EXPERTS IN WATER CHEMISTRY SINCE 1903

9071C Hydrazine Analyzer

User Manual

Revision 2.15

WALTRON CUSTOMER COMMITMENT

This user manual is a technical guide to aid the customer in the set-up and maintenance of their new Waltron measuring system. Waltron provides continuous product improvement and reserves the right to make any modifications to the information contained herein without notice.

Technical questions concerning this product should be addressed to:

Waltron Technical Service Department

25 Minneakoning Rd, Suite 101
Flemington, New Jersey 08822
Phone: +1 908 534 5100, option 3 **Fax**: +1 908 534 5546
www.waltron.net

Please be ready to provide the following information:

- Date analyzer was purchased.
- Analyzer model and serial number.
- Recent maintenance history.
- Calibration slope values and detailed description of problem.

Waltron's technical expertise and extensive experience provides personalized solutions to the water quality industry. It is Waltron's commitment to provide the customer with timely and accurate technical service and support.

Waltron fully expects the customer to be satisfied with the quality, performance, and cost of this product. If there are any questions or concerns regarding this product, please feel free to contact Waltron at.

Thank you for choosing Waltron!

Please note Waltron mailing and UPS shipping addresses:

DIRECT ALL CORRESPONDENCE AND SHIPMENTS TO:
Waltron Bull & Roberts, LLC
25 Minneakoning Rd, Suite 101
Flemington, NJ 08822

Safety:

Please observe proper safety and handling precautions when installing, operating, maintaining, and servicing this product. The following should be noted and adhered to:

1. Read and understand manual before working with analyzer.
2. Pay special attention to warning labels on enclosures, containers, packages and chemicals.
3. Only qualified personnel should be involved in the installation, operation, and servicing of the analyzer.
4. Follow safety precautions when operating analyzer in conditions of high pressure and/or temperature.
5. Keep analyzer chemicals away from heat and extreme temperatures. Reagent powders must be kept dry.
6. Follow all regulations and warning labels when disposing of chemicals. Do not mix chemicals.

*To obtain analyzer safety information or **Safety Data Sheets (SDS)**, please contact Waltron or logon to www.waltron.net .*

Warranty Agreement

If, within one year from the date of shipment, the customer experiences any equipment defects or is not satisfied with the analyzer manufacturing, Waltron will repair, or at its option, replace any defective part(s) free of charge. This warranty requires that the defective part(s) be returned to Waltron with shipping charges prepaid.

At Waltron discretion, a Technical Service Specialist may be sent out to repair or replace the defective part(s) on location. Traveling time and expenses of the Technical Service Specialist is at the customer's expense.

Equipment sent to Waltron must be appropriately packaged and the following information must be provided prior to returning to Waltron:

- ✓ The Return Authorization (RA) number assigned to the customer by the Waltron Technical Service Department.
- ✓ Customer name, address and department.
- ✓ Name and telephone number of the individual responsible for returning items for repair.
- ✓ Brief problem description.

Ship to Waltron Service Center:

Waltron Bull & Roberts, LLC
25 Minneakoning Rd, Suite 101
Flemington, NJ 08822

Checklist of Materials

In order to ensure customer satisfaction, Waltron does its best to provide adequate and timely packaging and shipping services. Please perform the following after receiving a shipment:

- ✓ Inspect all shipping containers upon receipt and record any visible damage. If there are any outward signs of damage, please retain all containers and packages for inspection by carrier. Please retain all packing material so that it can be used for future moving and shipping needs.

- ✓ Check all items received against those on the packing list. Chemicals are usually shipped in a separate package and will be itemized accordingly.

- ✓ Verify that the number of packages received agrees with the packing list and shipping papers.

- ✓ Notify both Waltron and the carrier if any problems occur.

Important Notice

7. All monitors are inspected and tested prior to shipment.
8. In normal use, the unit should require only minor maintenance and should operate correctly and without fault over a long period of time.
9. Please note that if electronic components need to be replaced, it may be necessary to adjust and/or calibrate the monitor.
10. Failure to carry out correct maintenance procedures may result in inaccurate monitor reading.

Table of Contents

1 INTRODUCTION

1.1 *GENERAL*

The Waltron Quantichem® 9071C Hydrazine Analyzer is a microcontroller-based unit used for online measurement of hydrazine content in various water chemistry/treatment applications. Sampling points for power generation include mixed bed outlets, extraction pump discharge, boiler feed, boiler drum and steam. The measurement range of the 9071C analyzer spans from 0.01ppb to 1ppm.

1.2 *MAIN FEATURES*

Features of the Quantichem® 9071C Hydrazine Analyzer unit include:

1. Measurement of hydrazine concentration
    - Wide range analysis - 0.01ppb to 1ppm. Concentration and temperature are displayed continuously and analyzer adjusts automatically to user specified ranges.
    - Automatic temperature compensation
    - Protection from "Hot Sample"
2. Calibration
    - Single point calibration
    - Process calibration
    - Low reagent and standard consumption
    - Internal diagnostics used to show probe status
3. User Interface
    - 128x64 pixel graphics LCD with backlight
    - Large easy to read graphic display
    - Tactile membrane keypad (4 keys) on front panel
    - Lower 2 lines of display for user interface messages. Menu driven software interface for various operations including diagnostics, configurations, calibrations, and dispatch modes.
4. Communication Interface via RS-232 & RS-485 using MODBUS RTU protocol
5. Analyzer Configuration :
    - User configurable settings for recorder outputs and alarm set points
    - Factory defaults can easily be reloaded to override user setting
6. Automatically stores last 10 calibration and alarm logs.
7. Complete analyzer diagnostics - individual transmitter module can be tested independently
8. Dispatch mode facility
9. 3 Relay outputs for High, Low and General Alarm
10. Two 4-20mA isolated current outputs
11. Wide range of input power supply 90VAC to 250VAC

1.3 *SYSTEM DESCRIPTION & ARCHITECTURE*

The 9071C Hydrazine analyzer system is comprised of the following:

1. Wet-Section (Sensor Unit)
    a. Reagent solution container
    b. Hydraulic panel consisting of constant head, flowcell, tubing, and solenoid valve
    c. Hydrazine sensor with thermistor
    d. Standard solution container bottle (CAL1)
2. Transmitter Unit

9071C Transmitter Section

9071C Wet Section

Figure 1. Overall system architecture.

1.3.1 *WET SECTION UNIT*

The 9071C Hydrazine system is capable of monitoring hydrazine concentrations in sample feed. A single solenoid valves is used to select between analyzing the sample and accessing calibration standard 1 (CAL1).

In normal mode, the feed water flows from the inlet into the heat exchanger through the solenoid valve and into the sensor. The sensor transmits a current proportional to the hydrazine content in the feed water. This output is then measured by the electrical system and converted into a ppb/ppm measurement. An internal thermistor (housed in sensor) is used to monitor the water temperature for temperature compensation. If the sample temperature exceeds 131°F, sample automatically gets diverted to drain and the system displays "HOT".

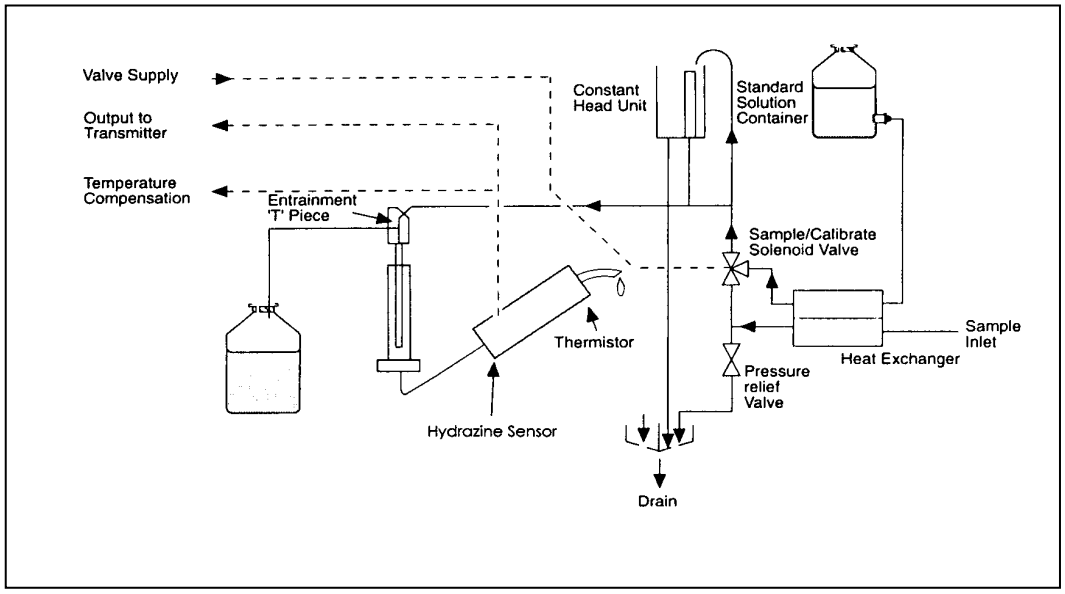


Figure 2. Sample flow during normal operation.

1.3.2 *TRANSMITTER UNIT*

The transmitter unit interprets the sensor and temperature output from the sensor and displays the corresponding hydrazine concentration (in ppb/ppm) and temperature. The transmitter unit controls all the operations of the analyzer system. The display is a graphics LCD with backlight.

2 INSTALLATION

2.1 *MOUNTING OF WET SECTION UNIT*

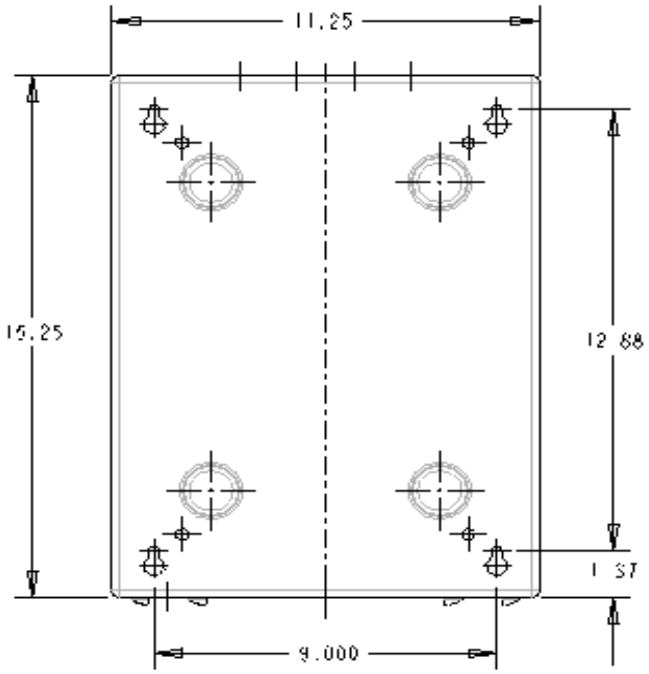


Figure 3. Dimensions to mount the Wet Section. (All dimensions in inches)

2.1.1 *LOCATION AND LAYOUT*

Mount the analyzer in a clean, vibration-free area avoiding direct radiant heat, sunlight and drafts. Avoid areas containing chlorinating equipment. The 9071C Hydrazine analyzer default design is comprised of two separate sections (transmitter and wet section). The sensor unit can be mounted separately as long as it is no more than 330 feet (100meters) from the transmitter unit.

2.1.2 *MOUNTING OF TRANSMITTER UNIT*

The transmitter unit controls the operations of the analyzer. Power supply, CPU card, Analog card and input power terminal junction are housed in the transmitter enclosure. Transmitter unit is a NEMA 4X rated enclosure with cable glands for wiring. Size and layout of transmitter is shown below.

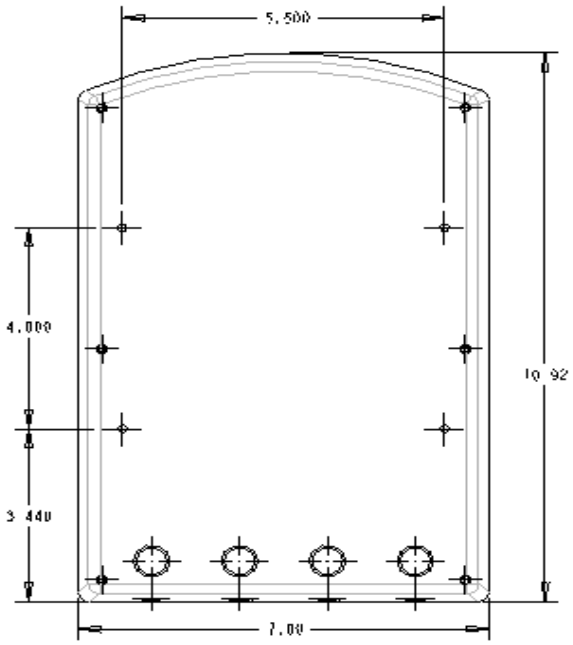


Figure 4. Dimensions of the transmitter unit. (All dimensions in inches)

For ease of mounting, the transmitter is attached to a sheet metal mounting bracket. The entire piece (transmitter on mounting bracket) can then be wall-mounted. Size and layout of mounting bracket is shown below.

