	P o i n t A 38	P o i n t A 38	P o i n t A 39	P o i n t A 39	P o i n t A 40	P o i n t A 40	P o i n t A 41	P o i n t A 41	P o i n t A 42	P o i n t A 42	P o i n t A 43	P o i n t A 43	P o i n t A 44	P o i n t A 44	P o i n t A 45	P o i n t A 45	P o i n t A 46	P o i n t A 46	P o i n t A 47	P o i n t A 47	P o i n t A 48	P o i n t A 48	P o i n t A 49	P o i n t A 49	P o i n t A 50	P o i n t A 50	P o i n t A 51	P o i n t A 51	P o i n t A 52	P o i n t A 52	P o i n t A 53	P o i n t A 53	P o i n t A 54	P o i n t A 54	P o i n t A 55	P o i n t A 55	P o i n t A 56	P o i n t A 56	P o i n t A 57	P o i n t A 57	P o i n t A 58	P o i n t A 58	P o i n t A 59	P o i n t A 59	P o i n t A 60	P o i n t A 60	P o i n t A 61	P o i n t A 61	P o i n t A 62	P o i n t A 62	P o i n t A 63	P o i n t A 63	P o i n t A 64	P o i n t A 64	P o i n t A 65	P o i n t A 65	P o i n t A 66	P o i n t A 66	P o i n t A 67	P o i n t A 67	P o i n t A 68	P o i n t A 68	P o i n t A 69	P o i n t A 69	P o i n t A 70	P o i n t A 70	P o i n t A 71	P o i n t A 71	P o i n t A 72	P o i n t A 72	P o i n t A 73	P o i n t A 73	P o i n t A 74	P o i n t A 74	P o i n t A 75	P o i n t A 75	P o i n t A 76	P o i n t A 76	P o i n t A 77	P o i n t A 77	P o i n t A 78	P o i n t A 78	P o i n t A 79	P o i n t A 79	P o i n t A 80	P o i n t A 80	P o i n t A 81	P o i n t A 81	P o i n t A 82	P o i n t A 82	P o i n t A 83	P o i n t A 83	P o i n t A 84	P o i n t A 84	P o i n t A 85	P o i n t A 85	P o i n t A 86	P o i n t A 86	P o i n t A 87	P o i n t A 87	P o i n t A 88	P o i n t A 88	P o i n t A 89	P o i n t A 89	P o i n t A 90	P o i n t A 90	P o i n t A 91	P o i n t A 91	P o i n t A 92	P o i n t A 92	P o i n t A 93	P o i n t A 93	P o i n t A 94	P o i n t A 94	P o i n t A 95	P o i n t A 95	P o i n t A 96	P o i n t A 96	P o i n t A 97	P o i n t A 97	P o i n t A 98	P o i n t A 98	P o i n t A 99	P o i n t A 99	P o i n t A 100	P o i n t A 100
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Figure G.4.2

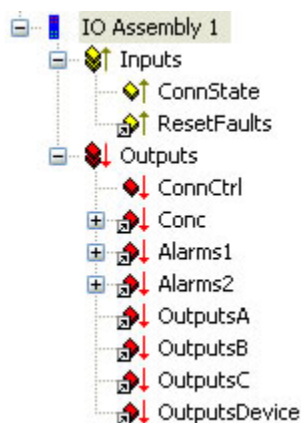
Appendix H – Data Communication

H.1 – Ethernet/IP

IMPORTANT: if you move to change the IP address of the CL96 the System must be 're-activated' by DOD Technologies support before data can be monitored via the Ethernet/IP Slave connection.

H.1.1 Data Format

The Ethernet/IP interface allows remote monitoring of fault/alarm outputs, concentration levels, and fault reset. You must supply the IP Address of the CL96 to DOD Technologies, INC to configure the Ethernet/IP. The data is mapped as:



Downlink (From Master to CL96):
 Assembly Instance: 102
 Size (16-bit Words) : 3

Offset (Words)	# Words	Data Description	Format
0	2	Connection Status	
2	1	Fault Reset	Bit 0 - Change from 1 to 0 to reset faults

Uplink (From CL96 to Master) :
 Assembly Instance: 101
 Size (16-bit words) : 114

Offset (Words)	# Words	Data Description	Format
0	2	Connection Status	
2	96	Concentration levels for all 96 points	Conc * 10 (eg. 23 = 2.3 actual conc)
98	1	Analyzer A Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
99	1	Analyzer A Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
100	1	Analyzer B Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
101	1	Analyzer B Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
102	1	Analyzer C Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
103	1	Analyzer C Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
104	1	Analyzer A Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
105	1	Analyzer A Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
106	1	Analyzer B Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
107	1	Analyzer B Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
108	1	Analyzer C Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
109	1	Analyzer C Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
110	1	Faults/Alarms Analyzer A	*See Below
111	1	Faults/Alarms Analyzer B	*See Below
112	1	Faults/Alarms Analyzer C	*See Below
113	1	Faults/Alarms CL96	*See Below

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 CL96 Fault/Alarms the alarms indicate the status of the entire machine. See the Appendix B for details of the I/O indicators.

The bits for Alarm Level 1, Alarm level 2, and all Faulty/Alarms may be affected by the “Energized Faults/Alarms” setting of the CL96.

H.2 – Profibus

The following information is available on the Profibus/Slave interface. The CL96 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

Each Analyzer Faults/Alarms (Discrete Outputs)

Token	Description	Type
Analyzer Critical Fault	This Analyzer has critical fault	Boolean
Analyzer Maintenance Fault	This analyzer has a maintenance issue	Boolean
Analyzer Gas Alarm 1	Level 1 Gas Alarm at Least 1 Point on Analyzer	Boolean
Analyzer Gas Alarm 2	Level 2 Gas Alarm at Least 1 Point on Analyzer	Boolean
Analyzing	Analysis active on Analyzer	Boolean

Each Point Concentration & Alarm Indicators

Token	Description	Type
Concentration	Current concentration (*10) for point	Word

H.2.1 Data Format

Default Slave ID: 2

Size (Bytes): 228

Byte # (Bytes)	Size # Bytes	Data Description	Format
1	4	Connection Status	
5	192	Concentration levels for all 96 Points	Conc * 10 (eg. 23 = 2.3 actual conc)
197	2	Analyzer A Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
199	2	Analyzer A Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
201	2	Analyzer B Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
203	2	Analyzer B Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
205	2	Analyzer C Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
207	2	Analyzer C Alarm Level 1 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
209	2	Analyzer A Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
211	2	Analyzer A Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
213	2	Analyzer B Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
215	2	Analyzer B Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
217	2	Analyzer C Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 1-16
219	2	Analyzer C Alarm Level 2 Indicators	Bit 0 - 15 = Alarm Level 1 points 17-32
221	2	Faults/Alarms Analyzer A	*See Below
223	2	Faults/Alarms Analyzer B	*See Below
225	2	Faults/Alarms Analyzer C	*See Below
227	2	Faults/Alarms CL96	*See Below

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 CL96 Fault/Alarms the alarms indicate the status of the entire machine. See the Appendix B of the CL96 manual for detail of the I/O indicators. The bits for Alarm Level 1, Alarm Level 2 and all the Fault/Alarms may be affected by the “Energized Faults/Alarms” setting of the CL96.