EXPERTS IN WATER CHEMISTRY SINCE 1903

9096 Degassed Cation Conductivity Analyzer User Manual

101-046-B.4

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.

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1 OVERVIEW

1.1 SPECIFICATIONS

1.1.1 PERFORMANCE

Sensor Classification:	Cationic Exchange
Application:	Measurement of specific, cation, and degassed cation conductivities in high purity process water
Measuring Range:	0 to 9.999 µS/cm, 0 to 99.99 µS/cm
Accuracy:	< 0.6% of the measuring range
Degassing Efficiency:	93.5%
User Interface:	5.5” color touch screen
Data Storage:	Extract via USB 2.0
Degree of Protection:	Transmitter IP67, Corrosion Resistant Finishes
Materials in Contact with Sample:	Stainless steel, PVC
Power Supply:	AC 110 to 240 V +10 / -15%; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz
Required Maintenance:	Replace Cation Resin Bottle (monthly) Replace Decarbonization Column (monthly)
Mounting:	Wall or Panel Mount
Dimensions:	29 x 37 x 10” (613 x 939 x 254 mm)

1.1.2 OPERATING CONDITIONS

Ambient Temperature:	32 – 140° F (0 – 60 °C)
Sample Medium:	Liquid
Sample Temperature:	32 – 122° F (0 – 50 °C)
Sample Flow Rate:	.031 - .044 GPM (7-10L/h)
Sample Pressure:	Maximum of 30 psig (2 bar)
Outlet Sample Pressure:	Atmosphere

1.1.3 COMMUNICATIONS & SIGNAL OUTPUTS

Analog Outputs:	Four 0/4 – 20 mA for measured signals
Serial I/O for Signals:	RS422/RS485 (optional)
Alarms:	General Alarm, Low Degassing Efficiency Alarm, Resin Exhausted Alarm
Optional:	Additional inputs and outputs available

1.2 SAFETY PRECAUTIONS, INSTRUCTIONS, AND HAZARDS

1.2.1 GENERAL INFORMATION

This manual contains important information which is required for installation, start up and operation of the Waltron 9096 Desgassed Cation Conductivity Analyzer. Please read this manual carefully before installing and placing the analyzer into service!

Pay attention to all caution and danger labels present on the analyzer and all caution and danger statements written on this manual.

- Waltron shall not be liable for errors contained herein and/or for an incorrect use of the analyzer. The department head and analyzer's users must be sure to read and observe the following instructions and to apply all the national and local regulations and laws regarding workers health and safety.
- Use, maintenance, and service of this analyzer is allowed only by qualified personnel who are fully trained on the analyzer's operations. This personnel is intended to be physically and mentally fit and not under effect of alcohol or/and drugs.
- When the analyzer is not used it should be protected from intentional or unintentional powering on, using a proper circuit breaker.
- Failure to do so and non-observance of hazards or dangers warnings could result in death or serious injury to the operators or damage to the analyzer.
- Before using the analyzer, it is necessary to visually check for damages to safety devices and report to your department head even if they don't cause the analyzer to stop or malfunction.
- All the analyzer's components are installed inside a metallic enclosure with a door equipped with a special key opening, only endowed to qualified maintenance personnel.

1.2.2 LIST OF WARNINGS AND POTENTIAL DANGERS

The table below is a list of hazards and dangers warning labels that may be found on the analyzer and/or in this manual. In case of these labels becoming outdated, they should be replaced with new ones by the analyzer owner.

Table 1.1: List of hazards and dangers.

	**Hazard of electrical shock** This symbol is used to present a hazard of severe electric shock or electrocution. All controls and maintenance on electrical devices labeled with this symbol should be made by qualified personnel in accordance with national or local regulations. Qualified Personnel means personnel who have been fully trained and have professional experience in avoiding electricity hazards and dangers. To avoid potentially fatal electrical shocks and/or analyzer damage always disconnect input power to analyzer before servicing.
	**Hazard of chemical burns** This symbol is used to present a hazard of severe burns and serious injury for dangerous chemicals manipulation. All handling and operations maintenance on chemicals labeled with this symbol should be made by qualified personnel in accordance with national or local regulations. Qualified Personnel means personnel who have been fully trained and have professional experience in avoiding chemical hazards and dangers. Before proceeding with the handling of chemicals and service operations, read the material safety data sheets supplied with each chemical to take all the necessary precautions when handling.
	**Harmful** Specific indication depending on the parameter analyzed and the chemical colorimetric method used.
	**Warning of general hazard** This symbol means that is necessary read this manual before to proceed to any service operation to know exactly how to operate in proper way. Only qualified personnel fully trained on analyzer use and maintenance is allowed to proceed with service operations on the unit.

1.2.3 SAMPLE

Take the proper precautions to avoid direct contact with the sample stream. It is the responsibility of the user to collect all the information and take all the precautions regarding physical, chemical, radiation and/or biological hazards and dangers coming from sample stream and/or sample vapors. It is also the responsibility of the user to collect all the information and potential hazards regarding the chemical and physical compatibility of sample stream with analyzer materials.

1.2.4 ANALYZER GENERAL HAZARDS

1.2.4.1 Electrical Hazards and Precautions

General information:

- In all electrical devices that are 110-220 Vac powered, there is a hazard of electrical shock or electrocution.
- Only qualified service personnel should open the analyzer's enclosure.
- Before servicing the analyzer parts that are electrically powered, turn off power to the analyzer to avoid risks of electrocution.
- To turn off power from an electrical device, it is necessary to interrupt the power line using a circuit breaker or an isolating switch to be sure that there is no power in the area to be serviced.
- The analyzer's transmitter enclosure is IP67 (NEMA 6).
- Protection against indirect contacts is guaranteed by efficient grounding of all isolated metal masses. Grounding screw is located inside the electrical enclosure, in the lower right position.

2 INTRODUCTION

2.1 PRELIMINARY REMARKS

The primary purpose of power plant chemistry programs is the protection of major capital components by the prevention of corrosion. Online instrumentation is used to monitor the presence of potentially corrosive chemicals in the water and steam cycle, thereby giving the operator the opportunity to take corrective actions to prevent corrosion or depostion of deposits on the major components in the steam generator or turbine.

Conductivity is frequently used as a water quality measurement. However, the presence of commonly used chemicals such as ammonia, hydrazine, or caustic can mask the effects of corrosive species in the water if conductivity is used without further conditioning. Cation or acid conductivity is used to remove the cationic species from the water by passing the sample through a resin column containing hydrogen form cation resin.

The presence of dissolved carbon dioxide increases the cation conductivity but does not have any negative influence on corrosion. For this reason, removing the carbon dioxide from the cation resin treated sample makes it possible to obtain the cation conductivity value due to the presence of corrosive species, especially sulfate and chloride. Especially during turbine start-up when there are large amounts of carbon dioxide present in the steam and condensate, accurate cation conductivity readings are needed to minimize startup times and meet production goals.

The conductivity measurements in power plants provide indispensable information about the state of the water-steam circuit. Specific conductivity can be used to infer the pH and Ammonia concentration. Passing a water sample first through a cation exchange column removes the high conductivity cations such as NH_4^+ to provide a conductivity value based to the total anion load in the sample. Frequently, there is enough dissolved carbon dioxide in a sample to provide a false "high" cation conductivity indication, so removing the carbon dioxide becomes the final step in providing an accurate cation conductivity value.

The new 9096 Degassed Cation Conductivity Analyzer from Waltron removes carbon dioxide using a desorption column. Using this method, 93.5% of the CO_2 is removed in the 45 seconds the sample is in the desorption column. Another advantage of this approach is that there is no requirement for either a Nitrogen source nor for a heater to boil off the CO_2 as was done with the original reboiler units.