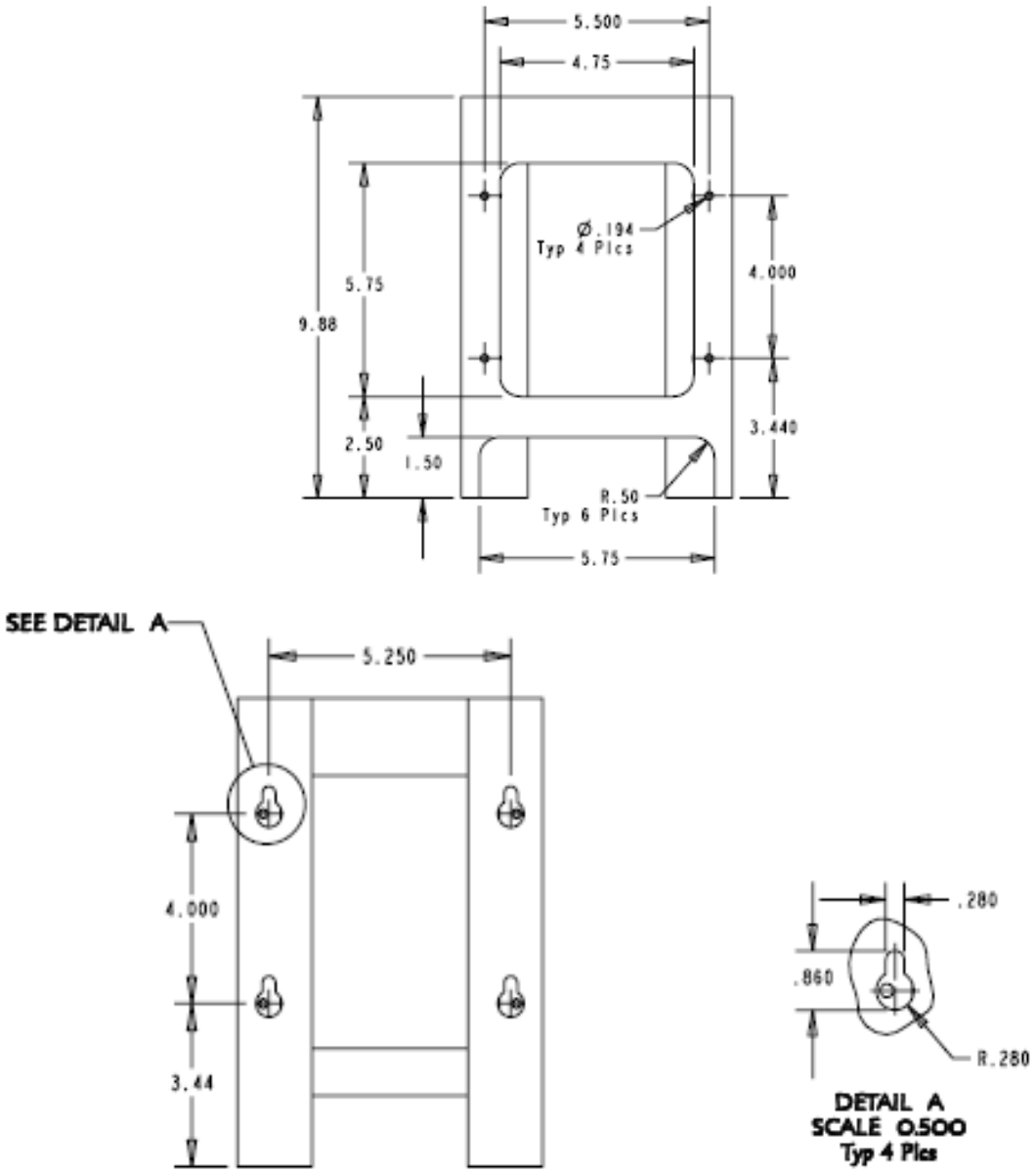


Figure 5. Dimensions for the transmitter mounting bracket.

2.2 *SAMPLE REQUIREMENTS*

The maximum sample pressures and temperatures specified in the SPECIFICATION section should not be exceeded. The sample should be introduced to the system at a temperature and pressure suitable for measurement. If necessary, customer may choose to use sample cooling and pressure reducing equipment. **It is highly recommended that a flow meter is installed to the sample inlet stream to ensure that the sample flow rate is within the specified range.** When pressure reducing equipment is being used, a pressure relief valve should be installed between the sample point and sample inlet to ensure maximum safety.

2.3 *EXTERNAL PIPING CONNECTIONS*

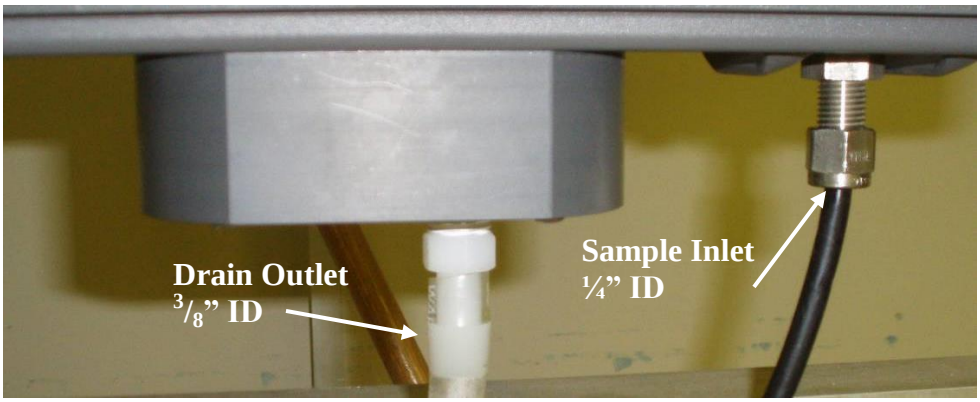


Figure 6. The bottom of the wet section case, with the sample inlet and drain connections shown.

2.4 *ELECTRICAL CONNECTIONS*

2.4.1 *WET SECTION UNIT*

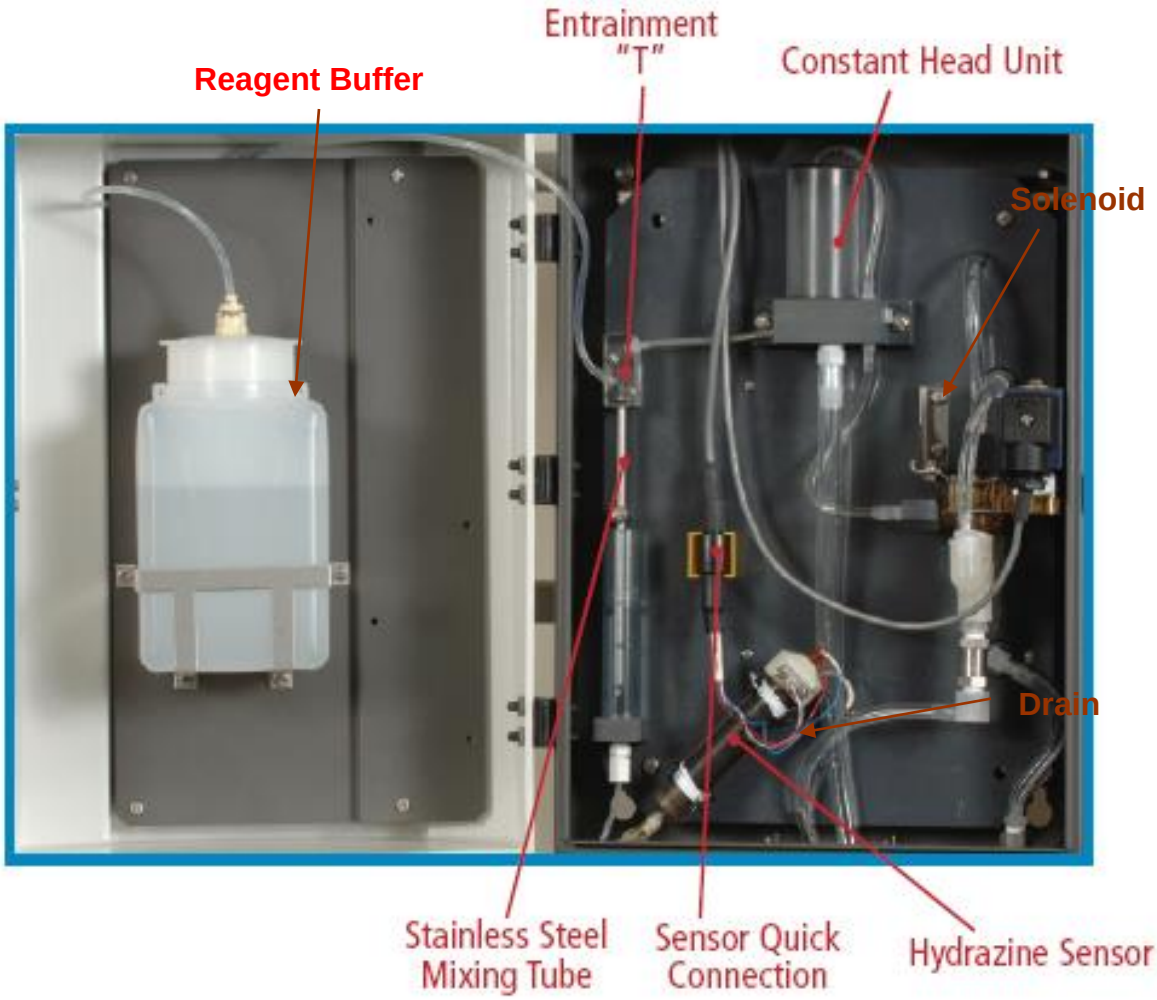


Figure 7. The wet section layout and connections.

Important: Refer to Section 4.6 for detailed information about the hydrazine sensor and Section 4.4 for instructions on installing and refurbishing the sensor.

2.4.2 *TRANSMITTER UNIT*

Proceed as follows to gain access when making the necessary connections:

Remove the six screws securing the top cover of the transmitter unit. Pass appropriate cables thru the cable glands for the following connections:

- Power Supply
- Solenoid and Alarms
- Sensor and Thermistor Wiring
- 4-20mA Current Output and Communication Interface

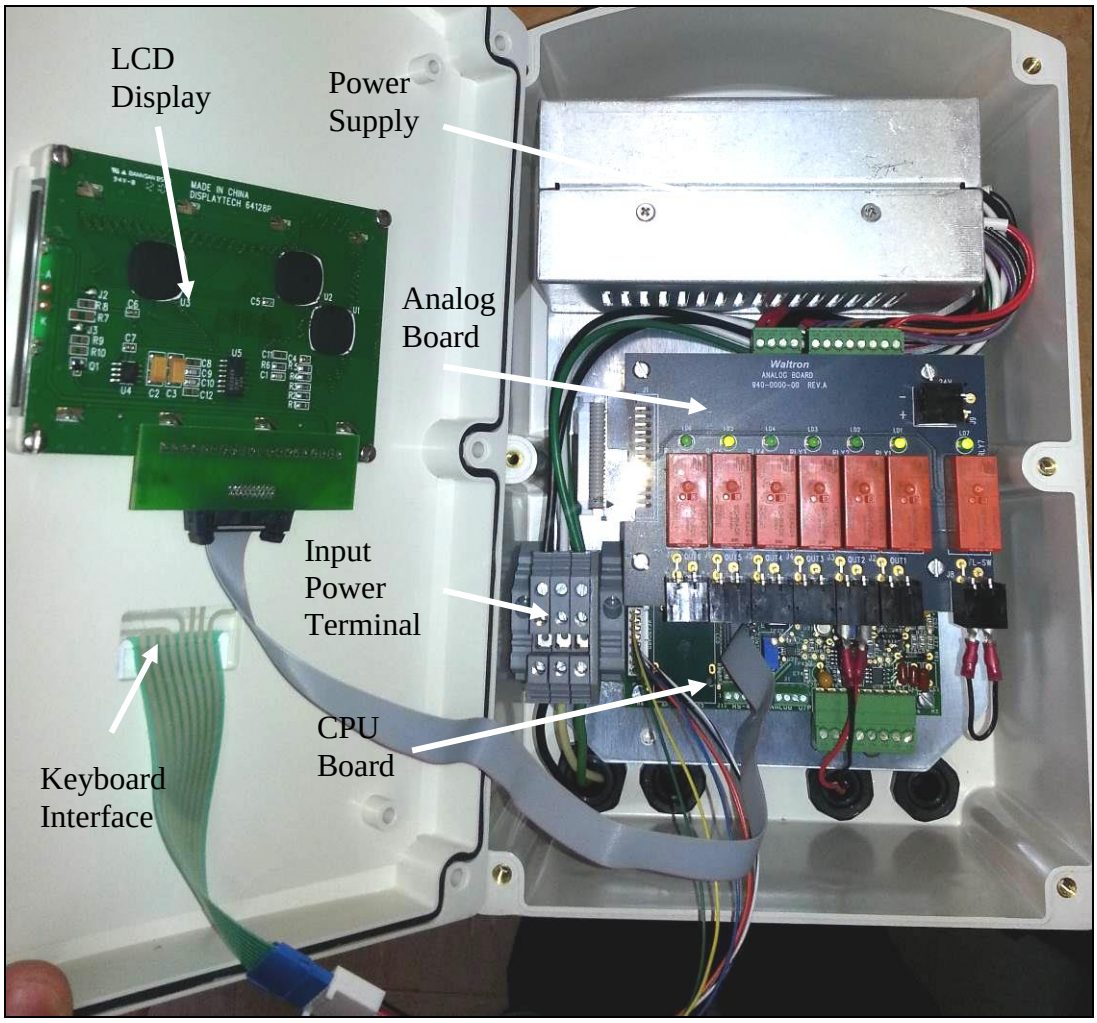


Figure 8. The layout and components of the transmitter case.

