EXPERTS IN WATER CHEMISTRY SINCE 1903

9031CX Sodium Analyzer
User Manual

101-045-E.2

WALTRON CUSTOMER COMMITMENT

This instruction manual is a technical guide to aid the customer in the set-up, operation, 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
Flemington, New Jersey
Phone: (908)-534-5100
Fax: (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 (908)-534-5100.

Thank you for choosing Waltron!

Please note the Waltron mailing and shipping address:

Waltron Bull & Roberts, LLC
25 Minneakoning Road, 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:

- Read and understand manual before working with analyzer.
- Pay special attention to warning labels on enclosures, containers, packages and chemicals.
- Only qualified personnel should be involved in the installation, operation, and servicing of the analyzer.
- Follow safety precautions when operating analyzer in conditions of high pressure and/or temperature.
- Keep analyzer chemicals away from heat and extreme temperatures. Reagent powders must be kept dry.
- 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 Road, Suite 101
Flemington, NJ 08822

The Waltron Warranty Agreement:

- Covers expendable sensors for one month after shipment and reusable electrodes for six months after shipment.
- Does not apply to damages occurred during shipping.
- Warranty will be nullified if goods have been used for purposes other than those for which they are intended or if any seal has been removed, broken or tampered with or if the Waltron trademark or serial number has be removed, defaced, or altered.
- Does not cover expendable supply items such as reagents, tubing and electrolytes.
- Does not cover misuse or mistreatment by the user.
- Does not cover previous repair or alteration by unauthorized individuals.

Waltron does not assume responsibility for contingent liability through alleged failure or failures of products or product accessories.

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:

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

SYMBOL DEFINITIONS

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	**ATTENTION:** Identifies information that requires special consideration.
	**TIP:** Identifies advice or hints for the user, often in terms of performing a task.
	**REFERENCE -EXTERNAL:** Identifies an additional source of information outside of the bookset.
	**REFERENCE - INTERNAL:** Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	**CAUTION**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING**: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING, Risk of electrical shock**: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.
	**ESD HAZARD:** Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	**Protective Earth (PE) terminal**: Provided for connection of the protective earth (green or green/yellow) supply system conductor.

Symbol	Definition
	**Functional earth terminal**: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	**Earth Ground**: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	**Chassis Ground**: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	The Factory Mutual® Approval mark means the equipment has been rigorously tested and certified to be reliable.
	The Canadian Standards mark means the equipment has been tested and meets applicable standards for safety and/or performance.
	The Ex mark means the equipment complies with the requirements of the European standards that are harmonised with the 94/9/EC Directive (ATEX Directive, named after the French "ATmosphere EXplosible").
	For radio equipment used in the European Union in accordance with the R&TTE Directive the CE Mark and the notified body (NB) identification number is used when the NB is involved in the conformity assessment procedure. The alert sign must be used when a restriction on use (output power limit by a country at certain frequencies) applies to the equipment and must follow the CE marking.
	The C-Tick mark is a certification trade mark registered to ACMA (Australian Communications and Media Authority) in Australia under the Trade Marks Act 1995 and to RSM in New Zealand under section 47 of the NZ Trade Marks Act. The mark is only to be used in accordance with conditions laid down by ACMA and RSM. This mark is equal to the CE Mark used in the European Union. N314 directly under the logo is Waltron's unique supplier identification number.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 OVERVIEW OF THE 9031CX SODIUM ANALYZER

The Waltron 9031CX Sodium Analyzer is a microcontroller-based unit used for online measurement of sodium 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 9031CX analyzer spans from 0.01ppb to 10ppm.

1.1.1 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.

1.1.2 MAIN FEATURES

Features of the 9031CX Sodium Analyzer unit include:

1. Measurement of sodium concentration
    a) Wide range analysis - 0.01ppb to 10ppm. Concentration and temperature are displayed continuously and analyzer adjusts automatically to user specified ranges.
    b) Automatic temperature compensation
    c) Protection from “Hot Sample”
2. Calibration
    a) Single & two point calibration
    b) Low reagent and standard consumption
    c) Internal diagnostics used to show probe status
3. User Interface
    a) 4.5” color touch screen HMI
    b) Large easy to read graphic display
4. Communication Interface via RS-232 & RS-485 using MODBUS RTU protocol
5. Analyzer Configuration :
    a) User configurable settings for recorder outputs and alarm set points
    b) 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

1.2 SYSTEM DESCRIPTION & ARCHITECTURE

The 9031CX Sodium analyzer system is comprised of the following:

1. Wet-Section (Sensor Unit)
   a. Hydraulic panel consisting of constant head, flowcell, tubing, thermistor and solenoid valve
   b. Sodium and reference electrodes
   c. Reagent container
   d. Separate sodium standard solution containers (Low and High)
2. Pre-Amp
3. Transmitter (electronics) unit

9031CX Transmitter

9031CX Wet Section

Figure 1 Overall system architecture.

1.2.1 WET SECTION UNIT

The 9031CX Sodium system is capable of monitoring sodium concentrations in sample feed. The solenoid valve is used to select between analyzing the sample, and accessing calibration standard 1 (Low)/calibration standard 2 (High) during calibration.

In normal mode, the feed water flows from the inlet into the heat exchanger through the solenoid valves and into the flowcell where it comes into contact with the sodium and reference electrodes. The electrodes transmit a voltage proportional to the sodium 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 flowcell) is used to monitor the sample temperature for temperature compensation. If the sample temperature exceeds 131°F, sample automatically gets diverted to drain and the system displays "HOT".

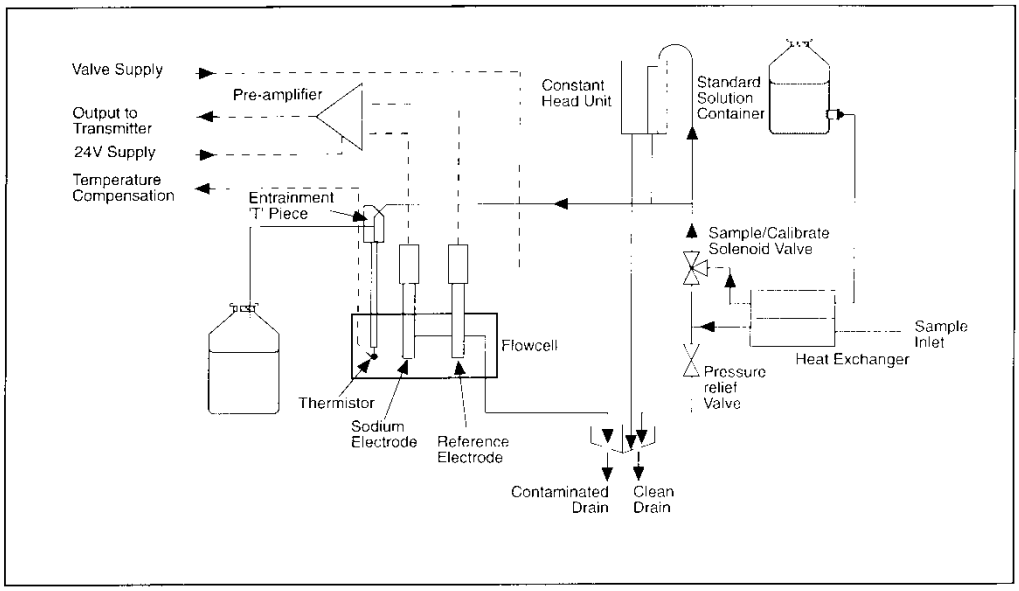


Figure 2 Sample flow during normal operation.

1.2.2 PRE-AMPLIFIER

The 9031CX Sodium analyzer requires a pre-amplifier unit which amplifies and converts the voltage output from the electrodes into proportionate current. Thermistor output is also fed to transmitter unit via pre-amp section.

1.2.3 TRANSMITTER UNIT

The transmitter unit interprets electrode response and temperature output from the pre-amp and displays the corresponding sodium concentration (in ppb/ppm) and temperature. The transmitter unit controls all the operations of the analyzer system. The display is a touchscreen HMI.

2 INSTALLATION

2.1 MOUNTING THE WET SECTION UNIT

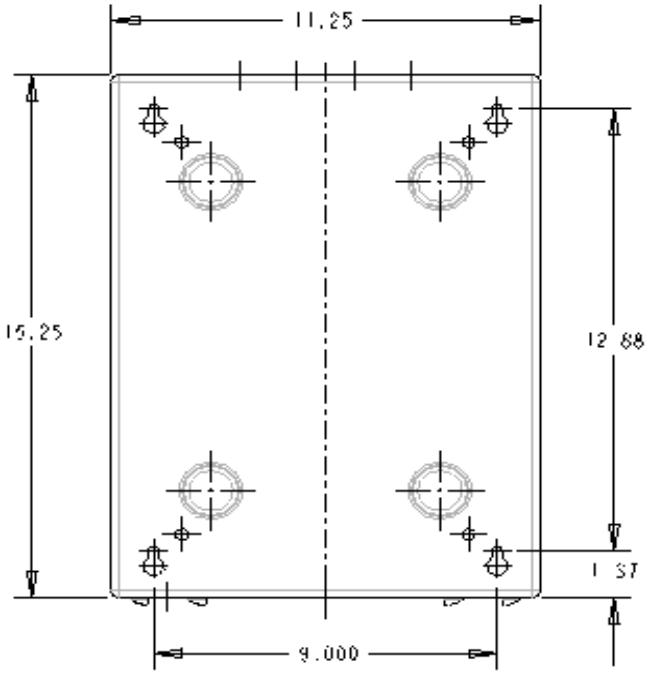


Figure 3 Dimensions to mount the Wet Section. (All dimensions in inches)

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 9031CX Sodium 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 THE TRANSMITTER UNIT

The transmitter unit controls the operations of the analyzer. Power supply, CPU card, DIO 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.

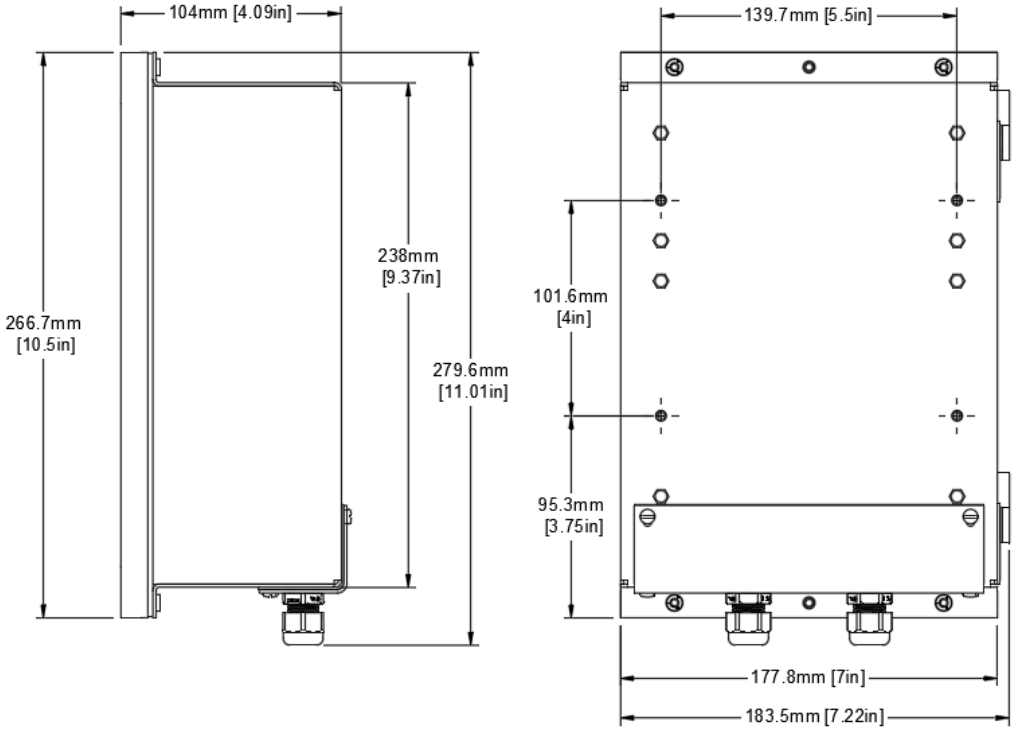


Figure 4 Dimensions of the transmitter unit. (All dimensions in inches)

2.1.2.1 Mounting dimensions

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.