2.2 WORKING PRINCIPLE

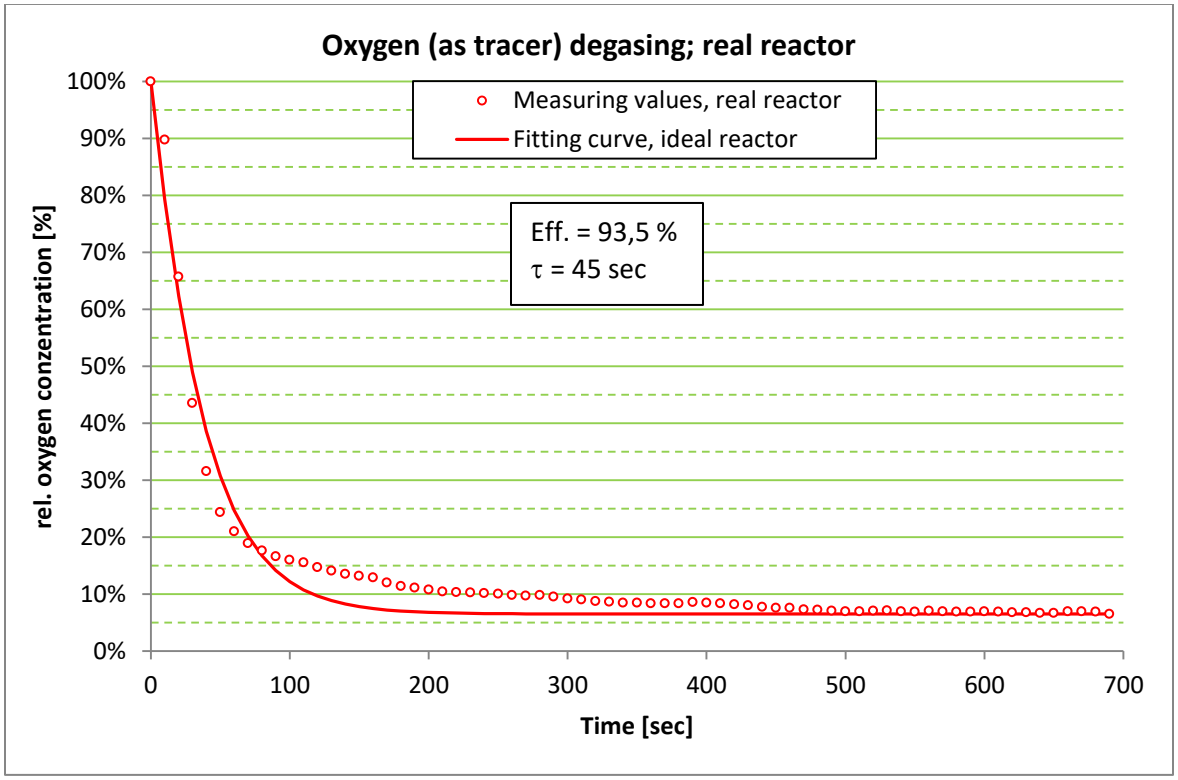
As the sample passes through the cation exchanger, the ions from the process treated sample water (eg. Ammonium NH_4^+) are removed. Next, the ions present due to gaseous components must be removed. These gaseous components from the atmosphere are introduced into the sample during the process and through leaks in the water - steam cycle. Of the atmospheric gases, only carbon dioxide (CO_2) dissolves in the water sample to chemically form ions. The remaining gases (oxygen, nitrogen, etc.) dissolve physically and do not form ions and thus do not contribute to conductivity. The chemical reactions of carbon dioxide in water are shown by the following equations:

A) $CO_2 + 2\ H_2O \leftrightarrow HCO_3^- + H_2O + H^+$ pK = 6,3

B) $HCO_3^- + 2\ H_2O \leftrightarrow CO_3^{2-}$ pK = 10,3

Thia is a pH-dependent equilibrium. At a pH value of 5, 94% of the carbon dioxide is present as CO_2 gas and 6% as carbonate ion HCO_3-. Following the cation exchanger, the pH is about 5.5-6, so there is almost exclusively CO_2 gas. The bicarbonate ion (HCO_3^-)is practically non-existent. These are the ionic components of the carbon dioxide but are much less corrosive than the ions of the salt-containing components. In order to obtain a selective conductivity value for the salt ions (maximum potential risk for corrosion), the carbon dioxide has to be removed from the water sample. For this separation process, an inert gas (gas that does not contain CO_2) passes through the sample and the gas components are displaced by the gas components of the inert gas in the sample. Thus, the inert gas drives the carbon dioxide from the sample. In this way, the CO_2 contribution is removed from the cation conductivity.

The removal of carbon dioxide is carried out in an exchange column using a counterflow principle. The aqueous sample flows into the head space in the column and moves under gravity downwards. Inert gas flows from the bottom upwards in the column and escapes from the headspace to the outside. The inert gas is produced from decarbonised air. In the column an exchange process takes place in which the carbon dioxide is driven off from the liquid. With the circulating pump and a valve, a sample flow rate of 5-8 l / h is maintained . In order to achieve a constant liquid level in the column, a constant head bypass is installed.which also prevents back diffusion of carbon dioxide from the atmosphere into the column. A conductivity cell in the sample output measures the degassed cation conductivity (DCC).



2.3 FLOW & COMPONENT DIAGRAM

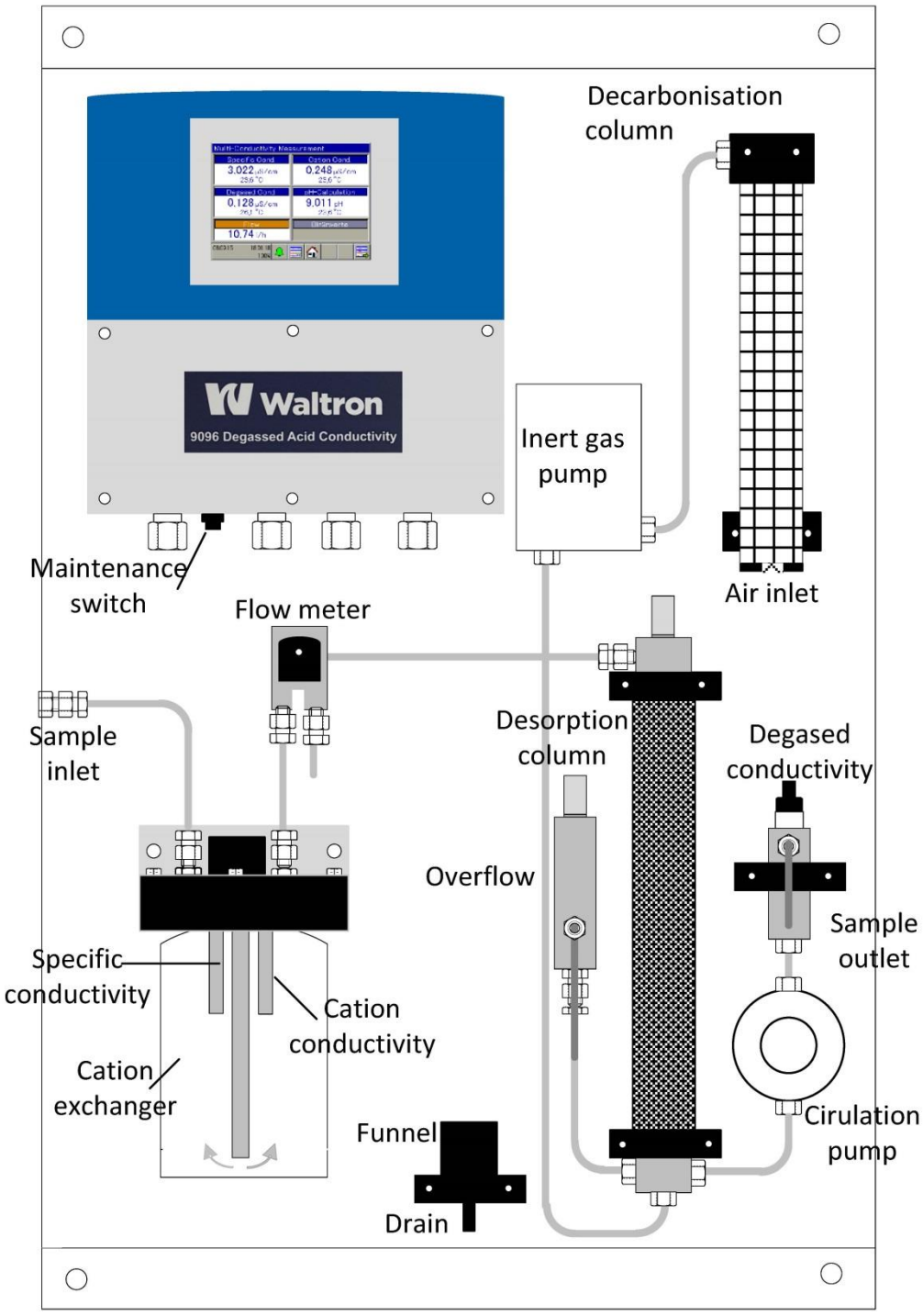


Figure 2.1: Flow & Component Diagram.