Note. Before connecting the analyzer to the main power supply check that there is correct voltage at the mains.

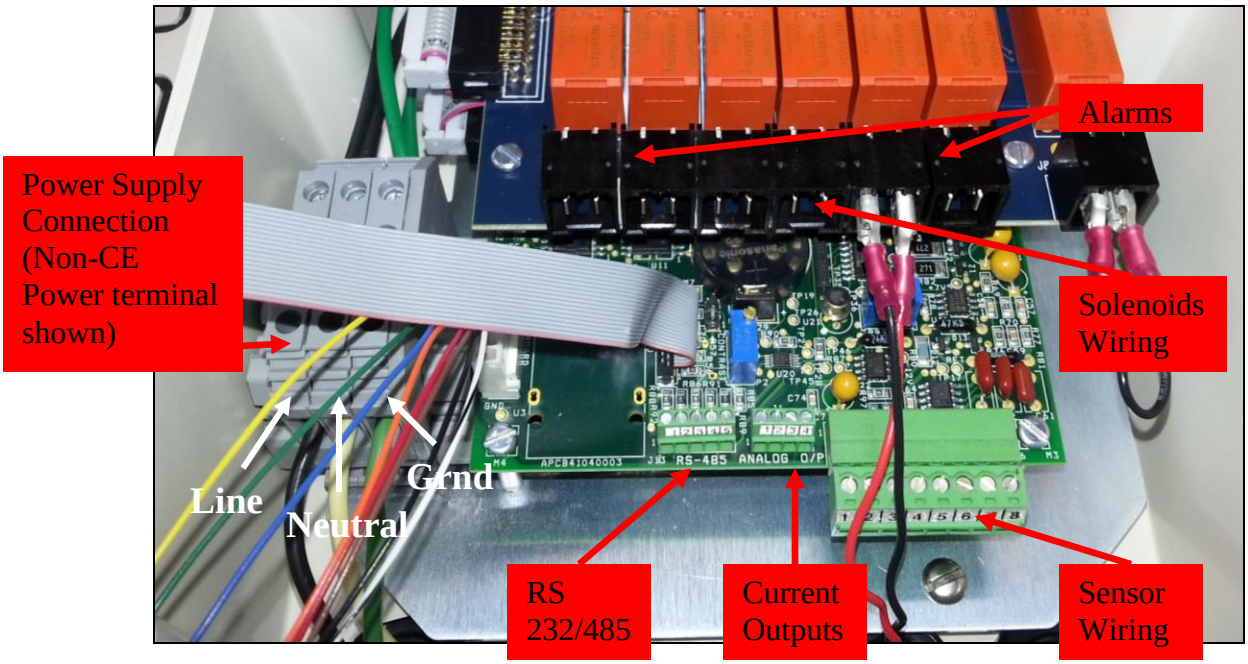


Figure 9. Location of the terminal block connections in the transmitter unit.

⦸**WARNING.** Although this instrument has internal fuse protection, the operator must use a suitably rated external protection device such as a fuse or miniature circuit breaker (MCB).
Switch **OFF** the power supply and high voltage power-operated control circuits before making any connections. This equipment operates on alternating current (AC) electricity. Always take suitable safety precautions to avoid the possibility of an electric shock.

⦸**WARNING.** Connecting the power supply earth (ground) ensures the safety of assembly personnel, reduction of the effects of Radio Frequency Interference (RFI), and ensures operation of the power supply interference filter.

2.4.3 *AC POWER TERMINAL BOX (OPTIONAL)*

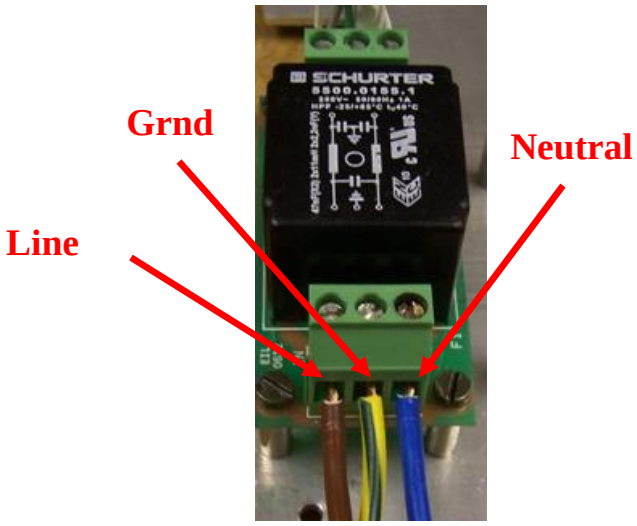
If user wishes to hard wire the system they can use an optional AC Power Terminal Box (P/N P1000-059).

If the user requires CE certification this box is mandatory.

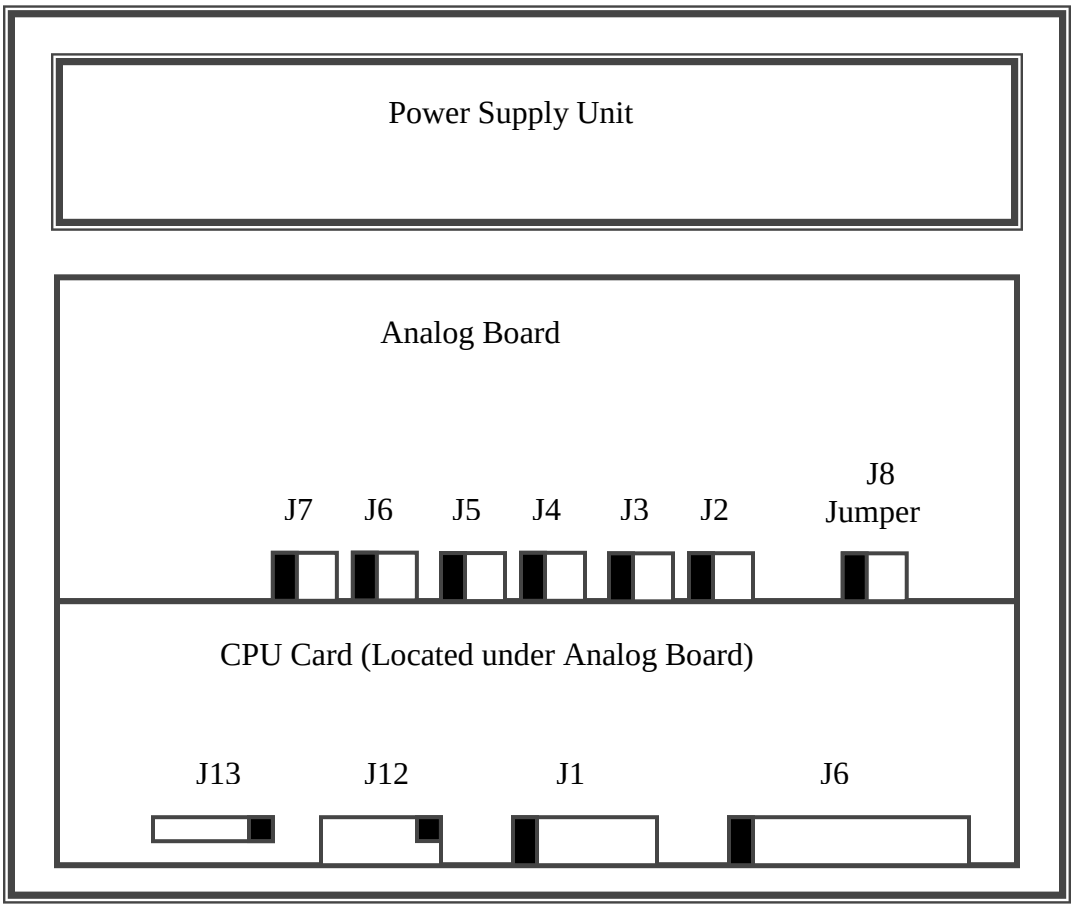
The user can turn ON/OFF power to the analyzer by pressing the GREEN button on the terminal box. When power is supplied to the analyzer the button will illuminate. The terminal box has IP66 rating and contains 3 AC power lines (LINE, GOUND, NEUTRAL) input and output. Picture of terminal box is shown below:

2.4.4 *CE POWER CONNECTIONS (OPTIONAL)*

For analyzers that are CE certified, the AC power box must be used (above). The power connections from the AC power box to the transmitter power terminal are shown below:



2.4.5 *WIRING TO TRANSMITTER*



Note: Pin 1 of all the connectors are shown in black

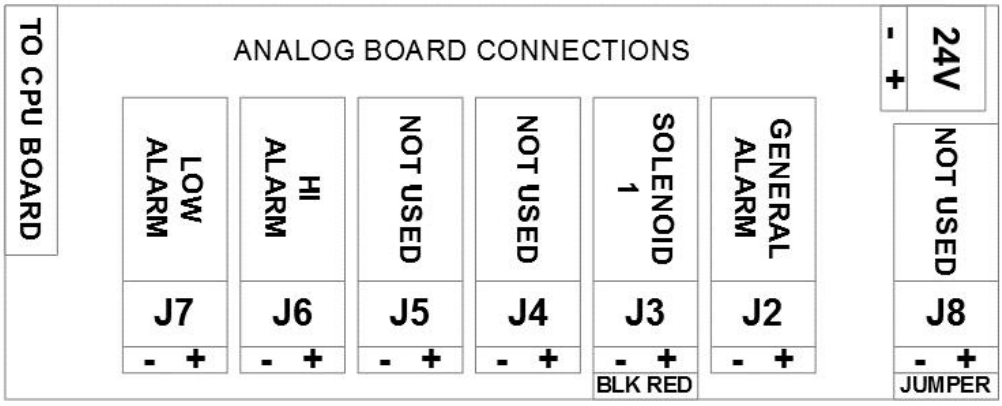


Figure 10. Pin locations for the Analog and CPU cards.

The Analog card is mounted above the CPU card. The CPU and Analog cards communicate with each other through a common flat ribbon cable and mating connectors. Power supply to the respective cards is routed through common cables and connectors.

The approximate dimensions of the PCB sub-assemblies are as follows:

CPU card - 131.5 mm (L) x 130 mm (W)
Analog card – 131.5 mm (L) x 100 mm (W)
Power Supply cards x 2 – 127 mm (L) x 76.2 mm (W) [Housed in common enclosure]

All field I/Os are routed inside the instrument with cable glands. All field I/Os for the sensor inputs are terminated on PHOENIX connector terminals. The terminal receptacle is a "90 ° Block Header" with "socket to pin orientation" and the Plug is 180° "wire to plug" orientation. The plug accepts a 30-14 AWG wire.

Connections to the Analog board are terminated via crimp terminals. Refer to the appendix in the back of the manual for instructions on properly crimping terminals to the wire ends.

Connecting the Wet Section (Sensor) to Transmitter:

The 4-Core PVC Shielded cable coming as an output from the sensor is connected to J6 of CPU Card, as follows:

Card	Connector	Pin Number	Connection	Wire Color
CPU	J6	1	Thermistor	Green
CPU	J6	2	Sensor +	Red
CPU	J6	3	Sensor -	Blue
CPU	J6	4	Thermistor	Yellow
CPU	J6	5	NC	
CPU	J6	6	NC	
CPU	J6	7	NC	
CPU	J6	8	NC	

Connecting the Current Output(s) to Transmitter:

Two 4-20mA recorder outputs supplying analog output proportional to the hydrazine concentration are provided on J1 connector on the CPU card. The pin locations from the connector are shown below:

Card	Connector	Pin Number	Connection
CPU	J1	1	Iout1
CPU	J1	2	FGnd
CPU	J1	3	Iout2
CPU	J1	4	FGnd

Note: In case no load is connected, it is advisable to connect a 470-ohm load resistor between Pin 1 & 2 and Pin 3 & 4 respectively.

Connecting the Alarm outputs to Transmitter:

Potential free contacts for High Alarm and Low Alarm are terminated on the J6 and J7 connectors (provided on the Analog card) as shown in Figure 10.

The pin out of the connector is as shown below:

Card	Connector	Alarm/Solenoid	Pin Number	Connection
Analog	J7	Low Alarm	1	-
Analog	J7		2	+
Analog	J6	High Alarm	1	-
Analog	J6		2	+

Similarly, potential free contacts for General Alarm are terminated on the J2 connector (provided on the Analog card) as shown in the Figure 10.

The pin out of the connector is as shown below:

Card	Connector	Alarm/Solenoid	Pin Number	Connection
Analog	J2	General Alarm	1	-
Analog	J2		2	+

Connecting the Solenoids to Transmitter:

The Solenoid valve for CAL1 operation is terminated on the J3 connector, provided on the Analog card, as shown in the Figure 10. The +24V DC excitation @ 400mA, each, is provided on board.