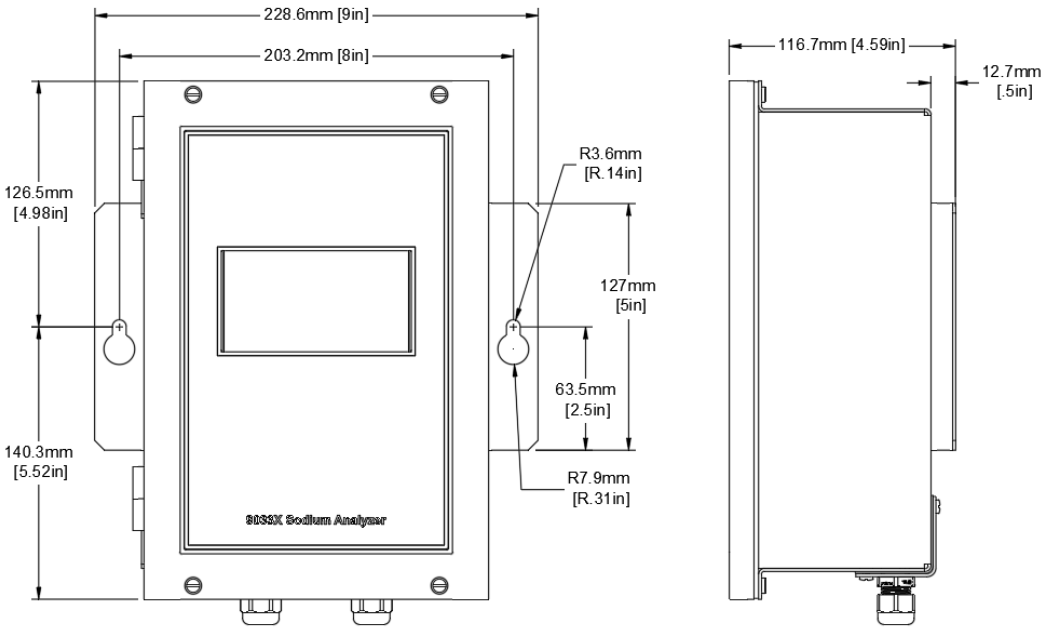


Figure 5 Dimensions for the transmitter mounting bracket.

2.1.3 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. 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.

2.1.4 EXTERNAL PIPING CONNECTIONS

Figure 6 Bottom of the wet section case, with sample inlet and drain connections

2.2 ELECTRODE INSTALLATION

2.2.1 PROBE CONNECTIONS

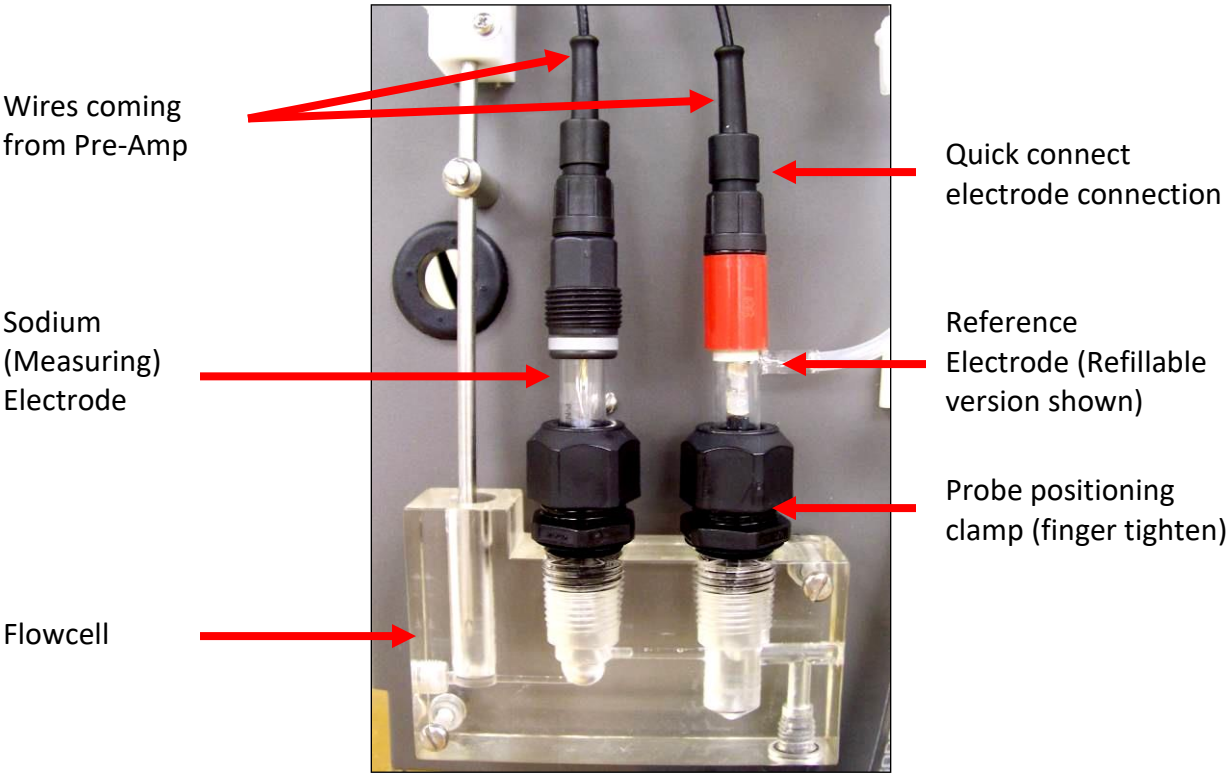
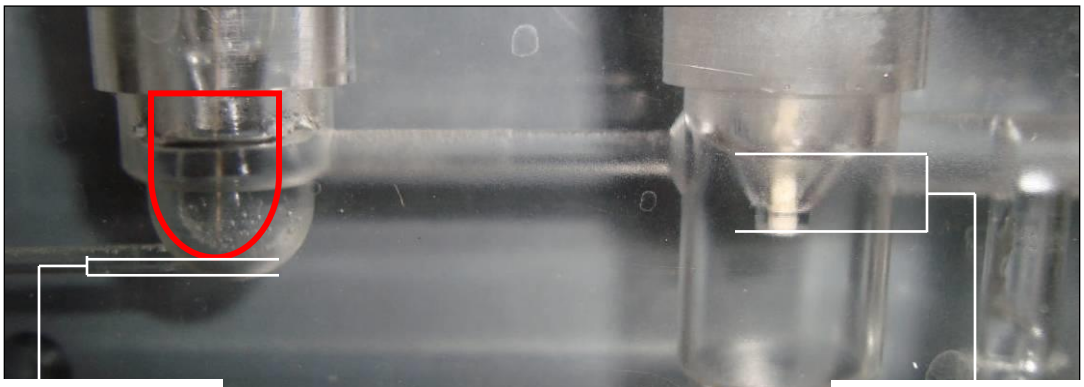


Figure 7 Probe connections

2.2.2 PROBE INSTALLATION

1. Remove the protectors from the tip of each electrode
2. Connect electrodes to wires from Pre Amplifier. Be sure to match the correct wires to the correct probe. Wires are marked “M” for measuring and “R” for Reference.
3. Use fingers to rotate the probe positioning clamp counterclockwise to loosen. Carefully insert the electrode through the clamp and into the flowcell. Electrodes may have to be inserted at an angle.
4. For reference electrode - insert the electrode so that the tip of the electrode is 5mm into the sample. Correct placement within the flow cell is important. Refer to figure below.
5. For measuring electrode – insert the electrode so that the tip is just off the bottom of the flowcell. Refer to figure below.

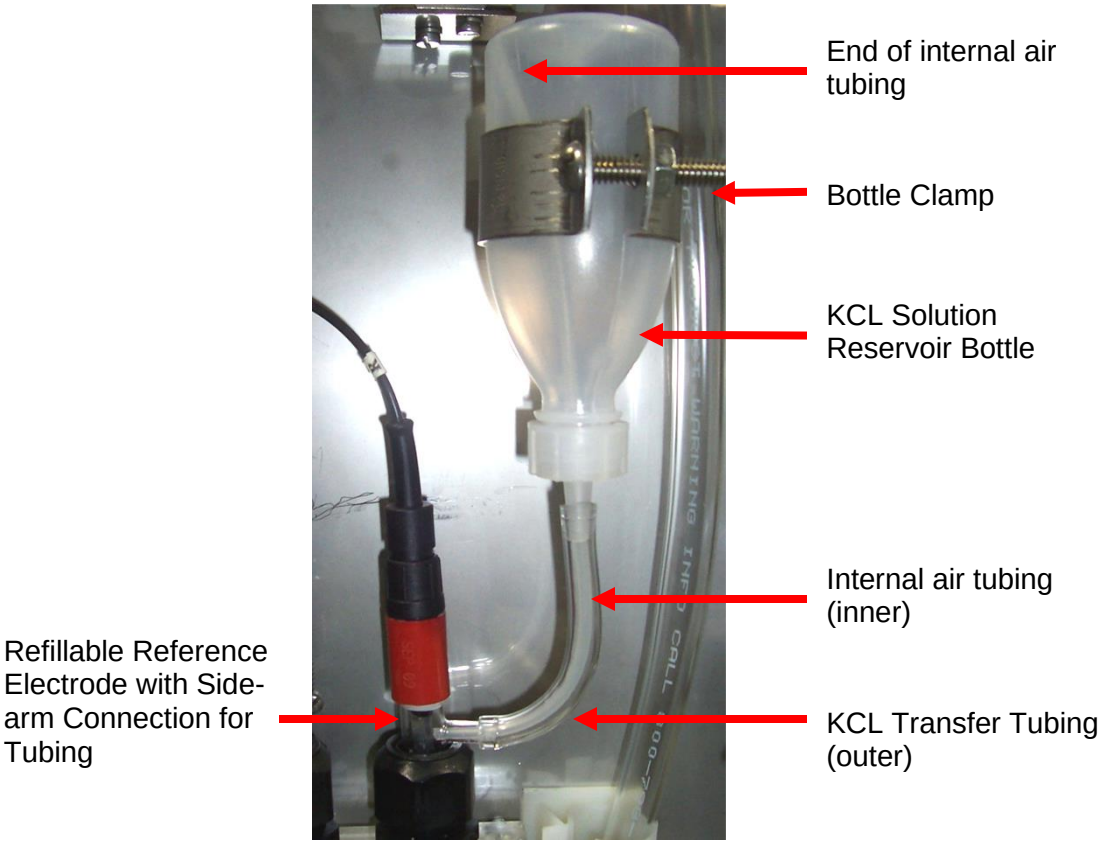


Tip of measuring electrode positioned just off bottom of flowcell

Tip of reference electrode positioned 5mm into sample (approximately even with the tip of the measuring electrode)

Figure 8. Proper installation of the electrodes in the flowcell.