2.4 WET-SECTION

Figure 2.2: Waltron 9096 Analyzer front view.

2.5 ELECTRONICS

The microprocessor and its PCB assembly are located in the electronic section. It provides control for the entire analyzing system. It handles the analyzer operations, it collects all the information and data coming from the different analyzer devices and it controls all the I/O for communication with the user touchscreen interface and transfer data equipment. The connections for the external communications are shown in Section 3.6.

3 INSTALLATION

3.1 RECEIVING

The Waltron 9096 Desgassed Cation Conductivity Analyzer is assembled and fully tested for proper performance. Before proceeding with analyzer installation, it is recommended to:

- Check that the box and analyzer have not been damaged during transportation.
- Take extreme care during analyzer unpacking and moving.
- Be careful not to misplace accessories during unpacking. Refer to the included packing list.

3.2 ANALYZER HANDLING

Take extreme care when lifting or moving the analyzer. Before moving the analyzer, it is recommended to manually empty all of the liquid containing components.

3.3 LOCATION AND MOUNTING

It is recommended to install the analyzer in a suitable position:

- The location is to be clean, covered and properly enclosed to provide the analyzer with good ventilation and low dust concentration.
- Operating environmental conditions are: temperature between 0 and 60°C (32-140°F) at max 80% relative humidity. If the temperature is below 0°C, the analyzer should be installed in a heated cabinet.
- Place the analyzer close to the sample point to achieve the minimum response time; the sample should be homogenous and representative.
- The drain line should be properly dimensioned and positioned at a downward slope to allow the drain of analyzed sample (by gravity).

WARNING!	The sample drain of the analyzer must be at ambient pressure with no restriction or counter pressure.

3.4 MOUNTING SCHEMATICS

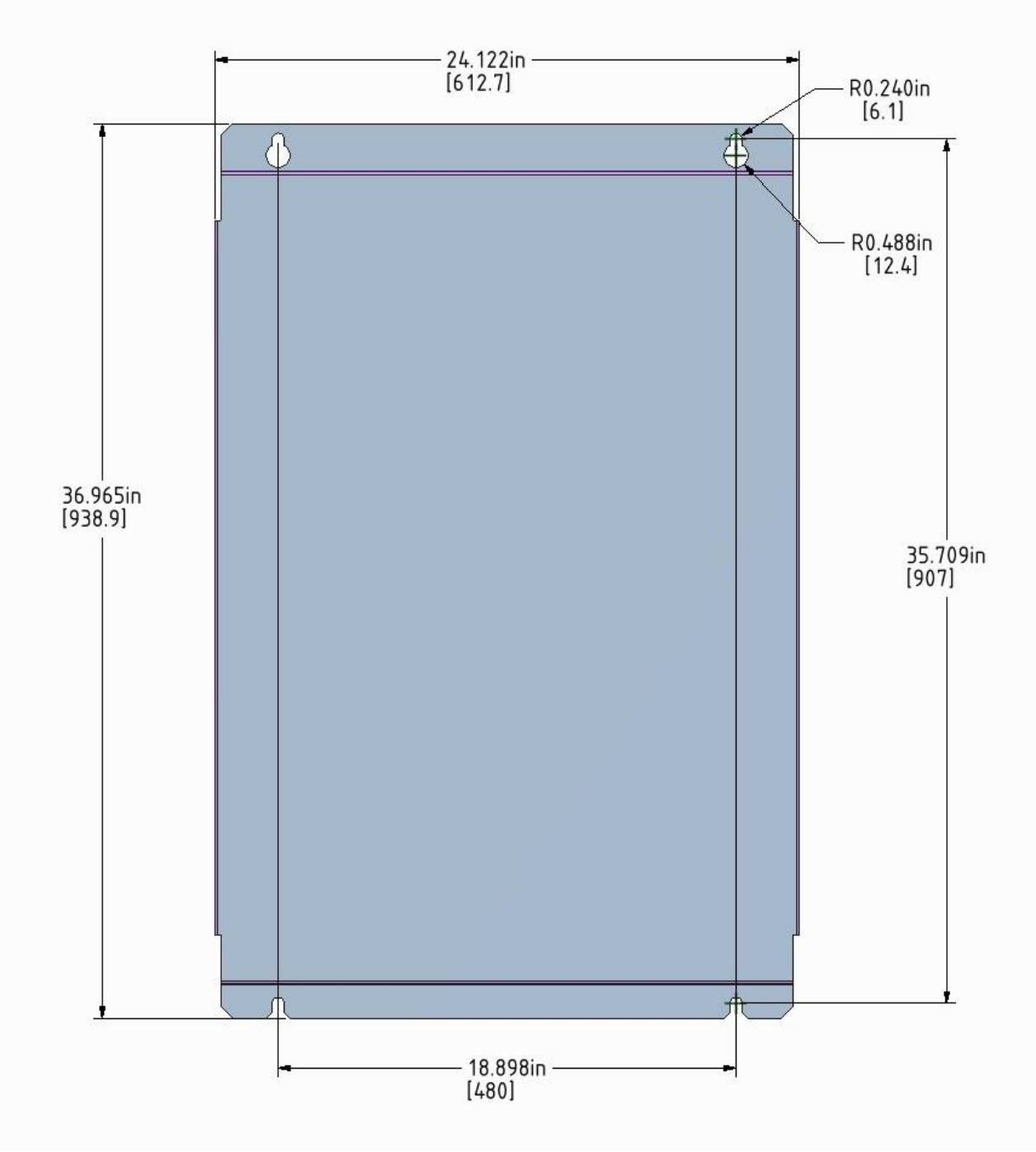


Figure 3.1: The dimensions for mounting the analyzer.

3.5 SAMPLE CONNECTIONS

Figure 3.2: Sample Connections.

3.6 ELECTRICAL CONNECTIONS

General information:

- The electrical installation should be carried out by qualified personnel in accordance with national or local regulations. Qualified Personnel means a person who has been fully trained and has professional experience to avoid electrical hazards and dangers.
- Before servicing the analyzer or its parts that are electrically powered, turn off power to avoid risks of electrocution.
- To turn off power from an electrical device, it is necessary to interrupt the power line using a circuit breaker or an isolating switch to be sure that there is no power in the area to be serviced.
- Protection against indirect contacts is guaranteed by efficient grounding of all isolated metal masses.

Users and qualified maintenance personnel must proceed as follows:

- Be careful of electrical shock and/or electrocutions labels placed on the analyzer.
- Always isolate power before servicing the analyzer.

In case of loss of power, the analyzer stops and automatically restarts into standby mode as soon as power is restored.

No maintenance should be carried out inside the transmitter without first switching off the power.