The pin out of the connector is as shown below:

Card	Connector	Alarm/Solenoid	Pin Number	Connection
Analog	J3	Solenoid 1 (CAL1)	1	S1- (BLK)
Analog	J3		2	S1+ (RED)

Connecting the serial communication ports to Transmitter:

Two separate serial ports RS-232 and RS-485 are provided on the CPU card. These ports are located near connector J1.

The pin out of the connector is as shown below:

Card	Connector	Serial Com	Pin Number	Connection
CPU	J12	RS-232	1	NC
CPU	J12		2	RxD
CPU	J12		3	TxD
CPU	J12		4	NC
CPU	J12		5	Gnd
CPU	J12		6	NC
CPU	J12		7	NC
CPU	J12		8	NC
CPU	J12		9	NC
CPU	J12		10	NC

Card	Connector	Serial Com	Pin Number	Connection
CPU	J4	RS-485	1	NC
CPU	J4		2	Data+
CPU	J4		3	Data-
CPU	J4		4	NC
CPU	J4		5	Gnd
CPU	J4		6	NC
CPU	J4		7	NC
CPU	J4		8	NC
CPU	J4		9	NC
CPU	J4		10	NC

3 OPERATING THE ANALYZER

3.1 *ANALYZER OPERATION*

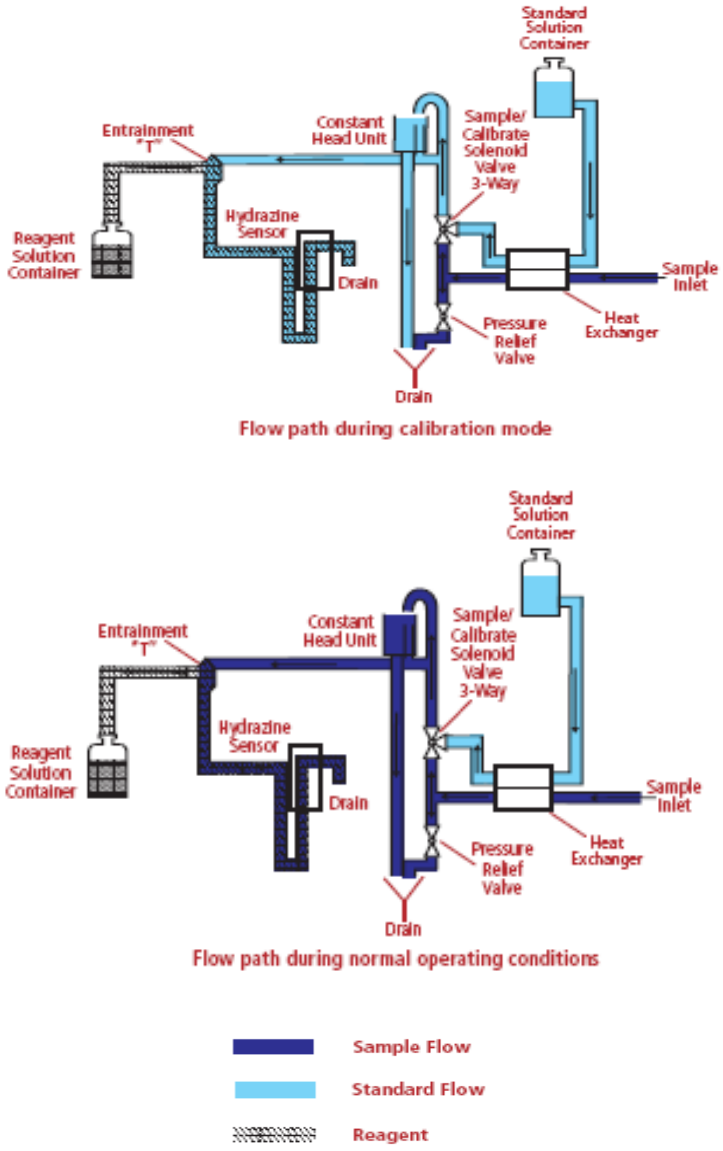


Figure 11. Sample flow during normal operation.

The 9071C Hydrazine analyzer system is comprised of separate combination sheet metal and plastic enclosures. The internal hydraulic components and pipe work are mounted onto a sample panel connected to the cabinet. Sample enters through the inlet compression fitting at the bottom of the case and first passes through the heat exchanger. The heat exchanger is used to keep the sample temperature and calibration solution temperature at equilibrium during calibration. Drastic and sudden changes in solution temperature may have a negative effect on sensor performance.

After flowing through the heat exchanger, the sample passes through a 3-way solenoid valve and then sample is taken to the constant head (the constant head unit stabilizes the effect of changes in sample inlet flowrate). After flow passes through the constant head unit it is then delivered to the entrainment 'T' where an alkaline vapor buffer is added to the sample in order to raise the pH value. After the sample and vapor reagent are mixed, the solution is sent to the flowcell where it comes into contact with the hydrazine sensor.

The sample flows through the sensor and then through the drain located in the bottom of the case. The potential developed inside the hydrazine sensor is logarithmic with respect to changes in hydrazine concentration. The signal from the sensor is sent to the transmitter unit via the interconnection cable.

A temperature sensor (thermistor) is housed in the sensor assembly and detects the temperature of the sample. The thermistor is connected to the transmitter unit and compensates for changes in output from the sensor over a range of 41°F to 131°F (5 °C to 55°C).

Calibration of the analyzer is controlled by the micro-controller. After the user connects the transmitter unit to the wet section, it is necessary to perform one successful one point calibration. See Section 3.7 for more details on calibration. Once a successful calibration is performed, the unit is now ready to measure the hydrazine concentration in the sample. The display then shows the ppm/ppb concentration of the sample while the analyzer compensates for the variations in the sample temperature automatically.

3.2 *ALARMS*

Sample Concentration Alarms

When the 9071C Hydrazine system is in normal operation mode one alarm operates as a "low" alarm and the other operates as a 'high' alarm. Alarm 1 (A1) operates as a LOW alarm and is activated when the hydrazine level decreases below the set value. Alarm 2 (A2) operates as a HIGH alarm and is activated when the hydrazine level increases above the set value. The two hydrazine alarms control the relays provided. Each relay has one pair of changeover contacts rated at 2A, 250VAC (non-inductive). Terminal connections for alarm relays are located on J2, J6, and J7 of the Analog card.

CONCENTRATION ALARM DESCRIPTIONS		
Symbol	ALARM	DESCRIPTION
A1	Low Alarm	Activates when Hz in sample feed is lower than "Low Set Point".
A2	High Alarm	Activates when Hz in sample feed is higher than "High Set Point".

Various Alarm Descriptions

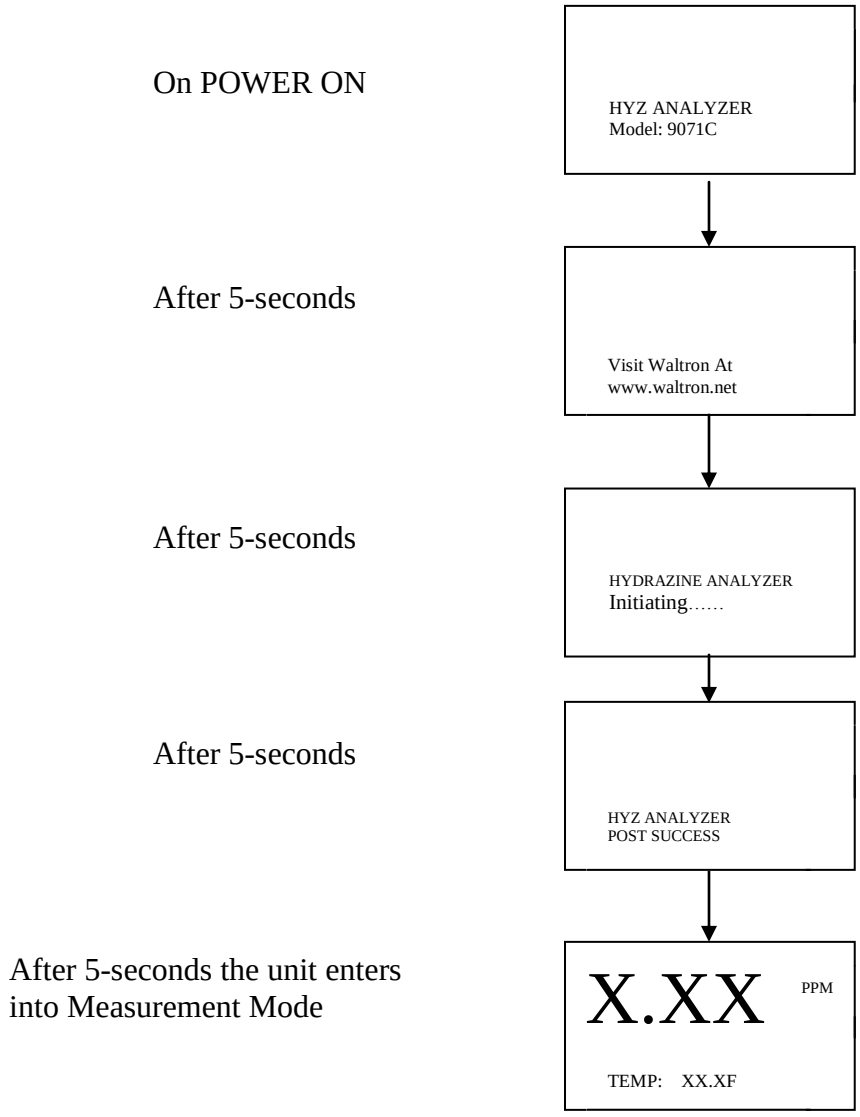
ALARM	DESCRIPTION
CF	Calibration Fail
HOT	Sample temperature over range (131F)
TEMP	No thermistor response
Output 1 Out	Concentration is outside O/PmA 1 set range
Output 2 Out	Concentration is outside O/PmA 2 set range
Conc. Low	Concentration is below Low Alarm set point
Conc. High	Concentration is above High Alarm set point
OVR	Concentration is above limits of analyzer (>1ppm)

3.3 *GETTING STARTED*

- Insert the POWER cords into the terminal connector housed inside the transmitter section and switch ON the system. The power up sequence should be as mentioned in Section 3.4. After power-up, the analyzer enters into Measurement Mode.
- The analyzer automatically displays the concentration of hydrazine interpreted by the sensor. Units of measurement (ppb/ppm) are displayed on the right-hand-side on the LCD.
- If the analyzer is being started up for the first time, or if it was not in operation for a long time, the user should perform a calibration as detailed in Section 3.7.1.

3.4 *POWER UP SEQUENCE*

- After switching ON the analyzer the following start up sequence is displayed:



3.5 *KEY-BOARD FUNCTIONS*

Figure 12. The front panel of the transmitter unit

There are four keys on front panel (shown above) which are used to navigate/view/edit the various menus/parameters. The functionality of the keys is described below:

- **MENU**: The MENU key can be pressed at any time to return to the Main Menu. When the MENU key is pressed the Main Menu options are displayed. There are 7 Main Menu options and only 2 main/sub menus are displayed at a time, on two separate lines.

- **DOWN ARROW**: By pressing this key the user can navigate through the various menu and sub-menu options. This same key also functions as an increment key during numerical entry.

- **RIGHT ARROW**: This key is used to position the cursor at desired place; the cursor moves in a left to right direction.

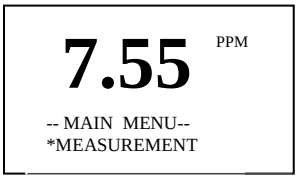
- **ENTER**: This key is used to enter into a selected menu. It is also used to confirm/store entered values.

3.6 *MAIN MENU - ANALYZER MODES*

There are 6 Main Menu options; each is listed below:

1. **MEASUREMENT** – Displays information during normal operation
2. **CONFIGURATION** – Used to configure analyzer settings
3. **MANUAL CALIB** – Perform manual calibration
4. **FAIL SAFE** – Used to shut-down/power off analyzer
5. **DIAGNOSTICS** – Stores data logs and aids in troubleshooting
6. **DISPATCH MODE** – Used to troubleshoot/calibrate electronics

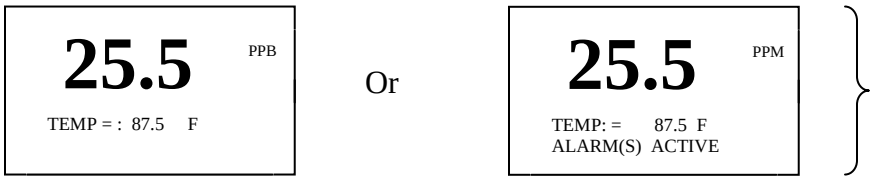
To enter the Main Menu press MENU Key. The following screen is displayed:



Note: The '*' indicates the selected item of that particular menu or sub-menu.

3.6.1 *MEASUREMENT*

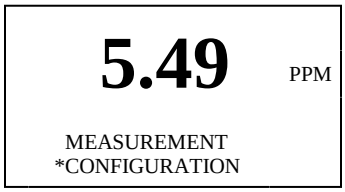
Press the ENTER key to go to MEASUREMENT screen. The display shows:



Note: The system loops backs to the MEASUREMENT mode and displays the measurement screen if there is no keypad activity for 60 seconds.