2.2.3 AUTOMATIC KCL REFILL SYSTEM (OPTIONAL)



Directions for installing and using the KCl refill system:

1. Feed inner (smaller diameter) tubing through outer (larger diameter) tubing.
2. Feed inner tubing through the side-arm of the reference electrode and connect the outer tubing over the side-arm.
3. Clip nozzle of KCl bottle, making sure the hole is large enough for inner tubing to pass through and that KCl solution can flow freely around it.
4. Insert inner tubing through nozzle of bottle and connect outer tubing over the nozzle of bottle. Make sure the inner tubing reaches the top of the bottle while the other end remains inside the reference electrode.
5. Install KCl bottle into the bottle clamp and finger-tighten wing nut to hold the bottle in place.
6. Poke a small hole in the top of the bottle so KCl flows freely and vacuum does not form.
7. Rinse off any spilled KCl with DI water before installing probe in the flowcell. (KCl will interfere with sample reading if it gets in the flowcell.)

2.3 ELECTRICAL CONNECTIONS

2.3.1 WET SECTION UNIT

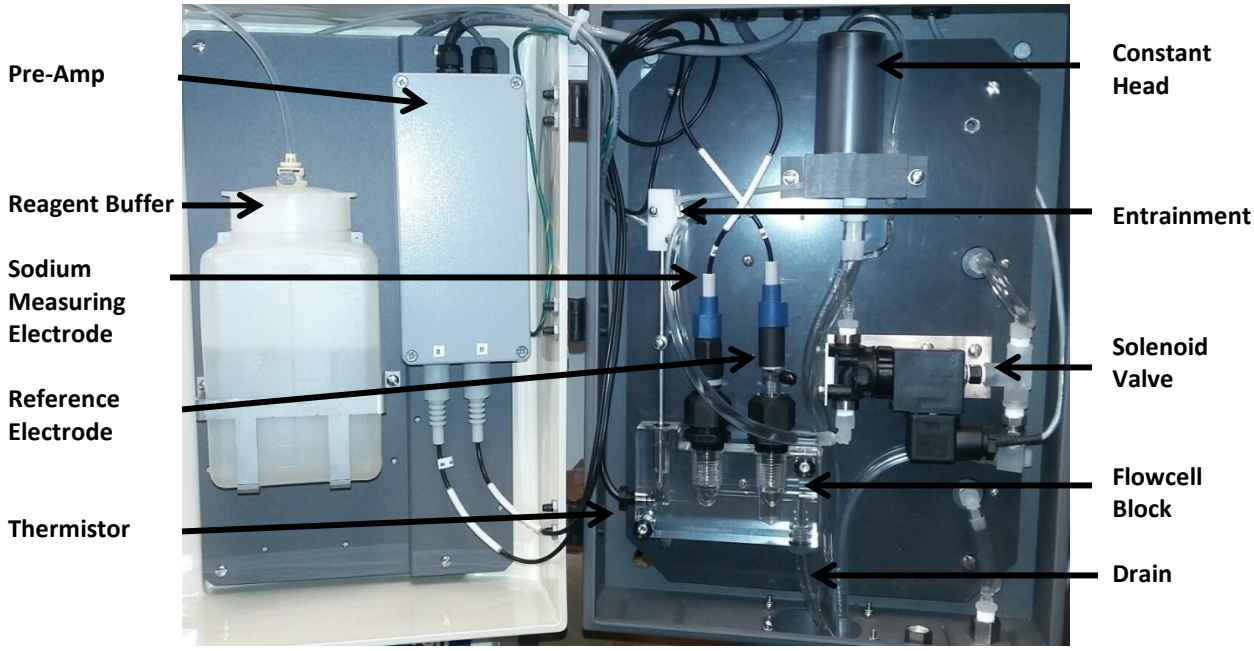
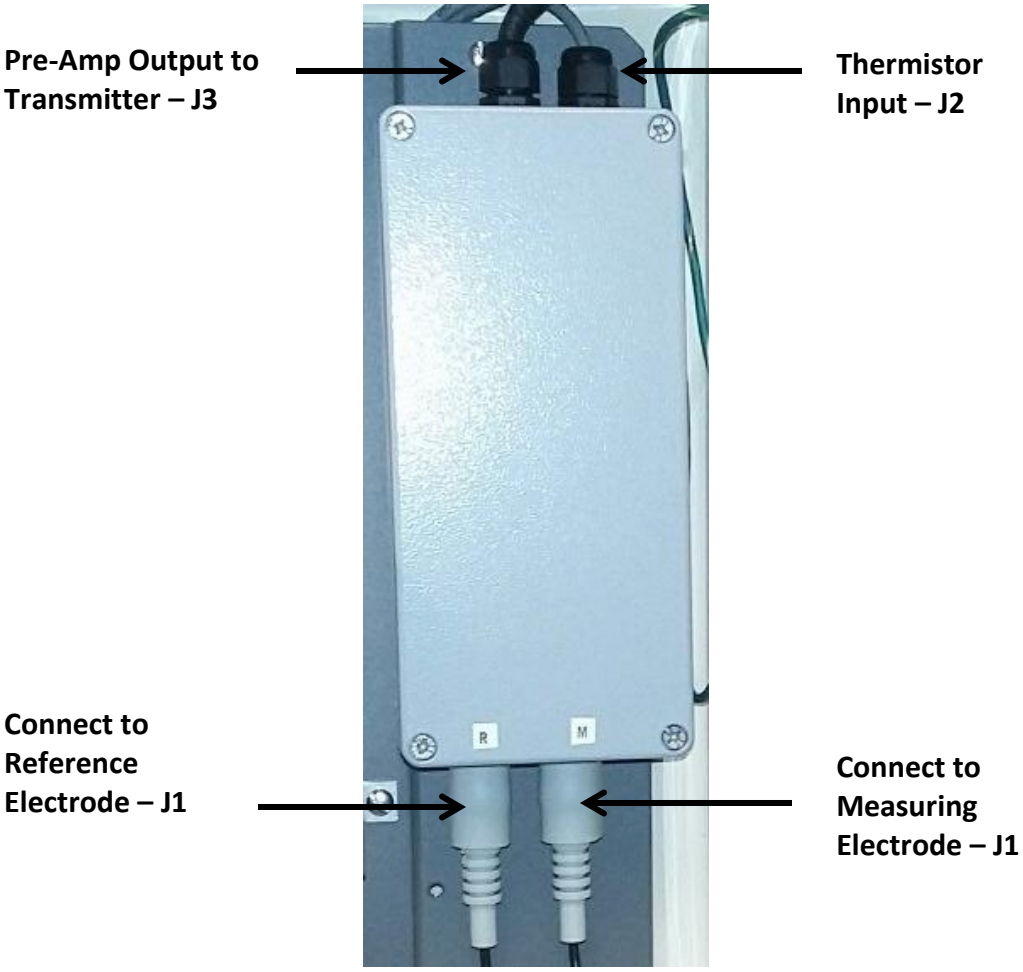


Figure 9 Wet section layout and connections

2.3.2 PRE-AMP UNIT



The pre-amplifier unit has 3 connection terminals (J1, J2, J3) shown below:

Figure 10 Pre-amplifier layout. Pin 1 of all the connectors is shown in black.

The following cables/connections are used in pre-amp system:

4. Multicore cable (8-Core) for interfacing the transmitter unit with pre-amp at J3.
   - Pin 1 (Black Wire)
   - Pin 2 (White/Black Wire)
   - Pin 3(Red Wire)
   - Pin 4(White Wire)
   - Pin 5(Red/Black Wire)
   - Pin 6(Green Wire)
   - Pin 7(Blue Wire)
   - Pin 8(Orange Wire)
   - Pin 4(Shield – Optional)
5. Multicore cable (2-Core PVC Shielded Twisted) for interfacing the thermistor with pre-amp at J2.
   a) Blue Wire : From +ve Thermister to Pin 1 of J2
   b) Red Wire : From -ve Thermister to Pin 2 of J2
   c) Black Heat Shrink (Shield) : From shield to Pin 3 of J2

2.3.3 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
- Pre-amp Input (sensor and thermistor wiring)
- 4-20mA Current Output and Communication Interface

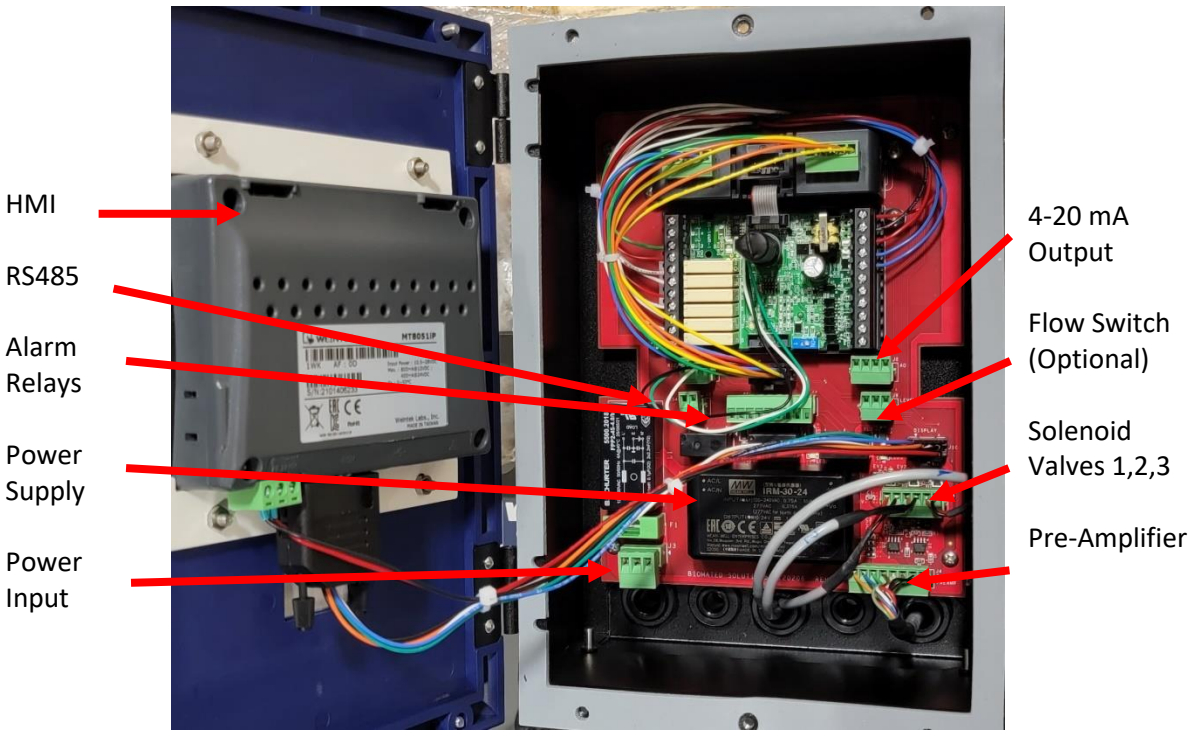


Figure 11 layout and components of the transmitter case

ATTENTION

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

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.

2.3.4 CONNECTING THE PRE-AMP OUTPUT TO TRANSMITTER:

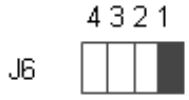
The 8-Core PVC shielded cable coming as an output from the pre-amplifier is connected to the CPU Card J4 as follows:

- Pin 1 (Black Wire)
- Pin 2 (White/Black Wire).
- Pin 3 (Red Wire)
- Pin 4 (White Wire)
- Pin 5 (Red/Black Wire)
- Pin 6 (Green Wire)
- Pin 7 (Blue Wire)
- Pin 8 (Orange Wire)

2.3.5 CONNECTING THE CURRENT OUTPUT(S) TO TRANSMITTER:

Two 4-20mA current outputs supplying analog output proportional to the sodium concentration are provided on J6 connector on the CPU card. The pin locations from the connector are shown below:

- Pin 1 Iout1
- Pin 2 FGnd
- Pin 3 Iout2
- Pin 4 FGnd



ATTENTION

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.