3.6.1 TRANSMITTER ENCLOSURE

The electronics are housed in the transmitter enclosure which has a protection rating of IP67 (NEMA 6). In order to maintain that level of protection, all communications and power cables passing through the transmitter enclosure must use the appropriate cable glands.

To gain access to the terminal block connections for power and communications, the lower panel on the front of the transmitter can be removed by unscrewing the six screws holding the panel in place.

Figure 3.3: Transmitter enclosure.

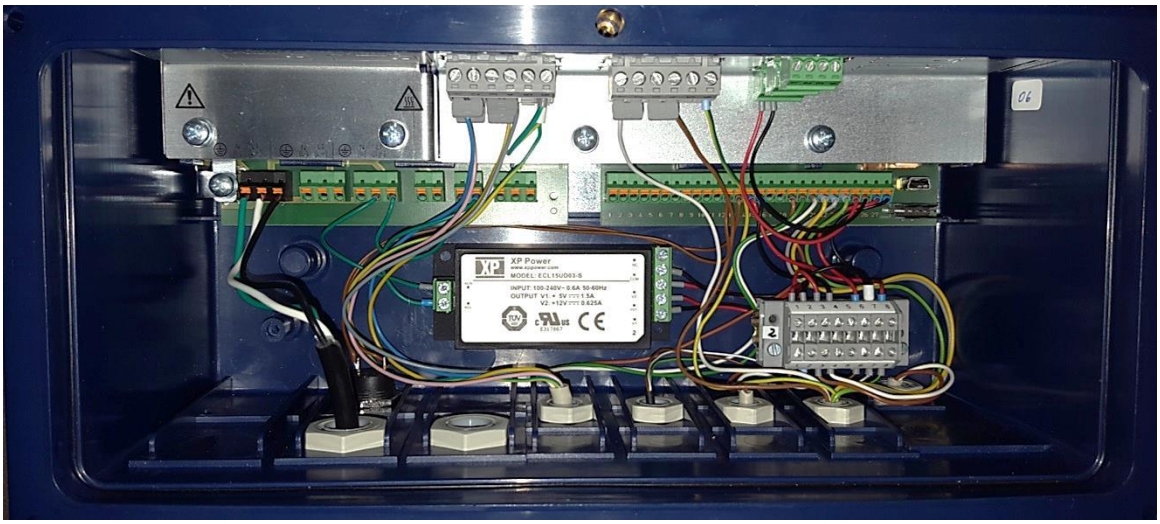


Figure 3.4: Electrical connections inside the transmitter housing.

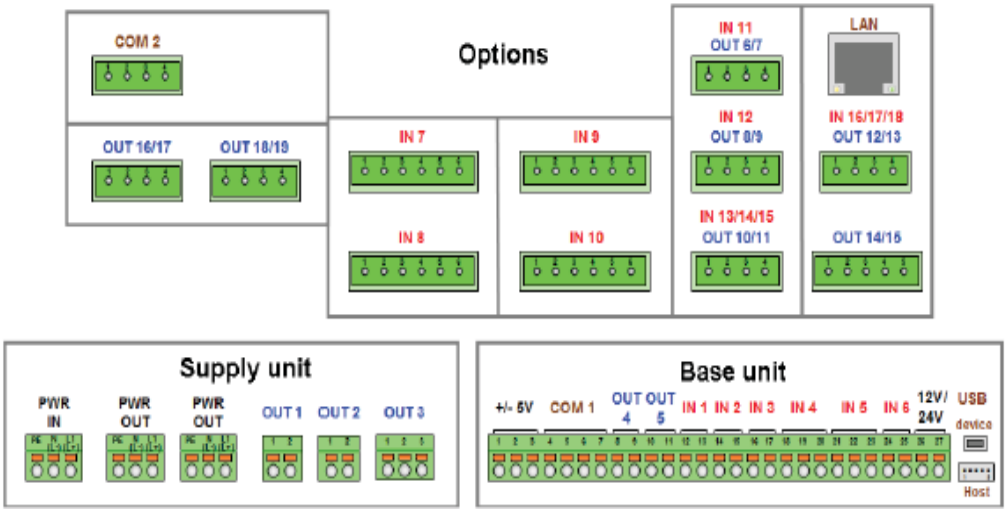


Figure 3.5: Terminal block diagram for electrical connections inside transmitter housing.

3.6.2 TERMINAL BLOCK CONNECTIONS

The terminal block connectors for making electrical connections to the Supply unit and Base unit have push-in spring connections. Connectors for the Options Boards are screw terminal blocks.

Figure 3.6: Push-In Spring Connector (Left) and Screw Connector (Right).

The following guidelines should be followed when making connections to avoid damaging the connectors and to ensure good electrical contact is made.

Maximum wire guage thickness for power input wire to Supply Unit connections: 10
Maximum wire guage thickness for Base Unit connections: 12
Maximum wire guage thickness for Options Boards connections: 12

Note: Attempting to use thicker guage wire may result in damage to the wire, terminal block, and electronics board.

To install wires to the push-in spring terminal blocks:

1. Prior to installing the wires to the push-in spring terminal blocks of the power supply unit and the base unit, the wire coating should be stripped back approximately ¼” to expose

the wire strands. The exposed wire should be soldered or a crimping tab should be used.
2. The wire can be inserted into the terminal block hole and pushed in fully.
3. The wire should be locked in the connector; gently tugging on the wire can confirm the wire has been isntalled correctly.

Disconnecting wires from the push-in spring terminal blocks:

1. Insert a small flat head screwdriver into the release slot.
2. Push the screwdriver into the release slot to release the wire lock. While still pushing on the lock release, the wire can be pulled out of the terminal block.
3. Note: Attempting to pull the wire out of the terminal block without release the wire lock may result in damage to the wire, terminal block, and electronics board.

To install wires to the screw terminal blocks:

1. Remove the terminal block connector by pulling it out.
2. Loosen the screw.
3. Insert wire into the connector and tighten screw.
4. Push connector back into place and gently tug on wire to confirm the wire is in place.

To remove wires from the screw terminal blocks:

1. Remove the terminal block connector.
2. Loosen the screw and remove wire.

3.6.3 AC POWER CONNECTION

The Waltron 9096 Degassed Cation Conductivity Analyzer is designed for operation with 110-220Vac, 48-63 Hz power. All the connections must be made in accordance with national or local regulations. It is always recommended that the analyzer is connected to the mains via a circuit breaker or an isolating switch installed near the unit.

To make changes to the AC power connections, it is necessary to remove the electronics enclosure cover. The AC power cable should be fed through the left-hand most cable gland on the bottom of the transmitter housing. The AC power connections are fed to a connector that sends the power to the analyzer. The connections are shown below.

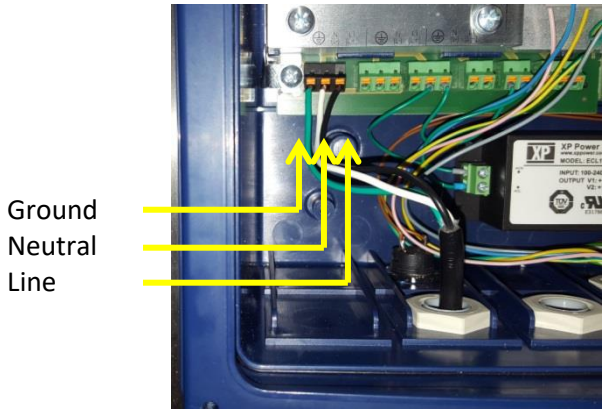


Figure 3.7: Power connections inside the transmitter housing.

3.6.4 USER SIGNAL CONNECTIONS

The analyzer provides several terminal blocks inside the transmitter enclosure. It allows the operator to connect to an external device, monitor the 4-20mA ouputs and monitor alarm relays.

Table 3.1: Terminal block pin locations.