3.6.2 CONFIGURATION

To go to the CONFIGURATION menu press the DOWN arrow key once to display the following screen:



Press the ENTER key to enter CONFIGURATION menu; the following sub-menu is displayed:

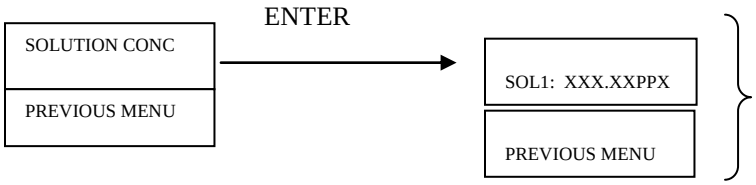
Press the DOWN arrow key to scroll down the remaining sub-menus. The CONFIGURATION menu has the following sub-menus:

1. **CALIB SETUP** – View/change settings for manual calibration
2. **O/P mA SETUP** – View/change settings for current output (4-20mA) alarms
3. **ALARM SET PTS** – View/change settings for High/Low/General Alarms
4. **DATE & TIME** – View/change date and time settings
5. **SERVICE PARAMS** – Password protected; controls valve timing during CAL
6. **SERIAL PORT** – View/change settings used for remote interface communication
7. **PREVIOUS MENU** – Reverts back to previous menu (Main Menu)

To navigate through the sub-menus press the DOWN arrow key and to select an item from the menu press the ENTER key whenever that sub-menu item is highlighted (‘* ‘). The logical flow is shown below. For simplicity all the sub-menus are shown at once.

3.6.2.1 CALIB SETUP (Calibration Set-Up)

The sub-menus for CALIB SETUP are as follows:



- “XXX.XX” and the last character of PPX all editable parameters.
- Press Right Arrow Key
  Once: To select the first ‘X’.
  Twice: To select the 2nd ‘X’
  Thrice: To select the 3rd ‘X’
  Four times: To select the 4th ‘X’
  Five times: To select the 5th ‘X’
- After selecting any of the ‘X’s use the DOWN arrow key to increment and press ENTER key to confirm.
- Pressing the ENTER key when the PREVIOUS MENU is displayed, loops back the display to the previous menu.

3.6.2.2 O/P mA SETUP

Press the ENTER key when O/P mA menu is displayed. The following sub-menus are displayed:

O/P1 PARAMETERS
LOW: XXXXXPPX
HIGH : XXXXXPPX
O/P2 PARAMETERS
LOW: XXXXXPPX
HIGH : XXXXXPPX
PREVIOUS MENU

- "XXX.XX" and the last character of PPX all editable parameters.
- Press RIGHT arrow key
  Once: To select the first 'X'.
  Twice: To select the 2nd 'X'
  Thrice: To select the 3rd 'X'
  Four times: To select the 4th 'X'
  Five times: To select the 5th 'X'
- After selecting any of the 'X's use the DOWN arrow key to increment and press ENTER key to confirm.
- Pressing the ENTER key when the PREVIOUS MENU is displayed loops back the display to the previous menu. . i.e, O/P mA SETUP

3.6.2.3 ALARM SET PTS

Press the ENTER key when ALARM SET PTS menu is displayed. The following sub-menus are displayed:

LO: XXXXXPPX
HI: XXXXXPPX
PREVIOUS MENU

- xxx.xx and the last character of PPX all editable parameters.
- Press RIGHT arrow key
  Once: To select the first 'X'.
  Twice: To select the 2nd 'X'
  Thrice: To select the 3rd 'X'
  Four times: To select the 4th 'X'
  Five times: To select the 5th 'X'
- After selecting any of the 'X's use the DOWN arrow key to increment and press ENTER key to confirm.
- Pressing the ENTER key when the PREVIOUS MENU is displayed loops back the display to the previous menu.i.e, ALARM SET PTS

3.6.2.4 DATE & TIME

Press the ENTER key when DATE & TIME menu is displayed. The following sub-menu options are displayed:

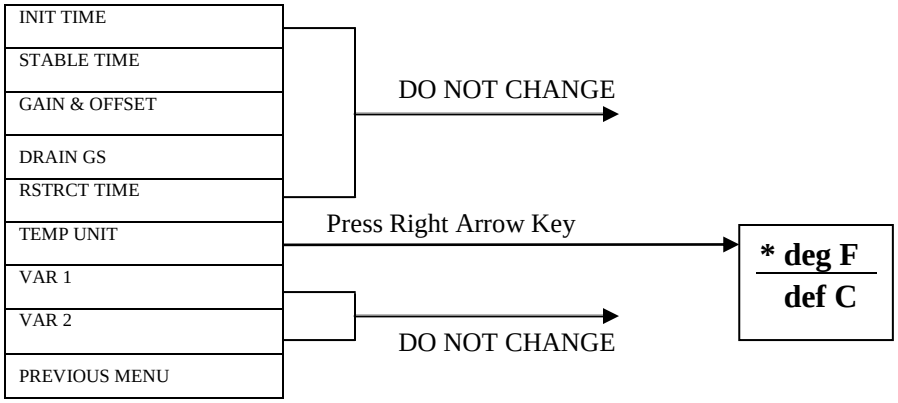
SET DATE & TIME
DATE: DD/ MM/ YY
TIME: HH:MM:SS
PREVIOUS MENU

The above explanation is tru

- DD, MM, SS, HH MM, SS are all editable parameters where DD is the Day, MM the Month, YY the Year, HH the Hours, MM the Minutes and SS the Seconds.
- Press RIGHT arrow key
  Once: To select 'DD'.
  Twice: To select 'MM'
  Thrice: To select 'YY'
- The highlighted value may be changed using the DOWN arrow key to increment and followed by ENTER key to confirm.
- Pressing the ENTER key when the PREVIOUS MENU is displayed loops back the display to the previous menu.i.e, DATE & TIME

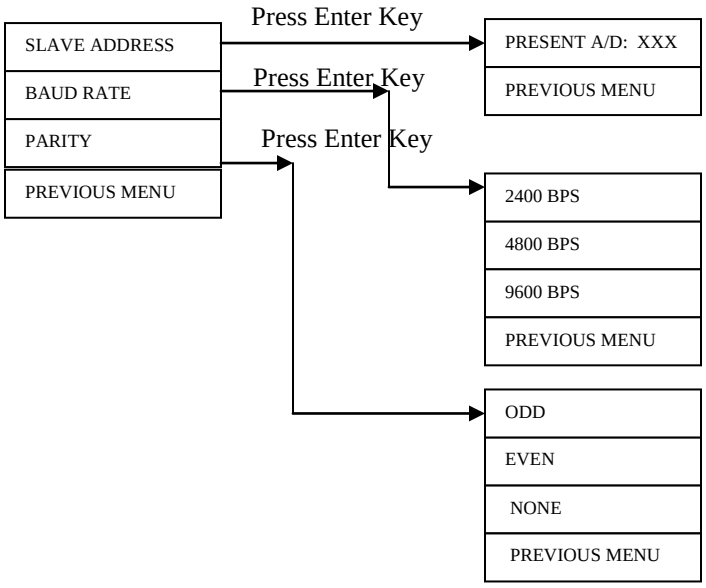
3.6.2.5 SERVICE PARAMATERS

1. Press ENTER key when Service Params menu is displayed. This menu is password protected and these default settings should not be changed.
2. Enter password by pressing menu key, down arrow key, right arrow key, enter key.
3. Use down arrow key to select degree display unit and press ENTER key to confirm.
4. Do NOT change the other default menu settings.
5. Pressing the ENTER key when the PREVIOUS MENU is displayed loops back the display to the previous menu.



3.6.2.6 SERIAL PORT

Press the ENTER key when SERIAL PORT menu is displayed. The following sub-menus are displayed:



- XXX are all editable parameters.
- Press RIGHT arrow key
  Once: To select the first 'X'.
  Twice: To select the 2nd 'X'
  Thrice: To select the 3rd 'X'
- After selecting any of the 'X's use the DOWN arrow key to increment and press ENTER key to confirm.
- Use DOWN arrow key to select and highlight baud rate /parity.
- Pressing the ENTER key when the PREVIOUS MENU is displayed loops back the display to the previous menu.

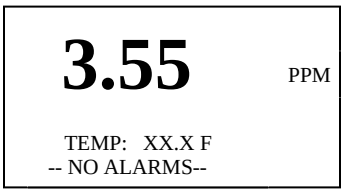
3.6.2.7 PREVIOUS MENU

Pressing the ENTER key when the PREVIOUS MENU is displayed loops back the display to the previous menu.

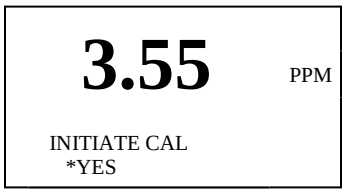
3.6.3 *MANUAL CALIBRATION*

Go to the MANUAL CALIB menu and press ENTER; the following screen will appear:

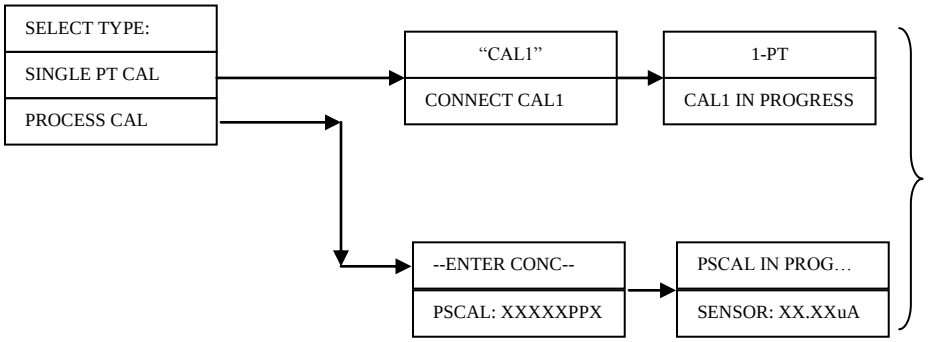
Press ENTER key



Else, press DOWN arrow key



Manual CALIB mode has following sub-menus:



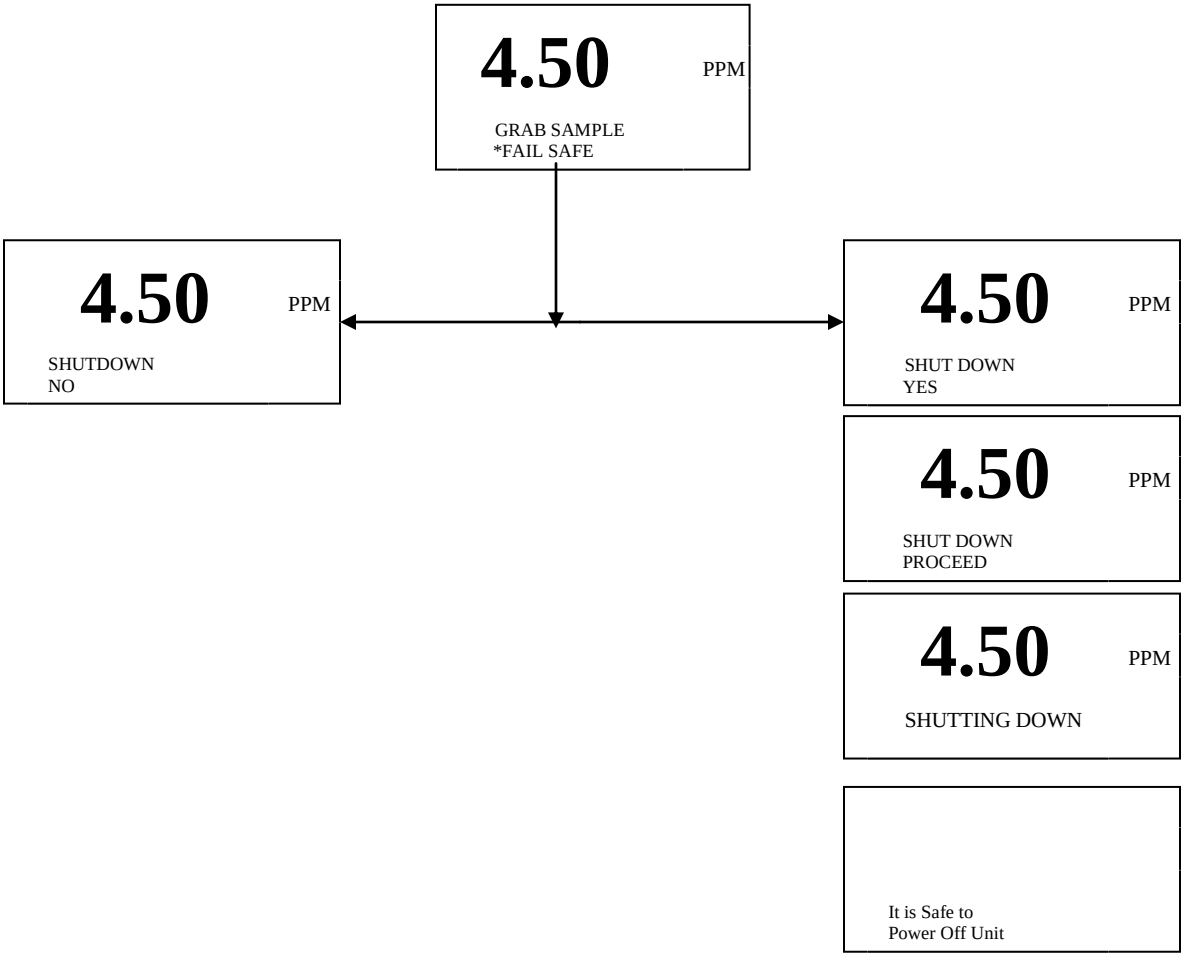
If ENTER key is pressed at this point the Calibration cycle ends. The friendly menus guide you through the abort process.