2.3.6 CONNECTING THE ALARM(S) OUTPUTS TO TRANSMITTER:

Potential free contacts for High Alarm and Low Alarm are terminated on the CPU card J11
The pin out of the connector is as shown below:

- General Alarm
  - Pin 1 NC 5
  - Pin 2 COM 5
  - Pin 3 NO 5
- Low Alarm
  - Pin 4 NC 6
  - Pin 5 COM 6
  - Pin 6 NO 6
- High Alarm
  - Pin 7 NC 7
  - Pin 8 COM 7
  - Pin 9 NO 7

2.3.7 CONNECTING THE SOLENOID TO TRANSMITTER:

The solenoid valve used for calibration is terminated on the CPU card J5. The +24V DC excitation @ 400mA, each, is provided on board.

The pin out of the connector is as shown below:

- Pin 1 S1 + (RED)
- Pin 2 S1 – (BLK)
- Pin 3 (not used)
- Pin 4 (not used)
- Pin 5 (not used)
- Pin 6 (not used)

2.3.8 CONNECTING THE SERIAL COMMUNICATION PORTS TO TRANSMITTER:

An RS-485 serial port is provided on the CPU card J7

The pin out of the connector is as shown below:

- Pin 1 NC
- Pin 2 Data +
- Pin 3 Data -

3 OPERATING THE ANALYZER

3.1 ANALYZER OPERATION

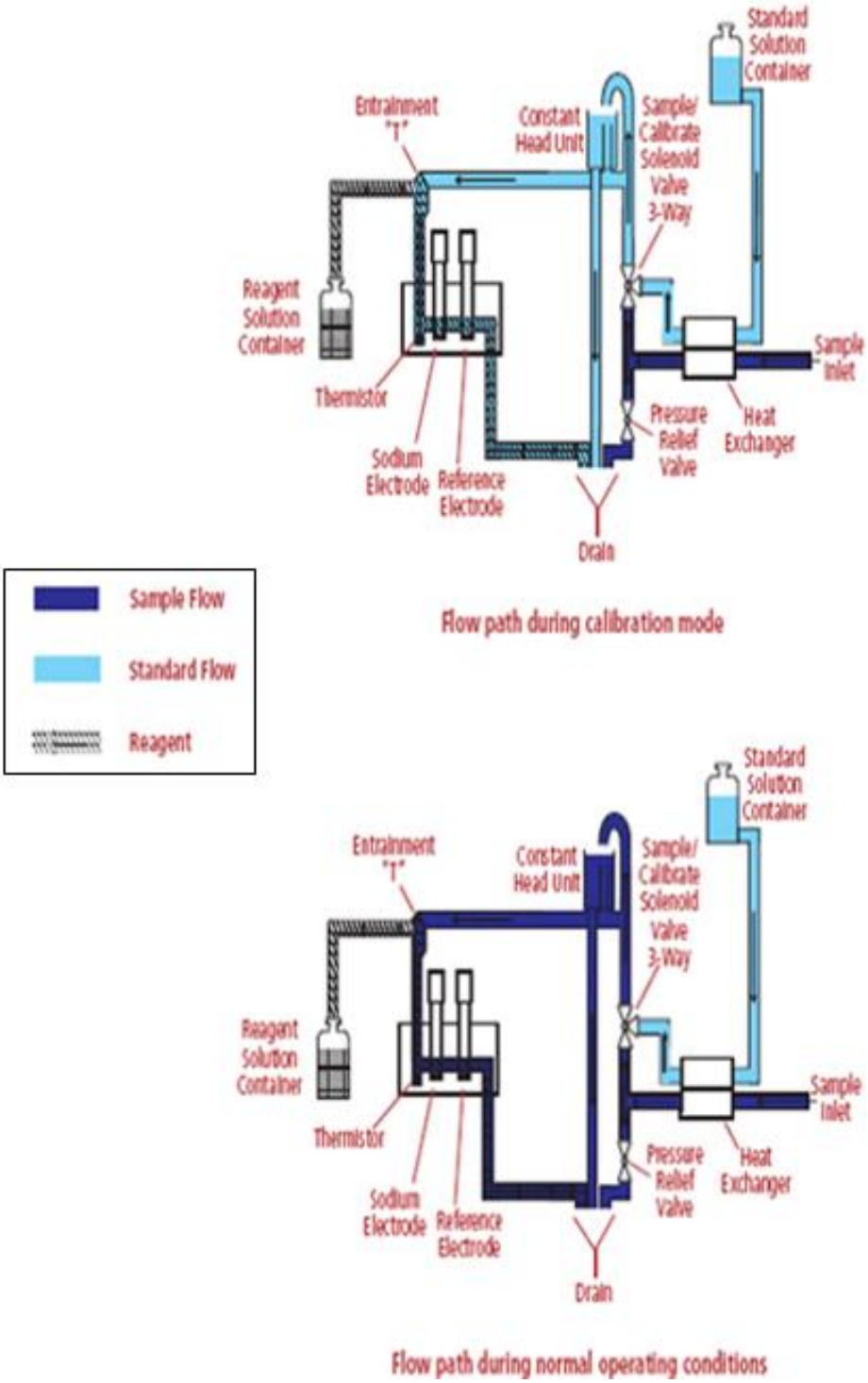


Figure 128 Sample flow during normal operation

The 9031CX Sodium analyzer system is comprised of separate combination sheet metal and plastic enclosures. The internal hydraulic components and tubing 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 solutions temperature at equilibrium during calibration. Drastic and sudden changes in solution temperature may have a negative effect on electrode performance.

After flowing through the heat exchanger, the sample passes through a 3-way solenoid valve. After the valve the sample flows through the constant head (the constant head unit stabilizes the effect of changes in sample inlet flowrate). After flow passes through the constant head piece 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 sodium and reference electrodes.

The sample flows past the electrodes and exits the flowcell through the drain located in the bottom of the case. The potential developed between the sodium measuring (ion-responsive) electrode and reference electrode is logarithmic with respect to changes in sodium ion concentration. The signal from the electrodes is fed to the pre-amplifier, which converts the voltage into current. The output from pre-amplifier is then sent to the transmitter unit via the interconnection cable.

A temperature sensor (thermistor) is housed in the flow cell and detects the temperature of the sample. The thermistor is connected to the transmitter unit and compensates for changes in output from the electrode pair 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 two point calibration. Once a successful calibration is performed, the unit is now ready to measure the sodium 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

3.2.1 SAMPLE CONCENTRATION ALARMS

When the 9031CX Sodium system is in normal operation mode one alarm operates as a "low" alarm and the other operates as a "high" alarm. The CONC LOW alarm is activated when the sodium level decreases below the set value. The CONC HIGH alarm is activated when the sodium level increases above the set value. The two sodium alarms control the relays provided. Each relay has one pair of changeover contacts rated at 2A, 250VAC (non-inductive). See Figure 10 for location of alarm relays

Concentration alarm descriptions

Symbol	*ALARM*	*DESCRIPTION*
CONC LOW	Low Alarm	Activates when Na in sample feed is lower then "Low Set Point".
CONC HIGH	High Alarm	Activates when Na in sample feed is higher then "High Set Point".

3.2.2 ALARM DESCRIPTIONS

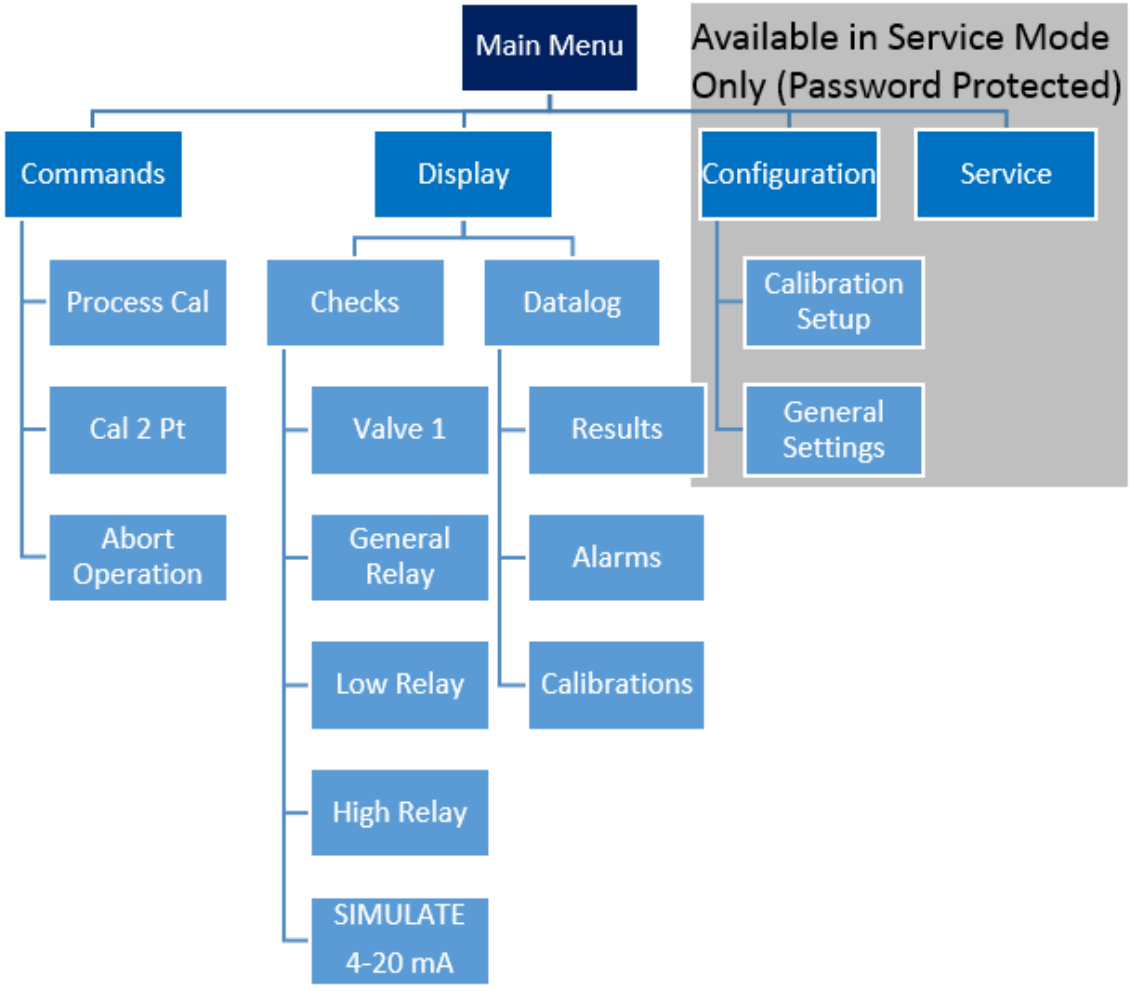
ALARM	DESCRIPTION
CALIBRATION FAIL	Unit failed calibration
SAMPLE HOT	Sample temperature over range (131F)
T. SENSOR FAIL	No thermistor response
O/P 1 Out	Concentration is outside O/PmA 1 set range
O/P 2 Out	Concentration is outside O/PmA 2 set range
CONC LOW	Concentration is below Low Alarm set point
CONC HIGH	Concentration is above High Alarm set point
OVR	Concentration is above limits of analyzer (>10ppm)

3.3 GETTING STARTED

3.3.1 INITIATING THE ANALYZER

1. Insert the POWER cord in the AC mains socket terminal connector located in transmitter section and switch ON the system.
2. The analyzer automatically displays the concentration of sodium interpreted by the electrodes.
3. 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 3.7.2.