Input/Output	Module	Terminal	Description
Inputs	Power supply unit	PWR IN	Main voltage supply
	Base unit	IN 1 Binary	Maintenance switch
	Base unit	IN 2 Binary	Flow measurement
	Base unit	IN 4 Analog	Temp. Ion exchanger
	Base unit	IN 5 Analog	Temp. DC-sensor
	Option board	IN 7 Analog	SC Sensor
	Option board	IN 8 Analog	CC sensor
	Option board	IN 9 Analog	DC sensor
Outputs	Power supply unit	PWR OUT	AC/DC Power supply pumps +5 V DC
	Power supply unit	OUT 1 Binary	Flow alarm
	Power supply unit	OUT 2 Binary	Turn on pumps
	Base unit	OUT 4 Analog	4-20 mA; SC conductivity
	Base unit	OUT 5 Analog	4-20 mA; CC conductivity
	Option board	OUT 6 Analog	4-20 mA; DC conductivity
	Option board	OUT 8 Analog	4-20 mA; pH calculation
	Option board	OUT 10 Analog	0-20 mA; calculated resin consumption

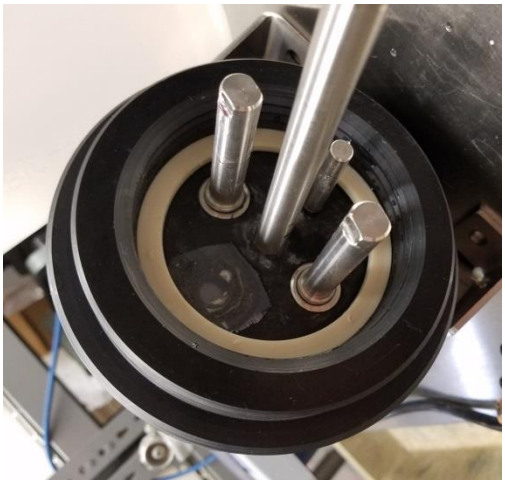
4 ANALYZER INITIAL START-UP

Before proceeding with analyzer start-up it is absolutely necessary to check that all procedures for a proper installation have been followed. Please verify that all the suggestions and recommendations have been followed.

4.1 PREPARING THE ANALYZER FOR START-UP

4.1.1 INSTALLING CATION RESIN BOTTLE

Step	Illustration	Description
1		Note the date and time you are exchanging the resin bottle.
2		Remove cap from new bottle of resin. Resin has been pre-rinsed.
3		Inside the cap is a gasket; remove it from the cap.

4		Place the gasket into the bottle holder assembly. Make sure that the gasket and bottle holder assembly mating surfaces are free of resin beads.
5		Install the bottle by threading the top of the bottle into the bottle holder assembly. Tighten about ¼ turn after the top of the bottle contacts the gasket. Note: If it leaks slightly, it can be tightened further until it stops leaking.

4.1.2 INSTALLING DECARBONIZATION COLUMN

Step	Illustration	Description
1		Note the date and time that you are installing the cartridge.
2		Remove plugs covering the inlet (bottom or cartrdige) and outlet (top of cartridge) holes of the new cartridge.
3		Screw the new cartridge into place.

4.2 PUTTING THE ANALYZER ONLINE

Once the analyzer has been installed, electrical connections, and sample connections have been made, the analyzer is ready for online measurement.

Turn on sample flow to the analyzer and adjust to 8-10L/hr (130-170ml/min). The analyzer will begin to display measurement readings for the specific, cation, and degassed cation conductivities, as well as the calculated pH. It will take about 1 hour of online sample flow until the measurements are accurate. In order for the degassing column to operate correctly, a small amount of sample flow must discharge contantly from the overflow chamber into the drain cup.

It is important to note that if Waltron's pre-rinsed resin is not used, it may take anywhere from several hours to several days for the cation and degassed cation conductivities to read correctly.

5 USER INTERFACE

5.1 USER INSTRUCTIONS

The user's interface consists of the touchscreen located on the front panel of the transmitter enclosure. All the output/input data, information, alarms and fault conditions are shown on the display while all the commands and settings may be transferred to the analyzer by simply pressing the touchscreen buttons.

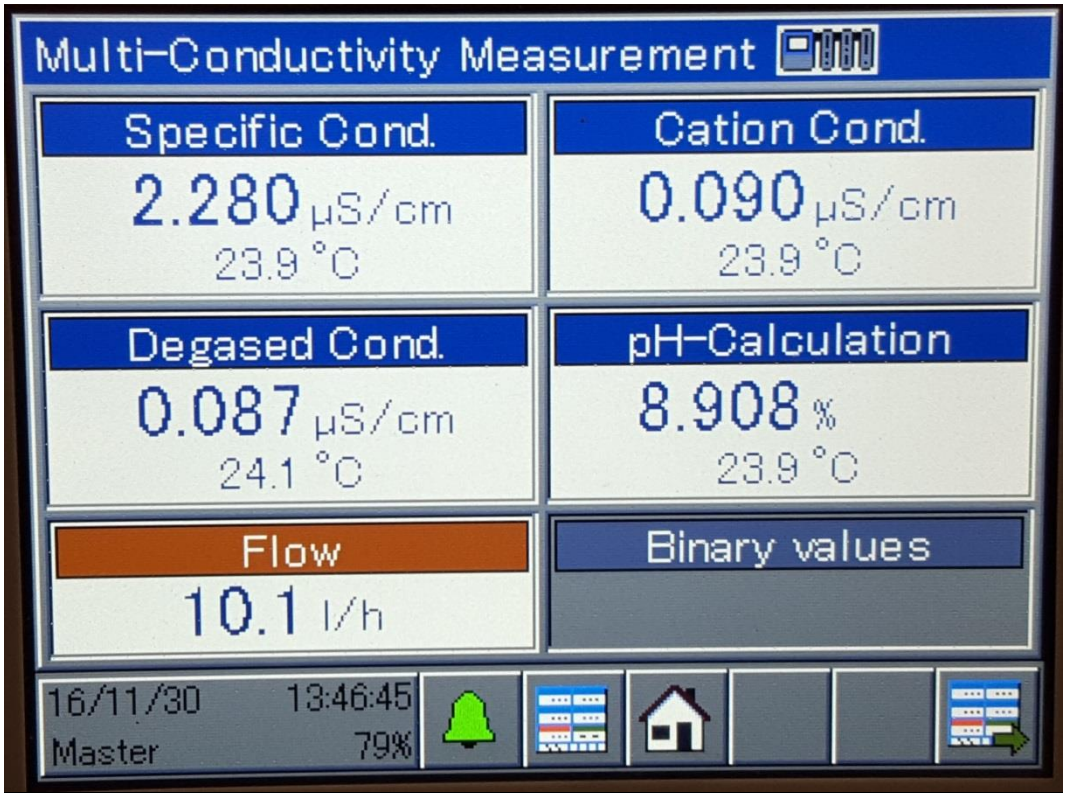
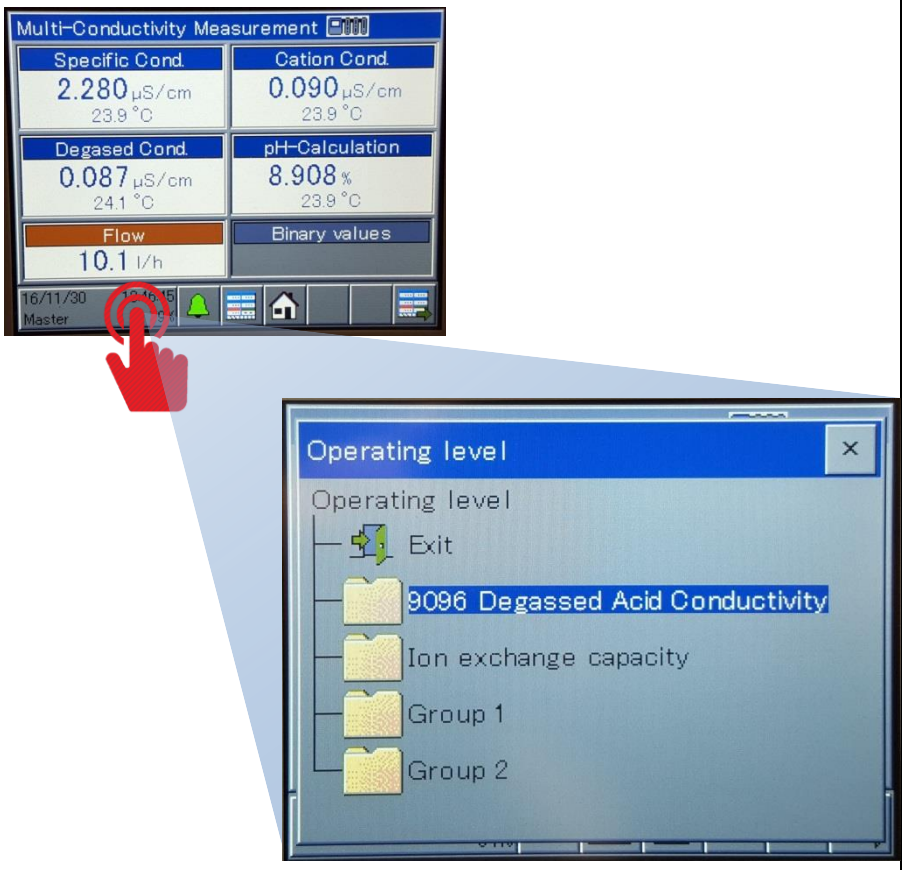