- XXX.XX are all editable parameters.
- Press RIGHT arrow key
  Once: To select the first 'X'.
  Twice: To select the 2nd 'X'
  Thrice: To select the 3rd 'X'
  Similar for fourth and fifth 'X'
- After selecting any of the 'X's use the DOWN arrow key to increment and press ENTER key to confirm

3.6.4 *FAIL SAFE*

This mode is used to perform a safe shut down so that the necessary parameters and changed default values are properly saved. To perform a safe shutdown go to the FAIL SAFE menu and press ENTER.

To go to the FAIL SAFE menu press the MENU key to get to MAIN MENU. Press DOWN arrow key to FAIL SAFE and press ENTER. The display will show the following screen during shutdown:



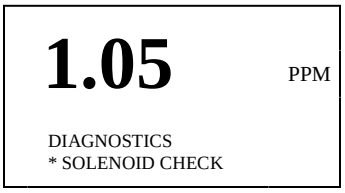
NOTE: Switching off the system abruptly, without going into FAIL SAFE mode may result in malfunctioning of the system after next power ON.

3.6.5 *DIAGNOSTICS*

A complete set of diagnostics is provided so that the various system parameters and diagnostic tasks such as switching relays ON/OFF, activating/de-activating the alarms and viewing logs may be carried out quickly and easily.

To access diagnostic parameters press the MENU key to get to MAIN MENU and go into the DIAGNOSTICS menu and press ENTER to display the following screen:

Press the ENTER key to display the sub-menus. The display shows:



The DIAGNOSTICS menu has the following sub-menus:

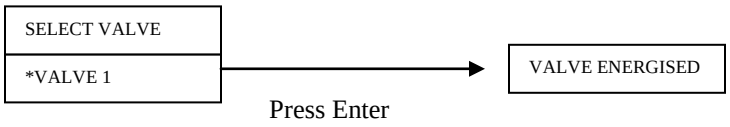
1. **SOLENOID CHECK** – Manually checks the operation of solenoid valve
2. **CALIB LOG** – Stores data for the last 10 calibrations
3. **ALARM LOG** – Stores data for the last 10 alarms
4. **PROBE DETAILS** – Input probe data for historical record
5. **THERM CHECK** – Checks real-time output from thermistor
6. **SENSOR CHECK** – Check real-time output from probes
7. **RELAY CHECK** – Checks status of relays
8. **O/P mA CHECK** – Manually sends 4-20mA outputs
9. **DIGITAL I/PS** – Checks status of digital I/Ps
10. **SERIAL CHECK** – Checks communication of serial port
11. **S/W VERSION** – Shows current version of software
12. **PREVIOUS MEN**U – Returns to previous menu (Main Menu)

To navigate through the sub-menus, press the ENTER key whenever the sub-menu is highlighted (‘* ‘).

3.6.5.1 SOLENOID CHECK

This mode is used to check the operation/status of the solenoid valve. To perform a solenoid check, go into the DIAGNOSTICS menu and select SOLENOID CHECK. The menu layout of the solenoid check cycles is as follows:

Press the DOWN arrow key to select which valve you want to initiate. Press ENTER to activate valve.

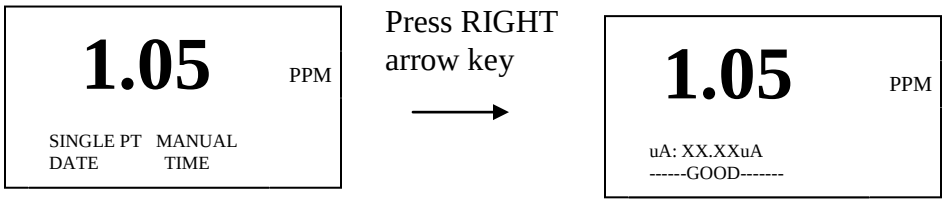


Press DOWN, RIGHT and ENTER keys to go to previous sub menu.

3.6.5.2 CALIBRATION LOG

The Calibration Log (CALIB LOG) stores the relevant data taken during a calibration. The data for each CALIB LOG is stored on 2 separate pages (Press the RIGHT arrow key to toggle between pages).

Select CALIB LOG in DIAGNOSTICS menu and press ENTER key. The following screen is displayed:



The **first** page of the CALIB LOG shows:
Calibration---→Single PT, Pro Cal
Type----------→ Manual
Date---------- → Date of Calibration
Time--------- → Time of Calibration

The **second** page of the CALIB LOG shows:
uA Value---→Calibration performance
PASS/FAIL----------→Calibration result (GOOD/FAIR/POOR)

To view the logs use the DOWN arrow key. A maximum of 10 logs are maintained in memory.

3.6.5.3 ALARM LOG

By pressing the ENTER key the following screen is displayed:

A log typically shows the:
Alarm Name → Output1 Set, Conc. High Set etc.
Date---------- → Date of Alarm
Time--------- → Time of Alarm

To view the logs use the DOWN arrow key.
A maximum of 10 logs are maintained in memory.

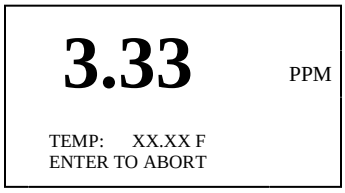
3.6.5.4 PROBE DETAILS

Upon pressing the ENTER key a screen asking for a password is displayed.
After entering the correct password the following screen is displayed:

The MfgDT is the editable part of this menu. The editing procedure is same as explained in the DATE AND TIME section.

3.6.5.5 THERM CHECK

By pressing ENTER key the following screen is displayed:



Press the ENTER key to abort. The system will then loop back to the Previous Menu.
If no key is pressed the system will loop back to the MEASUREMENT screen after 30 seconds.

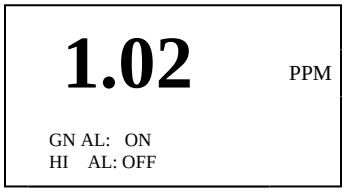
3.6.5.6 SENSOR CHECK

By pressing ENTER key the following screen is displayed:

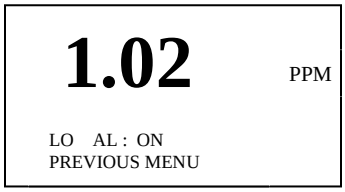
Press ENTER key to abort and go to the previous menu.

3.6.5.7 RELAY CHECK

By pressing ENTER key the following screen is displayed:



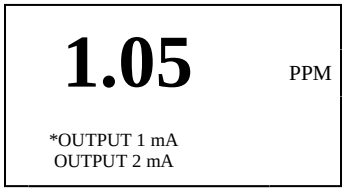
Press DOWN arrow key twice to get the following display:



This menu is used to test the Alarms. Select the sub-menu by pressing the DOWN arrow key and pressing ENTER. Use the RIGHT arrow key to select the relay and DOWN arrow key followed by ENTER key to Activate or De-activate the alarms.
Pressing the ENTER key when PREVIOUS MENU is highlighted loops the system to previous menu.

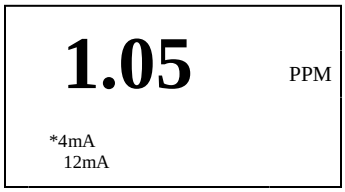
3.6.5.8 OUTPUT mA CHECK

By pressing the ENTER key the following screen is displayed:



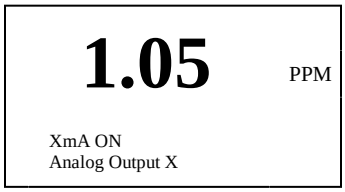
By default OUTPUT 1 mA is highlighted. Use DOWN arrow key to select OUTPUT 1 mA or PREVIOUS MENU.

Press ENTER to display the following:



Press DOWN arrow key to display the next option:

Press ENTER key to display the following:



Pressing the PREVIOUS MENU key loops back the system to the previous menu.

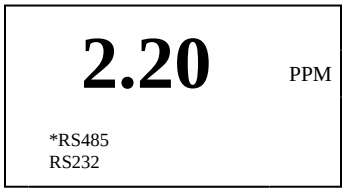
3.6.5.9 DIGITAL I/PS

By pressing the ENTER key the following screen is displayed:

The line "XXXXX…" corresponds to status of digital I/Ps. Press any of the four keys to see a change in state. This screen can be aborted only by leaving the keyboard idle for at least 60 seconds.

3.6.5.10 SERIAL CHECK

By pressing the ENTER key the following screen is displayed:

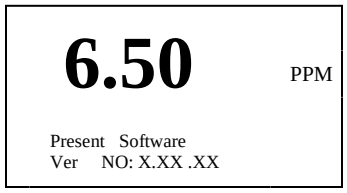


Select the type of communication (RS485 or RS232) by pressing the DOWN arrow key and press ENTER to check the serial outputs. User should get the following display:

Press the RIGHT arrow key or DOWN arrow key to go to the previous menu.

3.6.5.11 S/W VERSION

By pressing the ENTER key the following screen is displayed:



Press any key to go back to the previous menu.

3.6.5.12 PREVIOUS MENU

Selecting PREVIOUS MENU loops the system back to the previous menu.

3.6.6 *DISPATCH MODE*

DISPATCH MODE is to be used for Waltron in-house testing only.

To go to the DISPATCH MODE menu press the MENU key and the DOWN arrow key six times and then press the ENTER key to display the following screen:

Please enter the password.

The following is displayed:

After connecting the mA source and pressing ENTER key, or after 30 seconds, the following screen is displayed:

The system is now in DISPATCH MODE.
To abort press the ENTER key. The user-friendly menus guide you through the abort process.

3.7 *CALIBRATION PROCEDURE*

Before initiating a calibration sequence, please rinse the standard solution container bottle with high-purity (DI) water and fill it with fresh standard solution. If the user wishes to perform a single point calibration the standard solution CAL1 (100ppb standard) must be present and the container/bottle must be filled with standard solution.

The frequency of calibrations depends on the operating conditions and sensor condition. Waltron recommends calibrating the instrument at least twice a month however more frequent calibrations may be done to eliminate drift due to changing sensor response.

Please be sure the following tasks are performed **before** executing a CALIBRATION cycle:

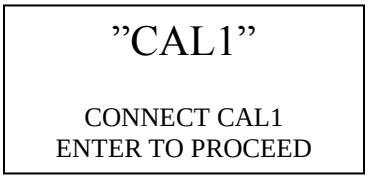
1) Low concentration solution (100ppb) is placed in the container/bottle CAL1.
2) The CAL1 solution concentration needs to be entered in the system under CALIBRATION SETUP. Refer to Section 3.5.2.1 for more details**.**

3.7.1 *SINGLE POINT CALIBRATION*

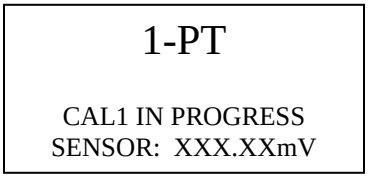
During Single Point (1-Pt) calibration the solenoid valve is energized and CAL1 solution flows through the flow cell. During a 1-Pt calibration the analyzer calibrates by determining the output based on the sensor response seen at a standard calibration solution.

To perform 1-Pt Calibration:

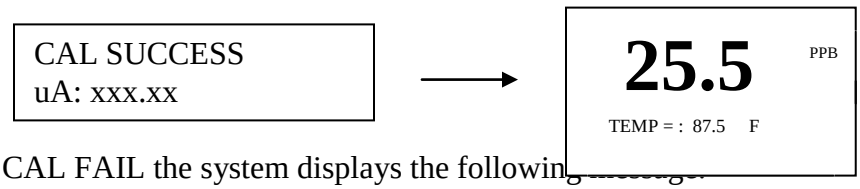
1) Press the MENU key.
2) Press the DOWN arrow key to scroll to MAN CALIB menu and press ENTER key to select.
3) Select PROCEED. The sub-menu gives the user the option to select the type of calibration.
4) Scroll to Single PT CALIB and press ENTER.



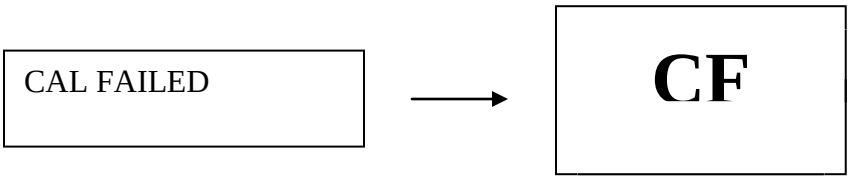
5) Once a 1-Pt calibration is in progress the following message is displayed on the bottom 2 lines of the LCD:



6) After successfully completing 1-Pt calibration the following message is displayed and the system returns to the normal measurement mode:



In case of CAL FAIL the system displays the following message.



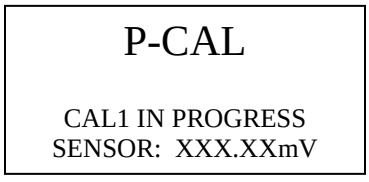
NOTE: A calibration cycle may be interrupted at any time by pressing the ENTER key. In order to avoid accidental key press, the calibration cycle is aborted only after confirmation from the user. Once the calibration process is aborted, the measurement screen is displayed.