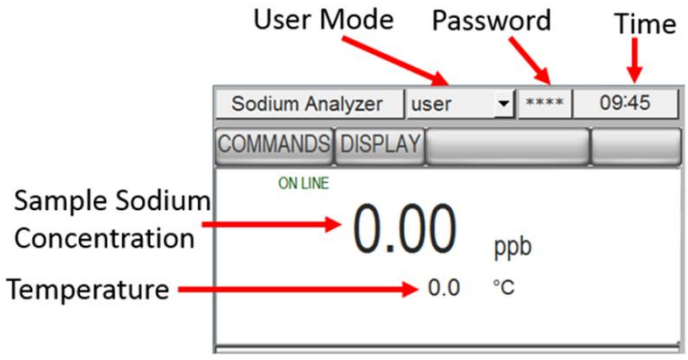
3.4 SOFTWARE STRUCTURE MAP



3.5 MAIN MENU

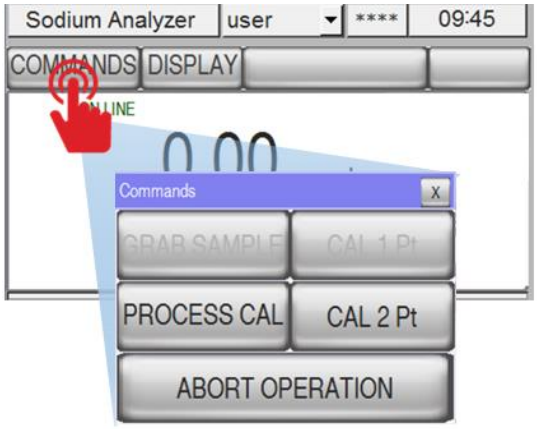
3.5.1 MAIN MENU – USER MODE

The default display when the analyzer is online is the Main Menu in User Mode. In User Mode the user is able to access only the COMMANDS window and the DISPLAY window and all functions within these windows.



3.5.2 COMMANDS WINDOW

Use the touch screen to open the Commands Window to initiate calibrations.



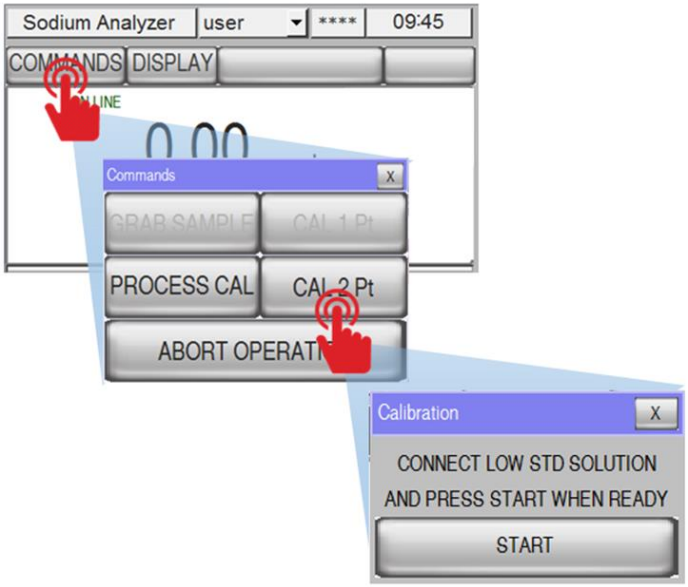
3.5.3 CAL 2 PT

A 2-Point calibration must be performed (and passed) for the instrument to function correctly. Before initiating a calibration sequence, rinse the two standard solution containers with high-purity (DI) water and fill them with fresh sodium standard solutions. This establishes the slope of the calibration curve. During a 2-Pt calibration the solenoid valve is energized first and Low (100ppb) standard solution flows through the flow cell. Once analyzer finishes measuring the Low standard solution, the solenoid valve is deactivated and the analyzer prompts the user to connect calibration tubing to High (1000ppb) sodium standard. Once High Sodium Standard bottle is connected the user must press ENTER and the solenoid is again activated thus allowing High Sodium Standard on to flow through the flowcell. The analyzer

calibrates by measuring the change in mV values between the low and high standard solutions and comparing this “strength” (sometimes called “Slope”) to theoretical values.
The frequency of calibrations depends on the operating conditions and electrode conditions. It is recommended to perform a 2-Point calibration at least once a week to eliminate drift due to changing electrode response.

To Perform 2-Pt Calibration:

From the Main Menu, the “COMMANDS” button. From the Commands Window press “CAL 2 Pt” button. A window will pop up and prompt the user to connect the low standard solution (100ppb).



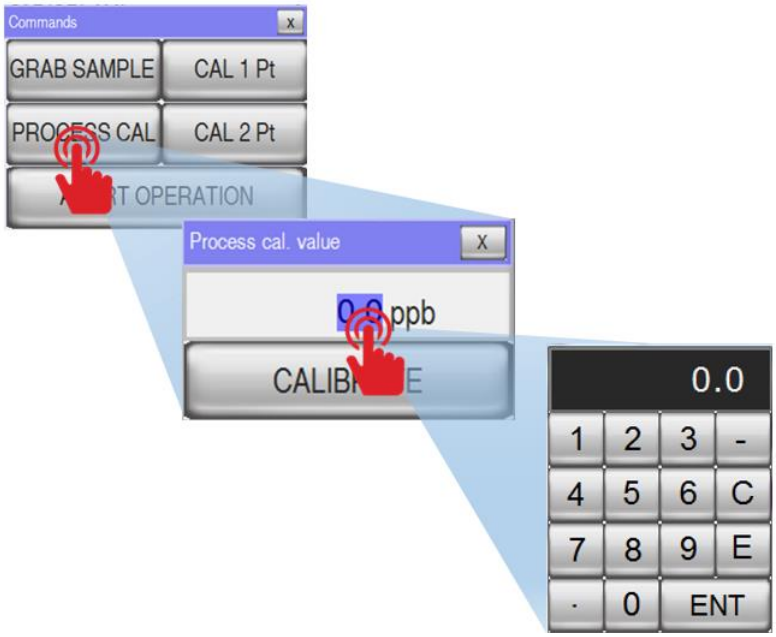
The user must then connect the low (100ppb) standard solution and press the “START” button when complete.
After the START button is pressed the analyzer will begin counting down the remaining time until the solenoid valve is closed and stops the flow of low standard solution.
A window will then automatically pop up to prompt the user to connect the high standard solution.

The user must then disconnect the low standard solution and connect the high (1000ppb) solution to the analyzer. After the high standard solution is connected, press the “START” button.
After the START button is pressed the analyzer will begin counting down the remaining time until the solenoid valve is closed and stops the flow of high standard solution.
When flow of the high standard solution is stopped, the calibration is complete and calibration values for mV1 and mV2 are stored in the Calibration Data Log.

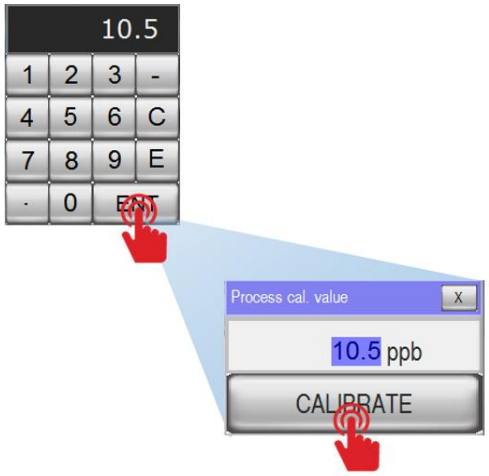
3.5.4 PROCESS CALIBRATION

A Process Calibration (PROCESS CAL) can be performed only if the analyzer has successfully passed a 2-Pt calibration. During PROCESS CAL, none of the solenoid valves are energized and the instrument is calibrated directly to the sample running through the flowcell. The analyzer calibrates by changing the offset of the strength/slope taken during the last 2-Pt calibration.

To perform Process Calibration:
From the Commands Window, press the "PROCESS CAL" button. Press on the "0.0 ppb" to open the numerical keypad.



Enter in the expected concentration of the sample and press "ENT." You will then see the entered value in the "Process cal. value" window. If you wish to make changes to the entered value, press the number "XX.X ppb" to edit the value and hit "ENT" again. Press "CALIBRATE" when ready. The Process Calibration will begin.



ABORT OPERATION

Any calibration cycle or Grab Sample cycle may be interrupted at any time by pressing the ABORT OPERATION button. Once the calibration process is aborted, the measurement screen is displayed.

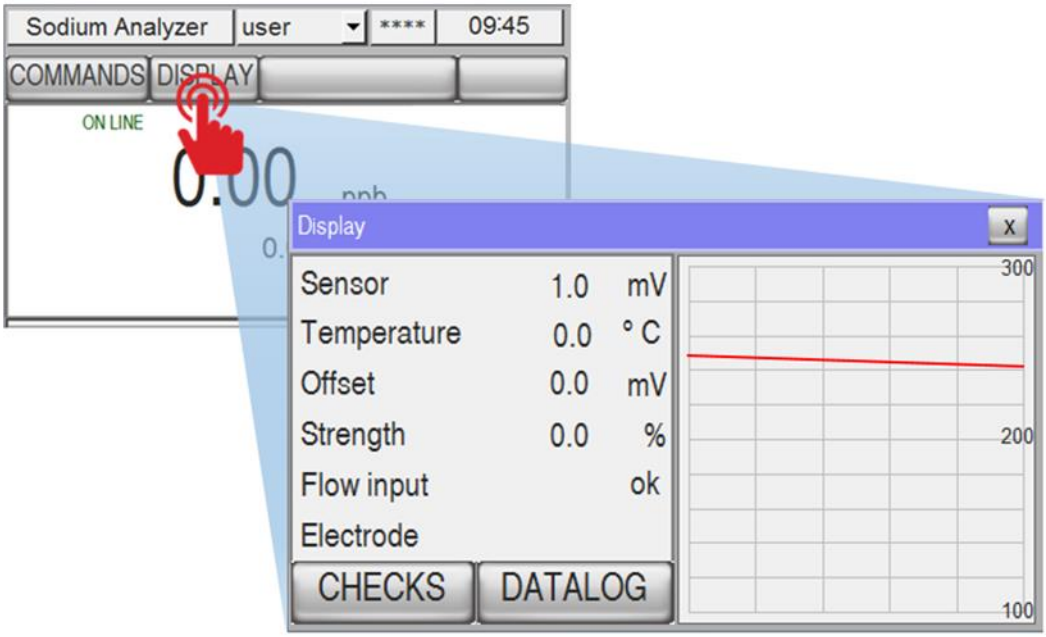
To abort the operation:

From the Commands window, press the "ABORT OPERATION" button.

3.5.5 DISPLAY WINDOW

The display window will give you access to useful tools for troubleshooting. The display window will show you the current analyzer reading graphically in mV as well as other useful information. The analyzer can graph real time the last 10 minutes of the sensor reading in mV. Each vertical line represents two minutes. The Y axis represents the sensor output in mV.