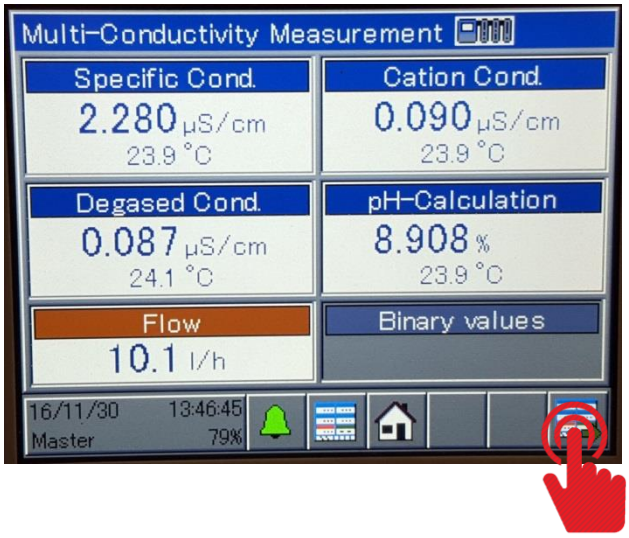
Figure 5.1: User interface main display screen.

5.2 MAIN SCREEN NAVIGATION

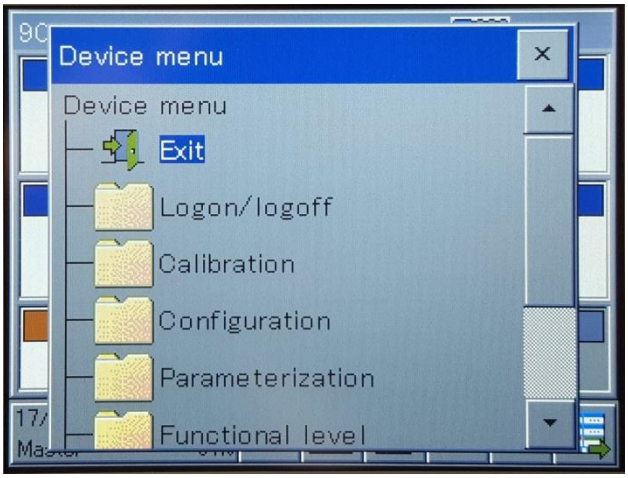
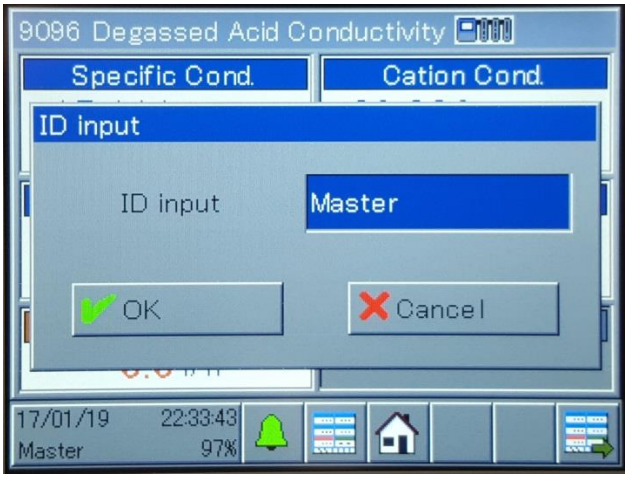
The main screen displays:

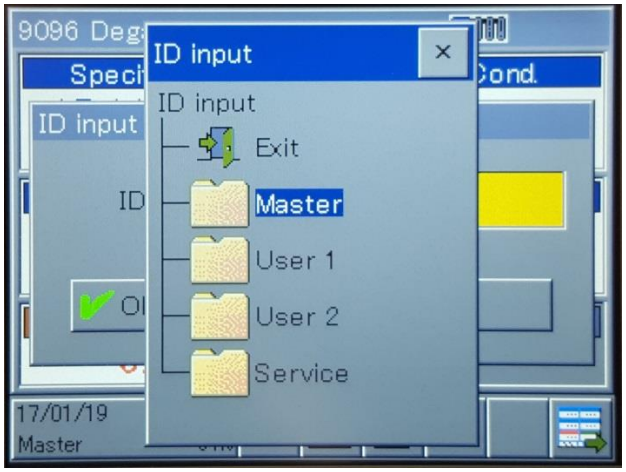
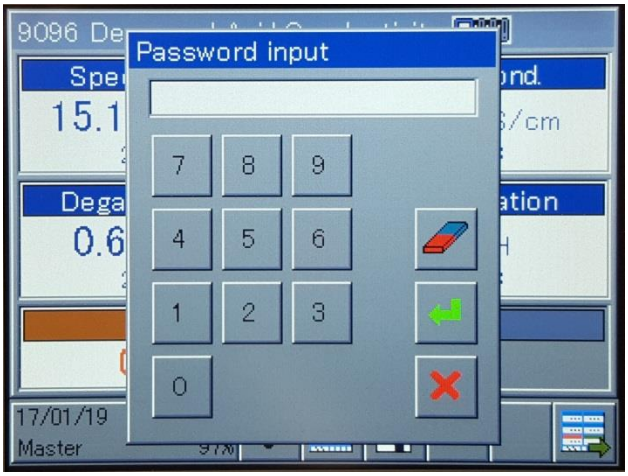
- Specific Conductivity
- Cation Conductivity
- Degassed Cation Conductivity
- Calculated pH
- Flowrate
- Temperature

Action	Display
Pressing the box in the lower left hand corner of the main screen will bring up the Operating Level Menu. Selecting the first option, *9096 Degassed Acid Conductivity*, will return to show the main display screen with all measured values displayed.	
Selecting the second option from the Operating Menu, *Ion Exchange Capacity,* will show the calculated life of the resin remaining before it will need to be replaced.	