3.7.2 *PROCESS CALIBRATION*

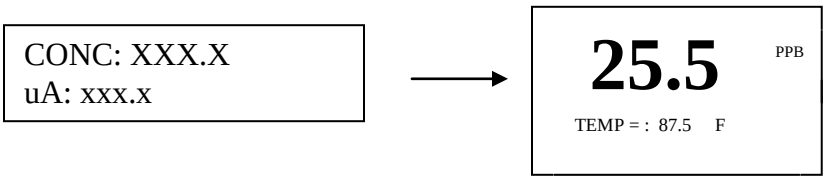
A Process Calibration (PROCESS CAL) can be performed only if the analyzer has successfully passed a 1-Pt calibration. During PROCESS CAL, the solenoid valve is not energized and the instrument is calibrated directly to the sample running through the flowcell. The analyzer calibrates by changing the **offset** of the output taken during the last 1-Pt calibration.

To perform Process Calibration:

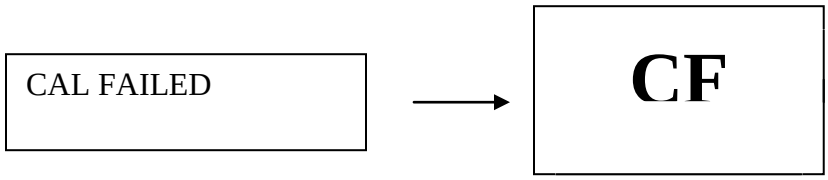
1) Press the MENU key.
2) Press the DOWN arrow key to scroll to MAN CALIB menu and press ENTER key to select.
3) Select PROCEED. This sub-menu gives the user the option to select the type of calibration.
4) Scroll to PROCESS CALIB and press ENTER.
5) Once the PROCESS CALIB is in progress the sample will continue flowing into the system and the following is displayed on the bottom 2 lines of the LCD:



6) After successfully completing the Process Calibration the following message is displayed and the system returns to the measurement mode:



7) In case of CAL FAIL the system displays the following message:



3.7.3 *CALIBRATION FAILURE*

A Calibration Fail (CAL FAIL) condition will occur after a 1-Pt calibration if the sensor response does not meet requirements. This happens when the sensor output from a 1-Pt calibration does not fall within the correct response range. This could be caused by a number of factors which should be investigated.

4 MAINTENANCE

4.1 *CHEMICAL SOLUTIONS*

The reagents and calibration solutions detailed in this section are required to keep the monitor operating. You should store solutions in plastic bottles and prepare these solutions just before use.

4.1.1 *BUFFER SOLUTION*

⃠**Warning:** This buffer is mildly toxic and hazardous: Handle with care.

Concentrated ammonia solution, suitable for measurements of hydrazine, provides adjustment of sample pH to 10.7

4.1.2 *CONCENTRATED AMMONIA SOLUTION - 1 liter*

⃠**Warning:** Handle this buffer **under a fume hood only**, as it causes burns and irritation to eyes, respiratory system and skin. **Wear rubber gloves and eye protection**. In warm weather, pressure increases in the bulk container of ammonia: **Release the cap carefully**.

Waltron L.L.C. uses a 28 - 30% w/v solution (0.89 s.g.) which is recommended.

Note: Waltron L.L.C. offers Ammonium Hydroxide in a 2.5 liter container part number N1234-116.

4.1.3 *STANDARD SOLUTIONS*

The following instructions refer to the preparation of a1000ppm stock solution and a 100ppb standard solution respectively, but an operator can prepare any concentrations within the measuring range selected by diluting the stock solution appropriately.

- Waltron L.L.C. offers Hydrazine Standard, 1000ppm, in a 1 liter container. Part Number H1234-060

Prepare a stock solution of 1000ppm Hydrazine as follows:

Dissolve 4.058(±0.001)g of analytical reagent grade Hydrazine Sulfate ($N_2H_4H_2SO_4$) in approximately 800ml high purity water. Transfer this solution to a one-liter volumetric flask and make up to the 1-liter mark with more high purity water to give a stock solution of 1000ppm Hydrazine. Store in a plastic container. Hydrazine Sulfate at this concentration is stable for one year.

Prepare a 100ppb Hydrazine Standard as follows:

Note. A two-step dilution is usually more accurate than a single dilution. The following dilution method produces more accurate results than those obtained by calorimetric laboratory analysis of the final diluted standard.

- ✓ Pipette 10ml of the 1000ppm stock solution to a one-liter volumetric flask. Make up to the 1-liter mark with high purity water to give an intermediate solution of 10ppm Hydrazine Sulfate.
- ✓ Pipette 20ml of the 10ppm intermediate stock solution to a 2-liter volumetric flask. Dilute with high purity water to give a final standard concentration of 100ppb.

Note. Do not prepare hydrazine solutions of less than 20ppb because low concentration solutions rapidly become contaminated and change in concentration.

Note. High purity water is water containing less than no Hydrazine and a specific conductivity of less than approximately 0.2µS/cm.

4.1.4 *NITRIC ACID CLEANING SOLUTION*

Note. Waltron offers Nitric Acid in a 2 ounce size part number H1234-556

Use this for refurbishing the sensor. This solution will clean the platinum anode and silver cathode. The cleaning solution is a 25% nitric acid aqueous solution.

⃠**Warning**: Be sure to add the acid solution to the water. Do not add water to the acid solution.

Prepare the cleaning solution as follows:

Add 25ml of reagent grade Nitric Acid to 75ml of high purity water to yield a 100ml total final volume. Store in a plastic container.

⃠**Warning:** Prepare the nitric acid solution under a fume hood and take the appropriate precautions when handling concentrated acids.

4.2 *HYDRAZINE SENSOR RECHARGE GEL*

This solution, required for refilling hydrazine sensor at extended intervals, is available in a syringe from Waltron L.L.C. (**Part number H3500-315A**). Store this gel in a refrigerated area until use.

4.3 *SCHEDULED SERVICING*

The following procedures are guides to the monitor's maintenance requirements. The procedure chosen depends on the particular installation and sample conditions.

4.3.1 *MONTHLY*

- ✓ Replace the bottle of buffer solution.
- ✓ Do not allow the level of solution to fall below about three-quarters full.
- ✓ On high ambient temperature, the solution may require replacement more frequently.
- ✓ Perform calibration- It is recommended to calibrate once a month

4.3.2 *QUARTERLY*

- ✓ Check the condition of all plastic tubing; replace as required.
- ✓ Monitor the condition of the hydrazine filling gel and the level of the buffer reservoir. Refurbish sensor if necessary.

4.4 *REFURBISHING THE SENSOR*

- ✓ Close the valve upstream of the monitor and allow the constant head unit to drain.
- ✓ Pull the hydrazine sensor out of its mounting clips on the sample panel. Disconnect the electrical leads at the plug and socket.
- ✓ Pull off the sample inlet "J" tube and let the tube and sensor cell drain.
- ✓ Carefully pull the sensor apart, and wash the components thoroughly to remove all traces of gel.
- ✓ Withdraw the platinum electrode, taking care not to damage the electrode or the electrical connection. Insert the brush supplied with the sensor kit into the bore of the ceramic tube. Rotate it gently and withdraw the brush. Immerse the platinum anode in a test tube containing the 25% nitric acid cleaning solution for a few minutes.

> **Caution**: Do not let the acid cleaning solution touch the rubber plug.

- ✓ If the silver cathode is tarnished or blackened, dip a cotton wool bud in 50% nitric acid and run this over the wire to restore it to a matte silver finish. Rinse thoroughly with high purity water.
- ✓ Assemble the sensor and fill with gel as follows:
    - Place the plastic plunger into position and cut off the blocked portion of the syringe tip.

> **Caution:** Do not remove too much of the syringe tip. The syringe tip will no longer fit into the outer-jacket-filling hole.

    - Slowly inject the filling gel through the bottom hole in the outer jacket of the sensor until the gel reaches to top hole.
    - Remove the syringe and set it aside.
    - Teflon-tape the bottom and top holes in the outer jacket.
    - Push the sensor into the clips of the sample panel.

- Connect the sample inlet "J" tube to the bottom of the sensor.

Note. Hold the sensor firmly at the top so that the center portion is not pushed out when the tubing is connected.

- Plug the electrical connection into the socket at the top of the liquid handling panel.
- Open the shut off valve upstream of the sensor unit and adjust until sample is overflowing from the constant head unit. Run sample through sensor for several hours before calibration.
- Carry out a calibration sequence as described in Section 5.

4.5 *SHUT DOWN PROCEDURE*

- ✓ Close the sample valve upstream of the monitor.
- ✓ Remove the Buffer container and safely dispose of the solution. Rinse the container thoroughly.

⃠**Warning:** For safe handling instructions of reagent solution refer to Section 6.1.

- ✓ Fill the calibration solution container with high purity water and do a single point calibration to flush the system.
- ✓ Remove the sensor and follow procedure in Section 6.2-4. Stop after rinsing thoroughly with high purity water.
- ✓ Use a syringe to flush all tubing with high purity water. This removes any particulate deposits.
- ✓ Switch off the main power supply to the Transmitter Unit.

4.6 *HYDRAZINE SENSOR*

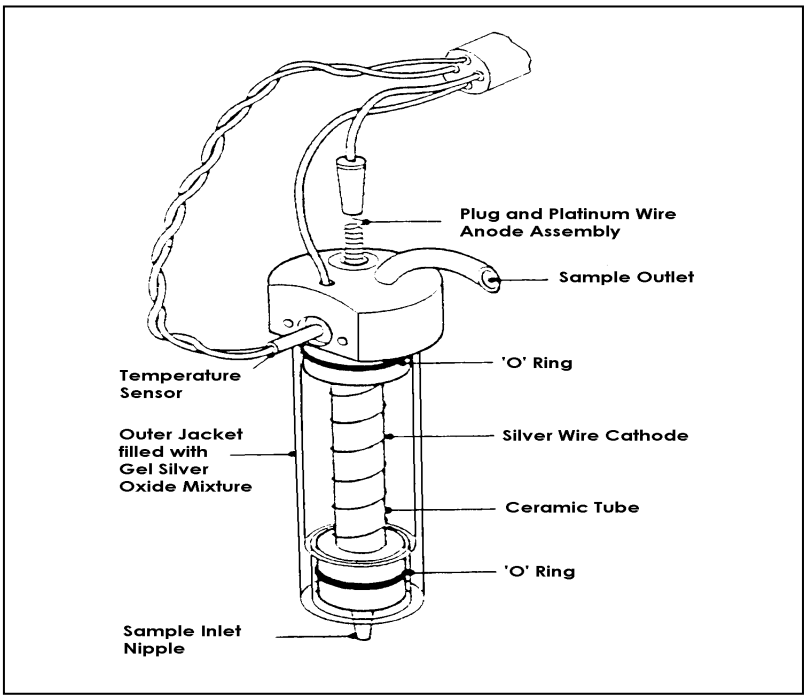


Figure 13. Diagram of the Hydrazine Sensor.

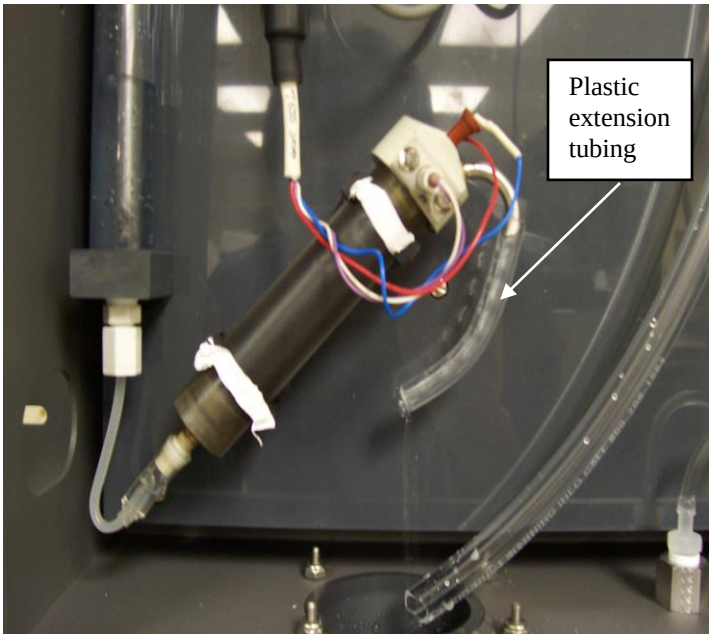


Figure 14. Installation of the Hyrdazine Sensor.

NOTE: In order for the sensor to drain properly into drain hole be sure to attach plastic extension tubing to sensor outlet hole as shown in picture above.

4.7 *STORAGE OF SENSOR*

- ✓ Remove the sensor from the sample panel.
- ✓ Disassemble sensor outer jacket from center ceramic assembly.
- ✓ Clean sensor of any gel.
- ✓ The sensor can be stored as a dry item.