To access the Display Window:

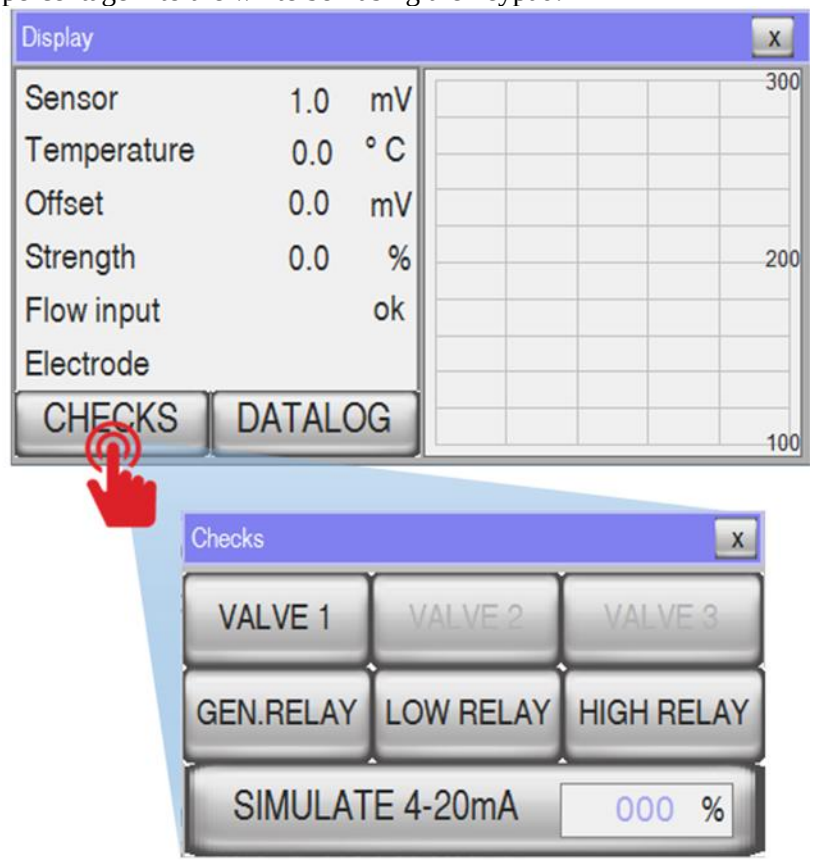


Sensor: Potential reading
Temperature: Temperature reading of the sample at the flow cell
Offset: Offset from the strength of the last calibration
Strength: Percentage of mV1 reading vs mV2 (also referred to as slope)
Flow input: Displays flow switch output (default ok if no flow switch is installed)
Electrode: Displays user inputted vale for electrode identification (useful for recording date of electrode replacement, etc)

3.5.6 CHECKS WINDOW

The “CHECKS” function allows you to perform maintenance diagnostics on the three way solenoid valves, the three alarm relays, and the 4-20mA output.

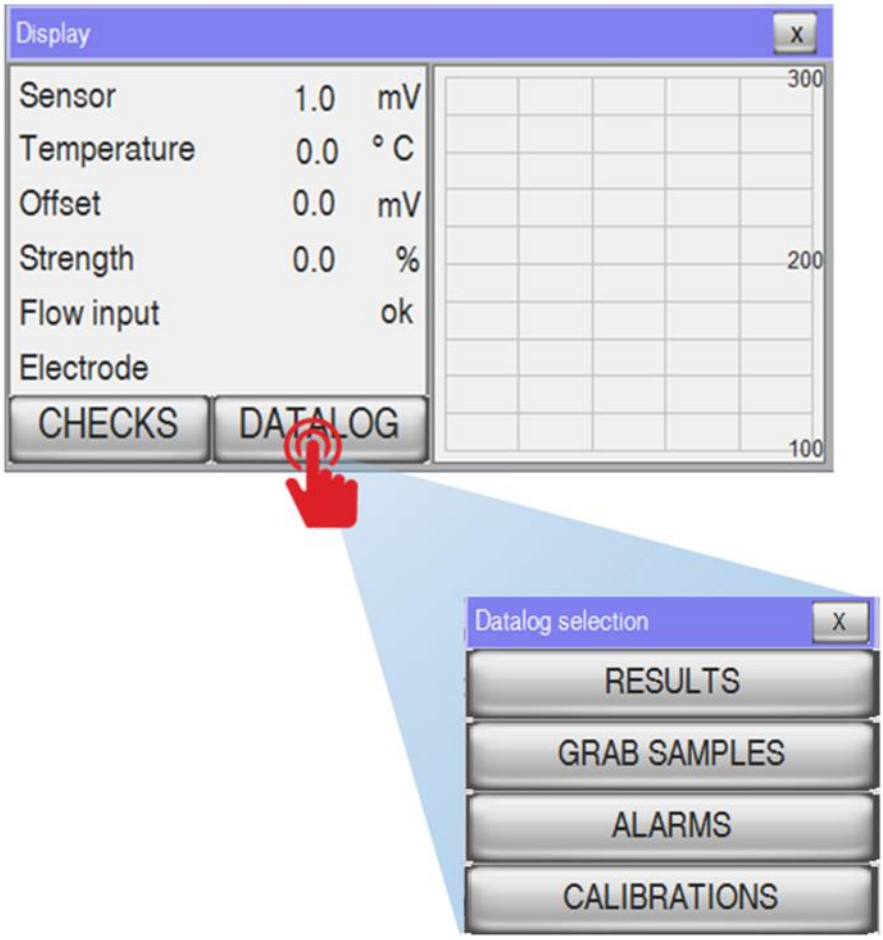
To access the Checks Window:
From the Main Menu, press the “DISPLAY” button. Then press the “CHECKS” button. The buttons for the valves and the relays will toggle on and off. The text within the button will turn red when the valve/relay is open. To simulate the 4-20mA output press on the button and then enter a value as a percentage into the white box using the keypad.



3.5.7 DATALOG SELECTION WINDOW

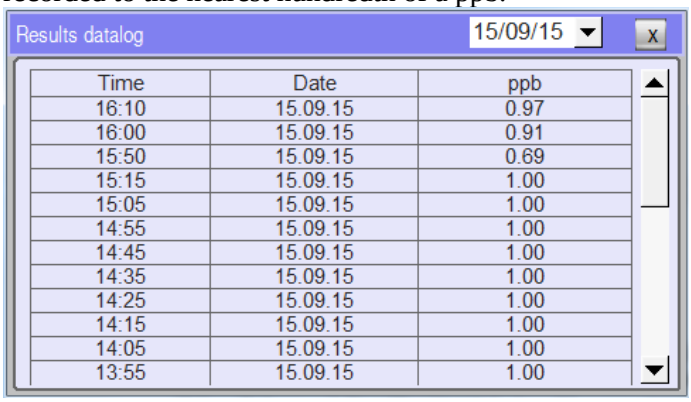
The analyzer is equipped with internal data loggers. Each data logger will automatically record your data and will automatically overwrite the oldest data set and record over with the most recent data set when the log reaches full capacity.

To access the Datalog Selection Window:
From the Main Menu, press the "DISPLAY" button. Then press the "DATALOG" button.



3.5.7.1 RESULTS DATALOG

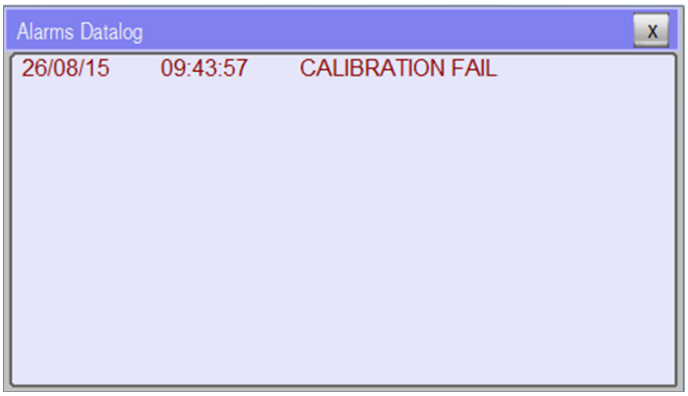
Results of your concentration readings by time and date are recorded in the Results Datalog. Data is stored for up to 30 days at a sampling rate of 1 sample every 10 minutes. You may scroll up or down to view results for the current day selected and select which day to view by selecting the day from the drop down menu box in the upper right corner. Dates are displayed in YY.MM.DD format. Results are recorded to the nearest hundredth of a ppb.



Time	Date	ppb
16:10	15.09.15	0.97
16:00	15.09.15	0.91
15:50	15.09.15	0.69
15:15	15.09.15	1.00
15:05	15.09.15	1.00
14:55	15.09.15	1.00
14:45	15.09.15	1.00
14:35	15.09.15	1.00
14:25	15.09.15	1.00
14:15	15.09.15	1.00
14:05	15.09.15	1.00
13:55	15.09.15	1.00

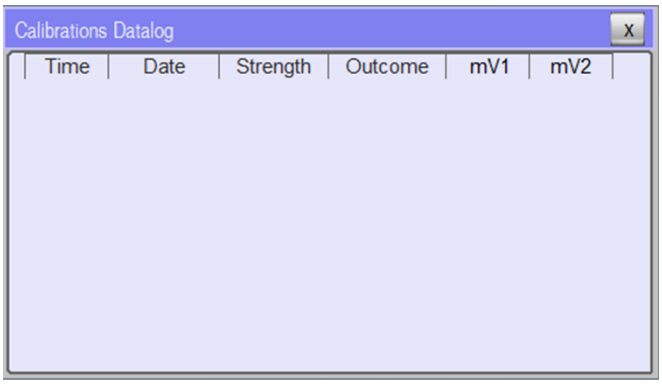
3.5.7.2 ALARMS DATALOG

The last 10 alarms are saved under the Alarms Datalog with red text. The user may press on the red text to turn it green to indicate the alarm has been addressed. A description of all the alarms are given in Section 3.2



3.5.7.3 CALIBRATIONS DATALOG

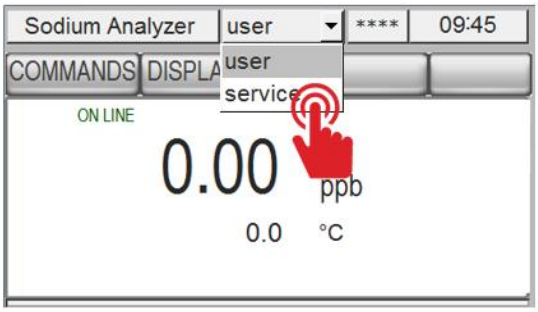
Results of the last 10 calibrations are stored in the Calibration Datalog.
Each result is recorded with the Time and Date the calibration occurred, Strength (or slope), Outcome (pass or fail), and mV1 and mV2 (the readings in mV of the low and high calibration standards).



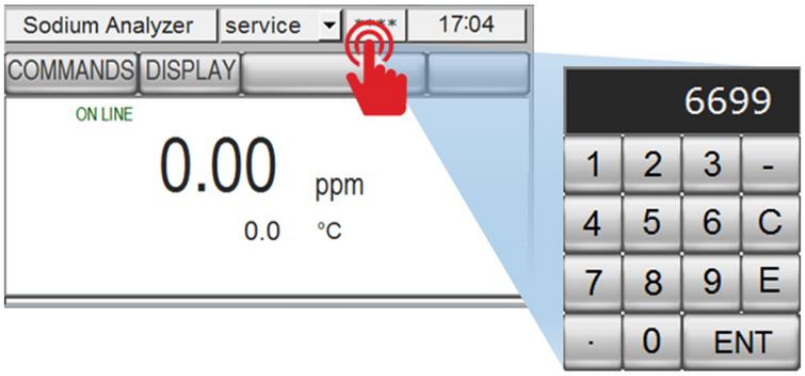
3.5.8 MAIN MENU – SERVICE MODE

The analyzer will default to operating in User Mode where the user can only access the functions in the "COMMANDS" window and the "DISPLAY" window (see Section 3.4.1). More features are available for the advanced user within the Service Mode which is password protected.

To access Service Mode:
From the Main Menu, select "service" from the drop down menu at the top of the screen.

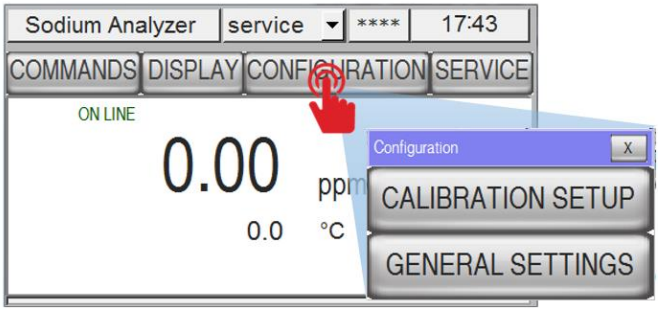


After service has been selected, then press on the "****" to open the keypad. Enter "6699" on the keypad and press "ENT." After the correct password is entered the "CONFIGURATION" and "SERVICE" buttons will become available.