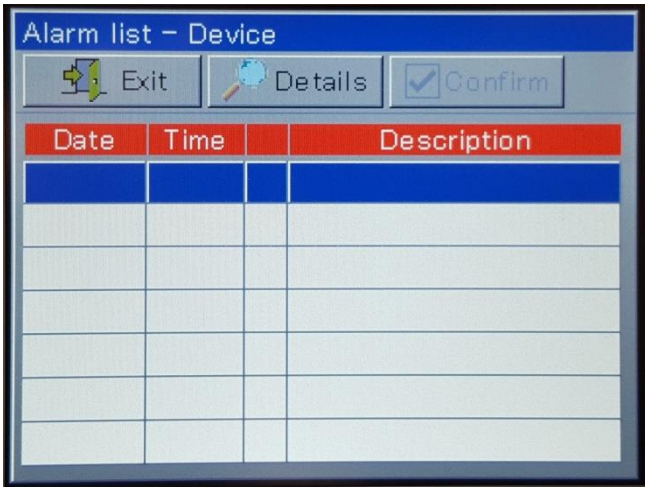
Selecting the third option from the Operating Menu, *Group 1,* will show a data chart that shows recent trends for each of the measured values.	
Selecting the fourth option from the Operating Menu, *Group 2,* will show a data chart that shows recent trends for each of the temperature values.	
Alternatively, pressing the button in the lower right hand corner of the main measurement screen will toggle through the above mentioned views.	

5.3 USER LOG ON NAVIGATION

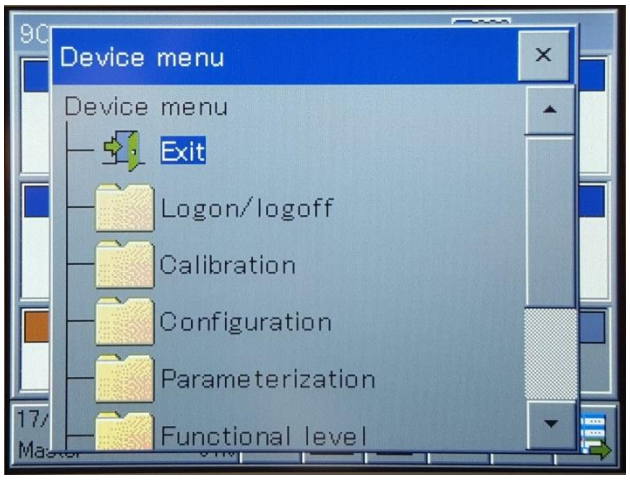
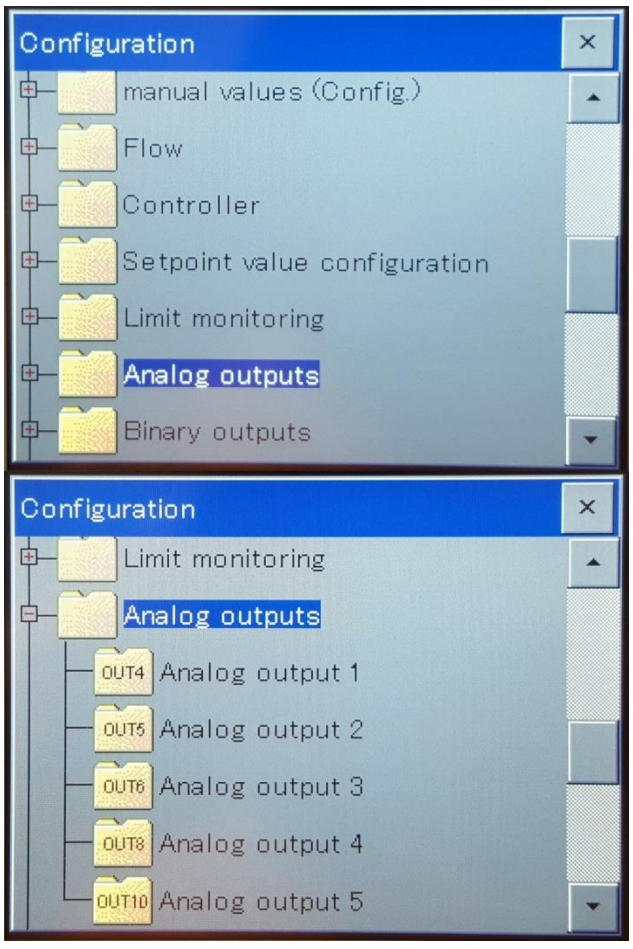
Action	Display
It is necessary to logon using a password to access some configurable parameters. Press the box in the lower left hand corner of the display to open the Device Menu and select logon/logoff.	
To logon, press the logon button.	
An ID input box will appear and pressing the input box where master is shown will provide options for the logon ID that will be used.	

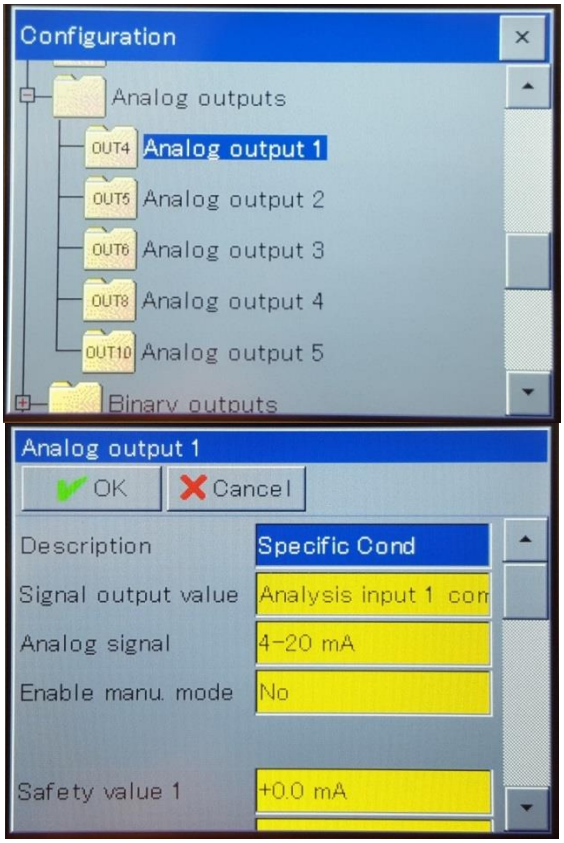
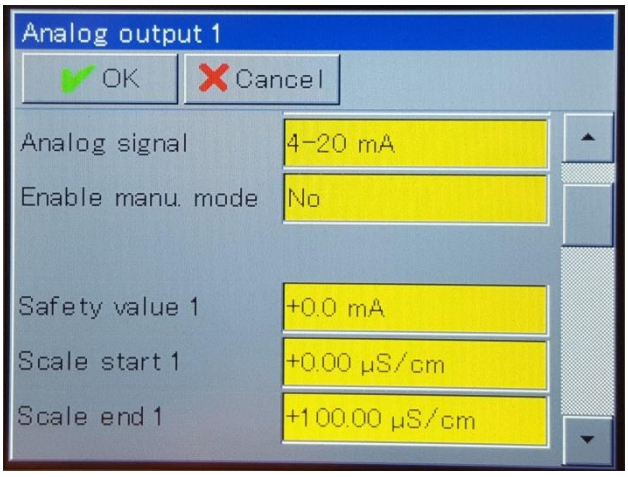
Select the appropriate logon ID.	
Type in the correct password and press the Enter button. Appropriate access (based on logon id used) will now be granted and the user will have permissions available to them.	