5 SPARE PARTS

Recommended Spare Parts

PART NUMBER	DESCRIPTION
H1234-060	Hydrazine Standard (1 liter 1000 ppm)
H3010-165	Hydrazine Sensor
H3500-338	Hydrazine Expendable Kit
N1234-116	29% Ammonium Hydroxide (2.5 L)
H3500-315A	Hydrazine Re-Gel Kit
H3500-341	Internal Re-tubing Kit

Additional Spare Parts

PART NUMBER	DESCRIPTION
N2554-065B	Constant Head Unit Assembly
H1142-151A	Calibration Bottle
H1152-197A	“J” Tube
K1152-200	Nupro Filter, Stainless Steel, 60 Micron
N2554-066A	Entrainment “T” Assembly
P1000-017B	CPU card
P1000-059	AC Power Terminal Box, 9001 Series
P1000-010	LCD Display
H1148-022	Solenoid Valve
H1152-198A	Assembly Nipple
N1152-169	Pressure Relief Valve
H1234-064	Solution, Hydrazine Standard 100ppb, 5 gallon
940-0000-00	Analog Board
907-0000-00	Crimp Terminal Kit

6 TROUBLESHOOTING

Problem	Possible Cause(s)	Solution(s)
Calibration Fail (CF)	Empty or Contaminated Standards Solutions Container	Check to make sure CAL standard bottle is full, check CAL tubing to make sure it is not pinched. Replace CAL standard with fresh solution and try again.
Calibration Fail (CF)	Faulty Solenoid Valve	Run Solenoid Check cycle in Diagnostics – check status and connections of solenoid valve.
Calibration Fail (CF)	Strength is close to zero.	Replace reagent solution. Re-gel/replace hydrazine sensor.
Calibration Fail (CF)	Strength is too low.	Replace reagent solution. Re-gel/replace hydrazine sensor.
Calibration Fail (CF)	Strength is too high.	New sensor – needs to rinse down. Let sensor run on sample for 5 hours – repeat calibration.
Readings are not accurate – too low.	Old/bad reagent. Poor sensor performance. Bad calibration.	Replace reagent solution. Re-gel/replace hydrazine sensor. Check CAL log and run another CAL if last result is not good.
Readings are not accurate – too high.	Poor sensor performance. Bad calibration. Hydrazine leak in sample system.	Let sensor run on sample water for 1-2 hours; then run another CAL. Re-gel/replace hydrazine sensor. Check CAL log and run another CAL if results are not good. Bench test sample water.
Current outputs (4-20mA) not functioning correctly.	Disconnected wiring at transmitter or along wire path. DCS/recording system not set up properly. Bad CPU board.	Check output set-up to make sure values are entered properly. Run Diagnostics – O/PmA check and check output coming directly from transmitter. Replace CPU board if output is not correct.
Display read “HOT”	Sample temperature over	Check sample temperature.

	specified range (>131F). Faulty thermistor.	Replace sensor.
Display read “TEMP”	No thermistor response.	Replace sensor. Check thermistor connection at transmitter and sensor
Display read “OVR”	Signal from sensor too high – sample concentration over maximum range (>1ppm)	Check sample concentration. Check sensor connections.

7 SPECIFICATIONS

Range:	0.01ppb – 1ppm
Accuracy:	+/-5% of reading or +/-2ppb (whichever is greater) for concentrations up to 500ppb. Less than 10% for concentrations above 500ppb.
Stability:	+/-5% of reading or +/-2ppb per week (whichever is greater)
Response Time:	90% of a step change in less than 3 minutes
Current Outputs:	Two isolated 4-20mA current (analog) outputs
Alarms:	Three voltage-free contacts, alarm points set from transmitter rated at 2A, 250VAC (non-inductive)
Power:	Wide range of input power supply 90VAC – 250VAC
Sample:	Temperature: 41-131F (5-55C); Flow 150-400ml/min
Ambient Temp:	32-131F (0-55C)
Pressure:	5-30psig
Composition:	Sample should be filtered to 60 microns, free of film forming compounds
Power Consumption:	Less than 20VA
Sample Inlet Fitting:	¼” Swagelok
Sample Outlet Fitting:	Barbed fitting for 3/8” ID hose connection

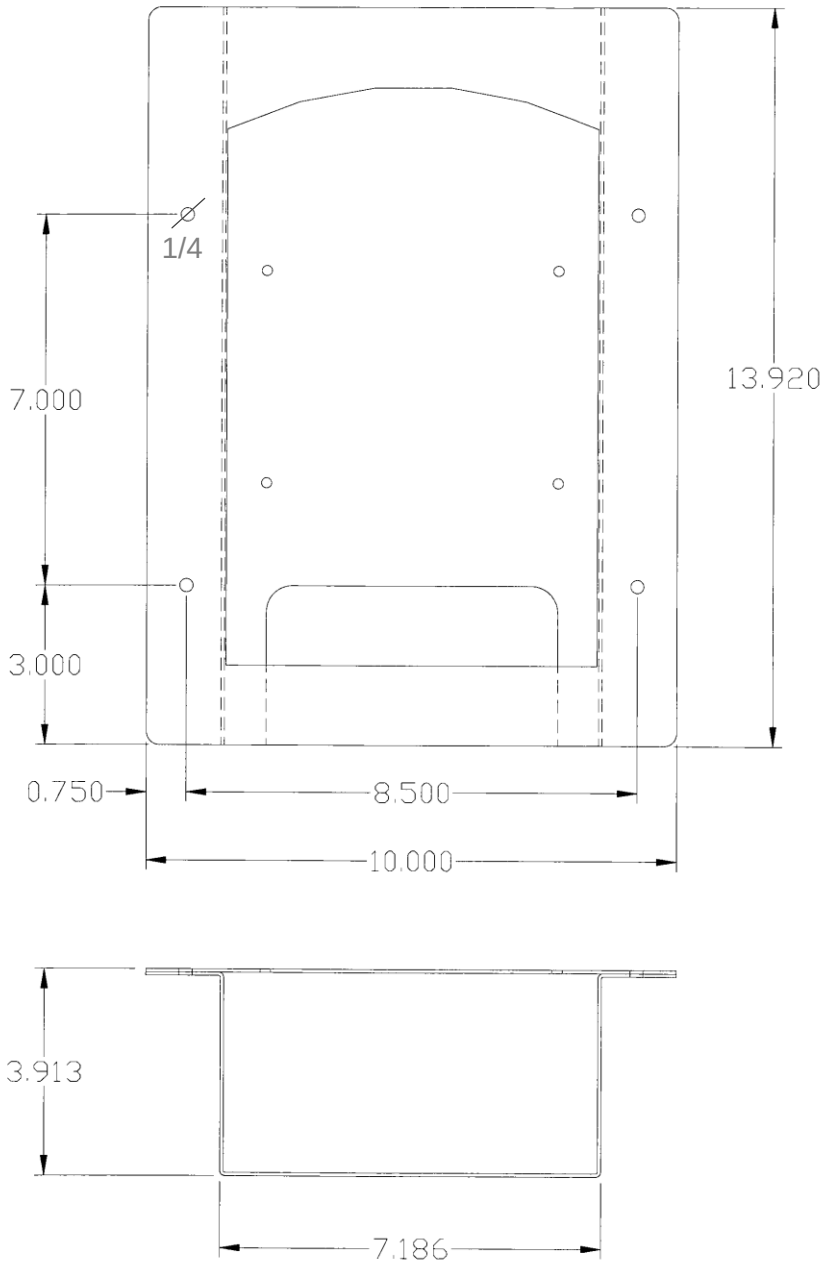
8 APPENDIX 9071C

This appendix is to be used as a reference. The information provided here is approximate and theoretical.

Hydrazine Concentration	Theoretical Input (uA)
1ppb	0.15uA
5ppb	0.5uA
10ppb	1.5uA
50ppb	5uA
100ppb	15uA
500ppb	50uA
1ppm	100uA

9 APPENDIX Panel Mount

This Appendix shows the schematics of the Panel Mount Bracket option for the transmitter case.



10 APPENDIX Instructions for Crimping Terminals

10.1 *Crimping Terminal onto Wire Ends*

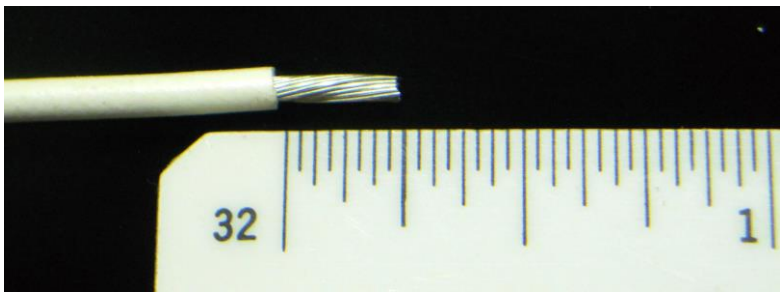


Figure 1: Strip the wire to approximately 0.25in. Ideally, use at least 20AWG wire but your wire terminal kit will accommodate gauges from 22-10AWG.

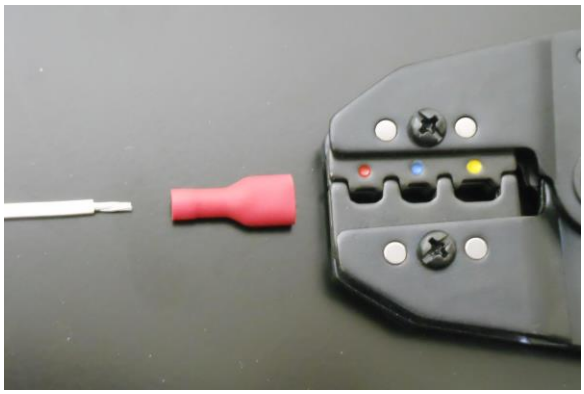


Figure 2: Select the appropriate terminal based on the wire gauge used. Red-colored terminals handle 22-18AWG; blue terminals are for 16-14AWG and yellow are for 12-10AWG. Note the corresponding color dots on the crimp tool die set. Match the terminal to the position on the die. Do not over-crimp by using a smaller die position for the terminal – you will damage the wire strands and wind up with a weak connection.

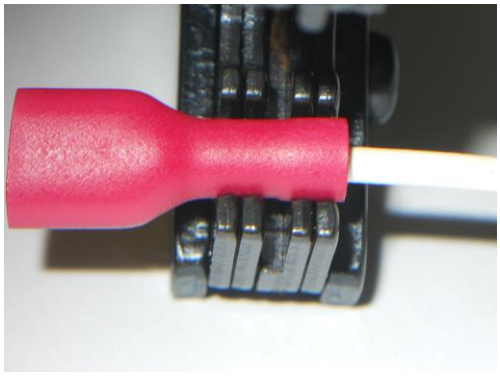


Figure 3A: Position the terminal in the die, as shown at the left. It is important to have the terminal positioned so that the connector end of the terminal is even with the jaw and the crimp part of the terminal mates correctly with the crimp tool die.

Figure 3B: If done correctly, the crimped terminal should appear as in the photo at the right. The die was centered in the crimp area and there is a good dual crimp made on that part of the terminal.

Note that there are actually two crimping actions – one to make the electrical connection (the rightmost pinch) and one to make a mechanical strain relief (the leftmost pinch). Take the time to seat the terminal in the die accurately. If the terminal twists or shifts on the die, reposition it before executing the crimp.

10.2 *Attachment of Terminated Wires to the Analog Board*

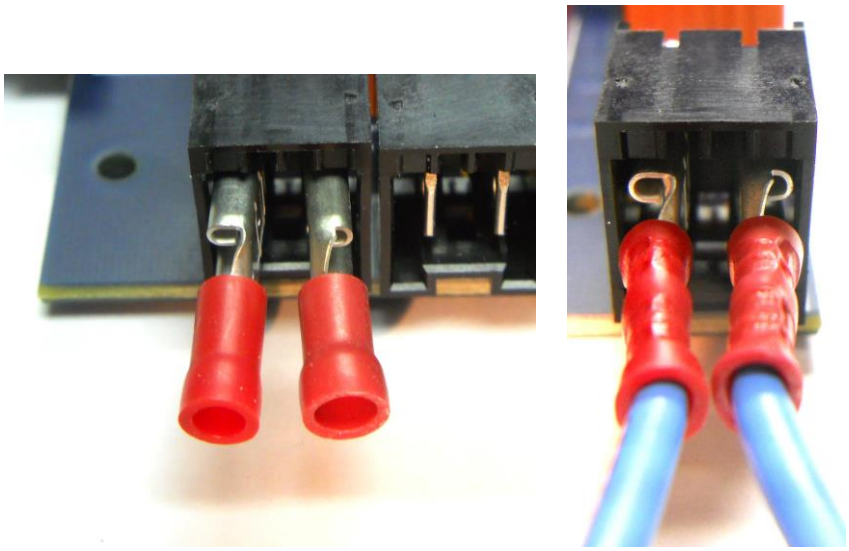


Figure 4A: Only partially shrounded terminals will fit onto the Analog Board's connectors. An assortment of suitable connectors and a crimp tool is supplied in Waltron's Terminal Kit, p/n 907-0000-00. Note that the orientation of the terminals is important to maintain maximum electrical separation. Position the connectors facing in the directions shown before fully inserting.

Figure 4B: Here is a completed wire termination to the Analog Board. The wires are mechanically secured in the terminals by the crimp tool action and the terminals are positively mechanically secured by a dimple in the board connector mating to a similar dimple in the crimp terminal. For this reason, Waltron only recommends using TE Connectivity (AMP) terminals when terminating to the Analog Board.