CONFIGURATION MENU – SERVICE MODE
The Configuration Window will give you access to calibration setup and general settings.

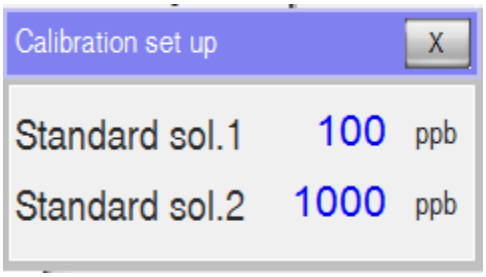
To access the Configuration Menu:
From the Main Menu under service mode, press the "CONFIGURATION" button.



3.5.9 CALIBRATION SETUP WINDOW

The Calibration Set Up menu will allow you to make adjustments to the calibration settings. You may adjust the concentration levels of the calibration standard.

To access the Calibration set up window:
From the Main Menu under service mode, press the "CONFIGURATION" button. Then press the "CALIBRATION SET UP" button.

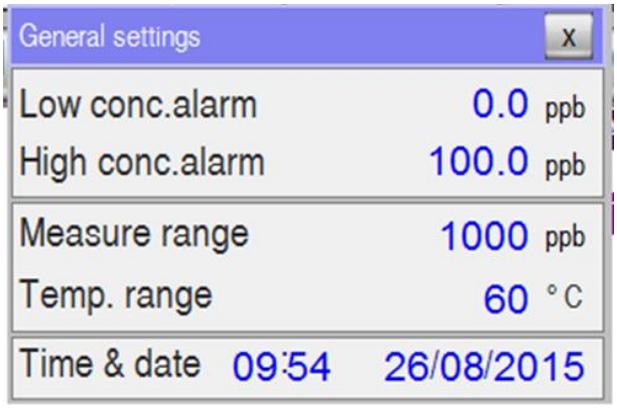


Standard sol.1: this should represent the concentration of the low sodium standard and should be set to 100 ppb
Standard sol.2: this should represent the concentration of the high sodium standard and should be set to 1000ppb

3.5.10 GENERAL SETTINGS WINDOW

The General Settings Menu will allow the user to set alarm ranges and time and date.

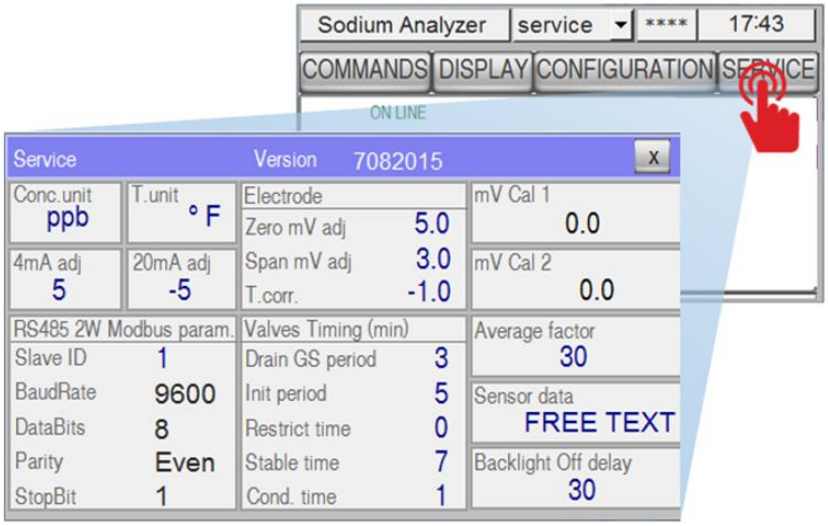
To access the General settings window:
From the Main Menu under service mode, press the "CONFIGURATION" button. Then press the "GENERAL SETTINGS" button.



Low conc.alarm: set the alarm limit for low concentration of sodium sample
High conc.alarm: set the alarm limit for high concentration of sodium sample
Measure range: set the measurement range
Temp.range: enter the upper limit of your temperature range
Time & date: enter the time and date for the analyzer's internal clock

3.5.11 SERVICE MENU – SERVICE MODE

The service menu allows you to adjust some of the programming of the analyzer. The software version number is indicated in the menu bar at the top of the window.



Conc. unit: toggle between ppb or ppm
T.unit: toggle between °C or °F for display temperature of the thermistor
4mA adj: adjust for the 4-20mA output
20mA adj: adjust for the 4-20mA output

Electrode
Zero mV adj: factory set adjustment for analyzer response at 0mV
Span mV adj: factory set adjustment for analyzer response at 400mV
T.corr.: adjust for thermistor error (up to +/- 3 °C or °F)

RS485 2W Modbus param.
Slave ID: adjust for Slave identification number
BaudRate = 9600
DataBits = 8
Parity = Even
StopBit = 1

Valves Timing (min)
Variables in this block set the timing for the calibration sequences.
Drain GS period: Drain the grab sample- Default setting 1
Init period: Allows the sensors to adjust to the calibration fluid – default setting 5
Restrict time: Default setting 0
Stable time: Allows the sensors to adjust to the calibration fluid – default setting 7
Cond. Time: Holds the analyzer output value at the last sensor value before initiating calibration to allow for the sensors to adjust back down to normal operating levels after running calibration standard through the flow cell.

mV Cal 1: displays the mV reading of calibration standard 1 from the last calibration
mV Cal 2: displays the mV reading of calibration standard 2 from the last calibration

Average factor: increasing the average factor will increase noise dampening and decrease response time of the analyzer. Recommended Average factor = 80
Sensor data: this is a free text field up to 12 characters. The user may input the date of exchange of a new sensor, the name of a sensor, etc.
Backlight Off delay: user may adjust the time the analyzer takes to turn off the backlight on the display in order to save the life of the HMI screen / save energy. This may be from 0 min to 120 mins.

3.6 TROUBLESHOOTING

3.6.1 CALIBRATION FAIL

A Calibration Fail condition will occur after a 2-Pt calibration if the electrode response does not meet requirements. This happens when the electrodes "strength" ("slope") from a 2-Pt calibration is below 83 or greater than 110. This could be caused by a number of factors

3.6.1.1 Strength less than 83%

- Make sure standard containers (CAL1 and CAL2) are full of solution.
- Check that vapor bubbles are emerging from the bottom of the stainless steel entrainment tube.
- Check the condition of the reagent solution.
- Regenerate the sodium measuring electrode. See Section *Monthly maintenance*

If the slope value is not improved after the sodium measuring electrode is regenerated, the electrode may need to be replaced.

3.6.1.2 Strength more than 100%

- Possible cause may be faulty reference electrode. Check status of reference electrode filling solution and add more if using N3010-171A.
- Check the status of reference electrode and replace if necessary.
- Make sure standard containers (CAL1 and CAL2) are full of solution.

3.6.1.3 Very low or 0% slope

- Check the operation of the solenoid valve(s).
- Check flow of standard solution through flow cell.
- Check the level of the salt bridge solution in the reference electrode, if using N3010-171A.
- Check for open circuit reference electrode by substituting it with an electrode of known performance.
- Check all electrical connections in the electrode junction box and interconnect cable.
- Make sure standard containers (CAL1 and CAL2) are full of solution.
- Make sure the low 100ppb standard is connected to Cal1 tubing and high 1000ppb standard is connected to Cal2 tubing. Note that the high standard is red in color.

4 MAINTENANCE

4.1 BUFFER SOLUTION(S)

WARNING

These buffers are mildly toxic and hazardous, and should be handled with care.

Two alternative reagent solutions may be used, depending on the required lower limit of measurement. Concentrated ammonia solution, which provides adjustment of sample pH to 10.7 is suitable for measurements of sodium ion to approximately 0.5ppb. At concentrations below 0.5ppb, hydrogen ion interference becomes significant and a reagent of 50% diethylamine solution should be used. This adjusts the sample pH to 11.2 - 11.5 and enables measurements to be made to concentrations below 0.5ppb.

4.1.1 CONCENTRATED AMMONIA SOLUTION - 1 LITER

WARNING

This buffer should only be handled under a fume hood. It causes burns and is irritating to the eyes, respiratory system and skin. Wear rubber gloves and eye protection. In warm weather pressure increases in the bulk container of ammonia and the cap must be released with care.

Waltron uses a 28 - 30% w/v solution (0.89 s.g.) which is recommended. Refer to section 5.7 which relates to sodium concentration and pH.

ATTENTION

Waltron offers Ammonium Hydroxide in a 2.5 liter container. Part N1234-116.

4.1.2 DIISOPROPYLAMINE SOLUTION - 99%

WARNING

Diisopropylamine is an extremely inflammable and irritating colorless liquid with a strong smell of ammonia. It should be handled with care at all times. The following points should also be noted:

- Avoid breathing vapor and avoid contact with skin and eyes.
- Work under a fume hood, wearing rubber gloves and eye protection.
- In the event of a fire, extinguish with water spray, foam, dry powder or carbon dioxide.
- If a spill occurs, shut off all possible sources of ignition, and instruct others to keep at a safe distance. Mop up spill with plenty of water, diluting greatly. Ventilate the area well to evaporate any remaining liquid and dispel vapor.

Effluent from the monitor contains diisopropylamine (if this buffer is used). Contact with it should also be avoided.
Allow solution it to cool to room temperature before fitting the container cap.

4.2 STANDARD SOLUTIONS

4.2.1 PREPARING STANDARD SOLUTIONS

The following instructions refer to the preparation of 100ppb and 1ppm sodium, LOW and HIGH standard solutions respectively, but any concentrations can be prepared within the measuring range selected by appropriate dilution of the stock solution.

ATTENTION

- Waltron offers Sodium Standard, 100 ppb, in a 5 gallon container. Part Number N1234-544.
- Waltron also offers Sodium Standard, 1 ppm, in a 5 gallon container. Part Number N1234-545. Note that the high calibration standard is red in color.

Dissolve 2.543(±0.001)g of analytical reagent grade sodium chloride in approximately 100ml 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 sodium ions. Store in a plastic container.

Pipette 10ml of this solution to a one liter volumetric flask. Make up to the 1 liter mark with high purity water to give a solution of 10ppm sodium ions.

Pipette 20ml of the 10ppm solution into a two liter volumetric flask and make up to the 2 liter mark with high purity water to give the LOW standard solution of 100ppb sodium ions. Transfer this solution to the bottle labeled Low Calibration Standard.

Transfer 200ml of the 10ppm solution into a two liter volumetric flask and make up to the 2 liter mark with high purity water to give the HIGH standard solution of 1ppm sodium ions. Transfer this solution to the bottle labeled High Calibration Standard.

- Do not prepare static sodium solutions of less than 50ppb because low concentration solutions rapidly become contaminated and change in concentration.
- Although the HIGH and LOW standard solutions are typically one decade apart in sodium concentration, any concentration difference can be used within the constraints of i) above and the need to have a significant change in electrode output to achieve an accurate calibration.

ATTENTION

High purity water is water containing less than 2ppb sodium ions and a specific conductivity of less than approximately 0.2µS/cm.

4.3 ETCHING SOLUTION

4.3.1 PREPARING ETCHING SOLUTIONS

ATTENTION

Waltron offers the solution under our Part Number N1234-543, Sodium Electrode Regeneration Solution, 2 oz size.

For use on applications where the sample sodium concentration is below 1ppb - see also Section 5.5.2.

WARNING

Sodium Fluoride is toxic. Avoid inhaling the dust and prevent contact with skin and eyes. Wear a dust mask, rubber gloves and eye protection. When prepared, the etching solution contains 0.1M Hydrofluoric acid (0.2% HF). Take care to prevent contact with skin and eyes.

Dissolve 5.0 (±0.2)g analytical grade sodium fluoride, NaF, in approximately 400ml high purity water. Add to this solution 20 (±0.2)ml 5M acetic acid*, CH3COOH, and dilute to 1 liter.

ATTENTION

5M acetic acid can be prepared from concentrated acid by adding 144 (□1)ml analytical reagent grade glacial acetic acid (1.05 s.g.) to 500ml of high purity water.

WARNING

Prepare the acetic acid solution under a fume hood and take the appropriate precautions when handling concentrated acids.

4.4 REFERENCE ELECTRODE FILL SOLUTION (FOR USE WITH N3010-174)

ATTENTION

Waltron offers a stock solution of 3.0 M Potassium Chloride in a 2oz. size. Part Number N1234-547.

This solution is required for refilling the reference electrode at extended intervals. This solution should be stored in a tightly sealed plastic bottle. The electrode is most conveniently filled using the supplied eyedropper or a syringe.

4.5 SCHEDULED SERVICING

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

4.5.1 WEEKLY MAINTENANCE

If the monitor is continuously running at high concentrations, greater than 100ppb, a weekly Single Point Calibration is recommended.

4.5.2 MONTHLY MAINTENANCE

- Replace the bottle of reagent buffer solution. The level of solution should not be allowed to fall below about three-quarters full. On high ambient temperature installations and for low sodium concentrations, the solution may require replacement more frequently.
- Check the level of reference electrode filling solution; refill as required.
- It is recommended you calibrate at least once a month

The following procedures should be carried out:
When the sodium concentration is above 1ppb, carry out a Two Point Calibration note the slope value.

4.5.2.1 Sodium Measuring Electrode Etching/Regeneration Instructions:

When the sodium concentration is below 1ppb, apply the following regeneration/etch procedure before carrying out a Two Point Calibration:

ATTENTION

When used for prolonged periods at low concentrations, leeching of sodium ions from the electrode surface accelerates the aging process of the electrode which is shown by poor response time, low slope value and a limitation to respond to low levels. Calibration may then be in error because of slow response and poor reproducibility. The reactivation procedure minimizes problems from these sources.

Also: Etching is not for new probes, it is part of the monthly maintenance procedure.

- Remove the sodium electrode from the flowcell and slide off the sleeve and 'O' ring; it is not necessary to detach the electrode lead.
- Prepare two plastic beakers, one containing about 50ml of etching solution, the other about 200ml high purity water.
- Dip the electrode in the etching solution for 60 (±5) seconds; then rinse in high purity water.

CAUTION It is important not to exceed the etching time or the performance of the electrode may be permanently degraded.

- Dispose of the etching solution by diluting to waste with plenty of water. Use fresh etching solution each time.

Fit the 'O' ring and sleeve and return the electrode to the flowcell. Prior to performing a calibration, run the monitor for one to two hours on low level sodium sample. No further calibration should be needed until the next reactivation procedure.
This procedure must be carried out at regular monthly intervals and the process started as soon as a new electrode is put into service.

ATTENTION

It is extremely difficult to recover an 'old' electrode.

As the buffer solution, is replaced monthly, the following procedure should be carried out 24 hours after replenishment to allow pH stability to be achieved.
This procedure applies to both ammonia and amine buffered systems.

4.5.3 SHUT-DOWN PROCEDURE (PROLONGED SHUT-DOWN, 1+ MONTHS)

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

WARNING

For safe handling instructions of buffer solutions refer to Section 4.

- Fill the Low Sodium Standard (100ppb) calibration solution container with high purity water and do a single point calibration to flush the system.
- Remove the electrodes and follow procedure in Section 5.6.1.
- 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.

4.5.4 STORING THE ELECTRODES

Fill the rubber teat, supplied with the sodium electrode, with 5M sodium solution. Push the teat over the end of the electrode. For storing the refillable reference electrodes, fill the rubber teat with the refillable solution and push teat onto the end of the electrode. Refit the filling hole plug to seal the refill aperture. For storing the Gel-filled reference electrode, fill the rubber teat with a dilute KCl solution (part number N1234-547) and push teat over the end of the electrode.

TIP

Do not let either electrode dry out.

4.5.5 PH EFFECTS

Measuring the pH of the effluent from the flowcell indicates adequate buffering. The minimum pH depends on the minimum sodium concentration, but the pH value is calculated as:
pH must be greater than pNa + 3, so ideally at:

- 100ppb Na+, the pH must be greater than 8.4
- 10ppb Na+, the pH must be greater than 9.4
- 1ppb Na+, the pH must be greater than 10.4
- 0.5ppb Na+, the pH must be greater than 11.4

ATTENTION

If the buffer is allowed to become completely exhausted, the reading may be very erratic due to the lack of ionic strength adjustment of the high purity sample.

5 SPARE PARTS

5.1 CONSUMABLE SPARE PARTS

PART NUMBER	DESCRIPTION
N1234-540	Sodium Standard, 100ppb, 1 Gallon Cube
N1234-541	Sodium Standard, 1000ppb (1 ppm), Red, 1 Gallon Cube
N3500-322	Kit, Re-tubing & O-Ring
N1234-544	Sodium Standard, 100 ppb (5 gal.)
N1234-545	Sodium Standard, 1000 ppb (5 gal.) - (1 ppm)
N1234-543	Sodium Electrode Regeneration Solution (2 fl.oz.)
N1234-547	3.5 M KCL Reference Electrode Filling Solution
N1234-548	3.5 M KCl Reference Solution Kit
N1234-116	29% Ammonium Hydroxide (2.5 L)
N1234-579	99% Di-Isopropylamine (1 Gallon)

5.2 RECOMMENDED SPARE PARTS

PART NUMBER	DESCRIPTION
N3010-177	Electrode, Measuring
N3010-174	Electrode, Reference. Re-fillable
N3010-173	Electrode, Reference, Gel-filled
N3010-171B	Electrode, Reference, Refillable, w/BNC Connector
N3010-182	Electrode Cable, BNC to DIN
P1000-067	Calibration Standard Bladder Cap

5.3 ADDITIONAL SPARE PARTS

PART NUMBER	DESCRIPTION
N3010-170C	Thermistor, Flow Cell
P2000-039A	Flow Cell Complete Assembly (Less Electrode)
N2554-065B	Constant Head Unit Assembly
N1053-106A	Earthing Tube
264-0000-01	10 Micron Filter
W9040-053	Filter Housing
P2000-022B	Pre-Amp, 9031CX, Complete
N2554-066A	Entrainment “T” Assembly
P5000-019	Transmitter Assembly
P2000-056	Solenoid Valve Assembly
P2000-054	Solenoid Cable Assembly
N1152-169	Pressure Relief Valve
N2554-067C	Heat Exchanger Assy, 9031CX

6 TROUBLESHOOTING

Problem	Possible Cause(s)	Solution(s)
Calibration Fail	Empty or Contaminated Standards Solutions Container(s)	Check to make sure calibration standard bottle is full, check calibration tubing to make sure it is not pinched. Replace calibration standard with fresh solution and try again.
Calibration Fail	Faulty Solenoid Valve	Run Solenoid Check cycle in Diagnostics – check status and connections of solenoid valve.
Calibration Fail	Strength is too low. <83	Make sure containers of standard are full of solution.
Calibration Fail	Strength is too low. <83	Verify condition of reagent solution. Replace monthly.
Calibration Fail	Strength is too low. <83	Verify electrodes are connected properly
Calibration Fail	Strength is too low. <83	Check that vapor bubbles are emerging from bottom of entrainment tube.
Calibration Fail	Strength is too low. <83	Ensure reference electrode tip is 42-48 mm from the top of the flowcell (5 mm into the sample)
Calibration Fail	Strength is too low. <83	Ensure calibration standard is flowing. Perform Solenoid Check cycle in Diagnostics to verify.
Calibration Fail	Strength is too low. <83	Regenerate the sodium measuring electrode. See section *Monthly maintenance* in manual.
Calibration Fail	Strength is too high. >110	Make sure both containers of standard are full of solution.
Calibration Fail	Strength is too high. >110	Check level of reference electrode salt bridge solution; add more if necessary
Calibration Fail	Strength is too high. >110	Faulty reference electrode. Replace with one of known performance.
Calibration Fail	Strength is close to zero.	Make sure both containers of standard are full of solution.
Calibration Fail	Strength is close to zero.	Ensure there is flow of standard solution through flow cell.
Calibration Fail	Strength is close to zero.	Check all connections from electrodes to pre-amp box
Calibration Fail	Strength is close to zero.	Verify operation of solenoid valve.
Calibration Fail	Strength is close to zero.	Check level of salt bridge solution in reference electrode.

Problem	Possible Cause(s)	Solution(s)
Calibration Fail	Strength is close to zero.	Faulty reference electrode. Replace with one of known performance.
Calibration Fail	No standard flow.	Check for clogs in system. Check for air trapped in tubing. Elevate standard container or temporarily disconnect tubing to solenoid to facilitate flow of standard through tubing to valve. Reconnect once standard is flowing. Filter sample if deposits found in analyzer tubing.
Readings are not accurate – too low.	Old/bad reagent. Poor electrode performance. Bad calibration.	Replace reagent solution. Regenerate/replace sodium measuring electrode, refill/replace reference electrode. Check calibration log and run another calibration if results are not good.
Readings are not accurate – too high.	Poor electrode performance. Bad calibration. Sodium leak in sample system.	Regenerate/replace sodium measuring electrode, refill/replace reference electrode. Check calibration log and run another calibration if last result is not good.
Readings are not accurate – erratic	Exhausted reagent	Replace reagent. Recommended monthly
Display read “SAMPLE HOT”	Sample temperature over specified range (>131F). Faulty thermistor.	Check sample temperature. Clean/replace thermistor.
Display read “T. SENSOR FAIL”	No thermistor response.	Clean/replace thermistor. Check thermistor connection at pre-amp.
Display read “OVR”	Signal from electrodes too high – sample concentration over maximum range (>10ppm)	Check sample concentration. Check electrode connections and pre-amp.

7 SPECIFICATIONS

Range	0.1ppb – 10ppm
Accuracy	**+/-**5% of reading or +/- 0.1ppb (whichever is greater) within +/-5C of calibration temperature
Reproducibility	**+/-**5% of reading or +/- 0.1ppb (whichever is greater) at constant temperature
Response Time	90% of 1-10ppb step: 4 minutes; 90% of 100-1ppm step: 5 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 at least 60 microns, free of film forming compounds
Power Consumption	Less than 20VA
Sample Inlet Fitting	1/4” Swagelok
Sample Outlet Fitting	Nozzle that fits 3/8” hose connection

8 APPENDIX 9031CX

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

Sodium Concentration	Theoretical Preamp Input (mV)
0.01 ppb	-476.63
0.02 ppb	-458.82
0.05 ppb	-435.27
0.1 ppb	-417.47
0.2 ppb	-399.66
0.5 ppb	-377.11
1 ppb	-358.31
2 ppb	-340.5
5 ppb	-316.95
10 ppb	-299.15
20 ppb	-281.34
50 ppb	-257.79
100 ppb	-239.99
200 ppb	-222.18
500 ppb	-198.63
1 ppm	-180.83
2 ppm	-163.02
5 ppm	-139.47
10ppm	-121.67

Approximate electrode mV outputs for calibrations using Waltron Electrodes:

Refillable Reference Electrode		Gel-Filled Reference Electrode	
mV 1 (100 ppb)	mV 2 (1 ppm)	mV 1 (100 ppb)	mV 2 (1 ppm)
240-260 mV	180-200 mV	240-260 mV	180-200 mV

9 APPENDIX PANEL MOUNT

This Appendix shows the schematics of the Retrofit Panel Mount Bracket option for the transmitter case for panel mounting over an existing 9030 panel cut-out and the dimensions of the required cut-out for panel mounting the transmitter without the retrofit faceplate.