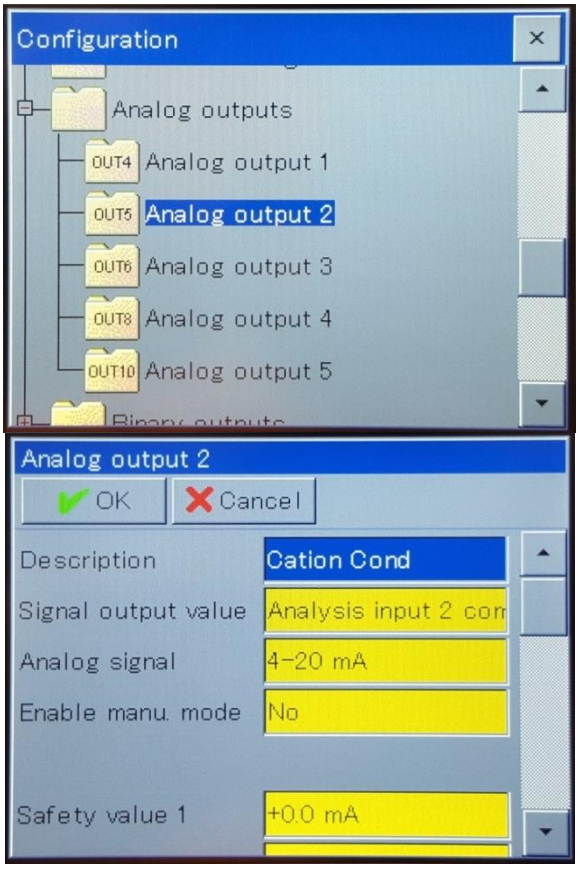
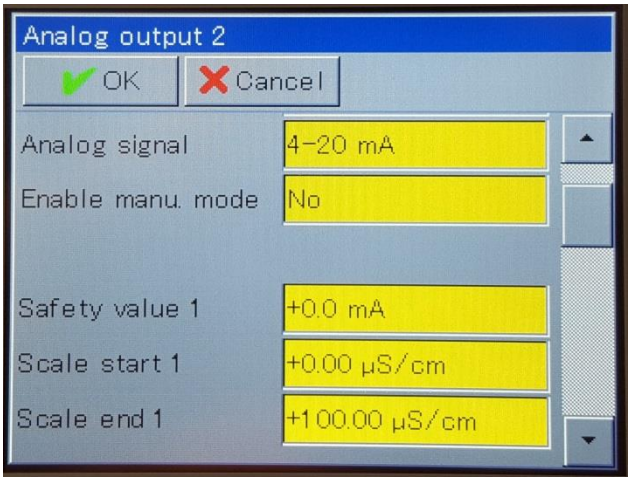
5.4 ALARM LOG

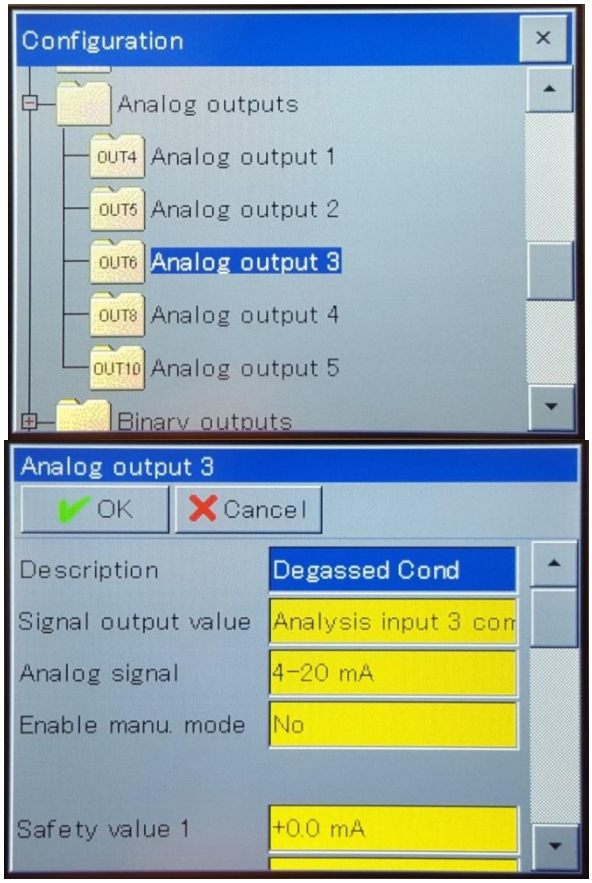
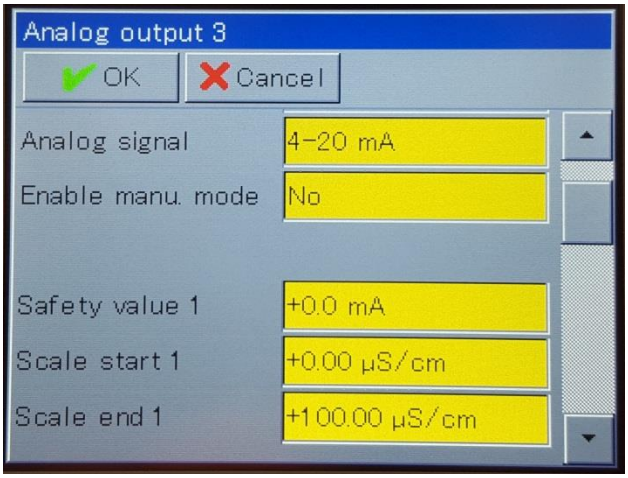
Action	Display
The alarm log tracks alarms that have been triggered and provides details about their occurence. To access the alarm log, press the bell icon along the bottom of the main display screen. Choosing alarm list will bring up the alarm log.	
The alarm log lists all alarms by date and time along with a brief description. Selecting an alarm will highlight that row blue. Once an alarm is selected, the Details button can be pressed to show more information about the alarm. Pressing the confirm button while an alarm is highlighted will acknowledge the alarm and remove it from the list.	

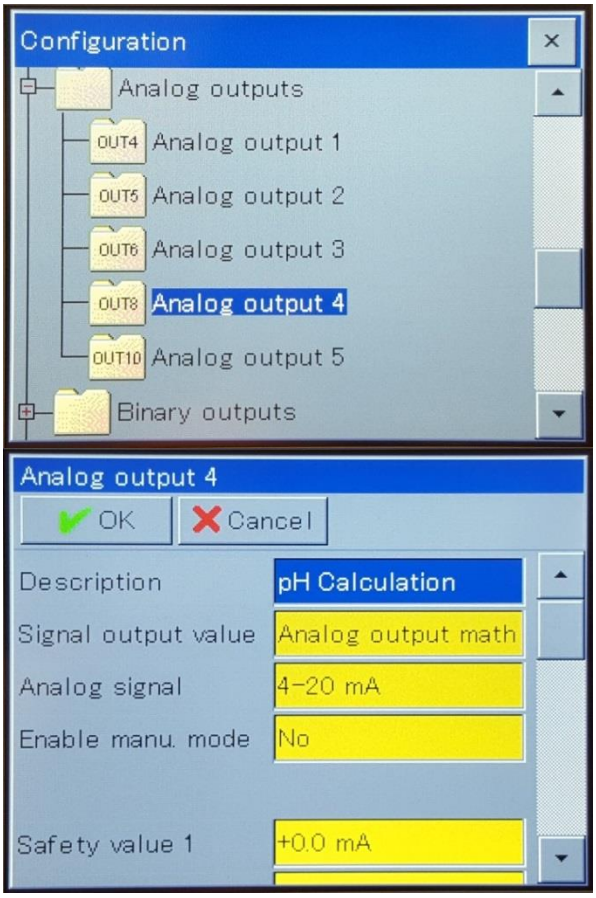
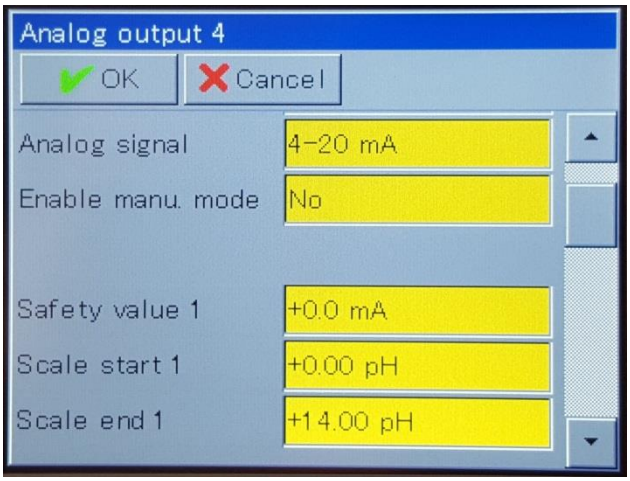
5.4.1 ANALOG OUTPUTS

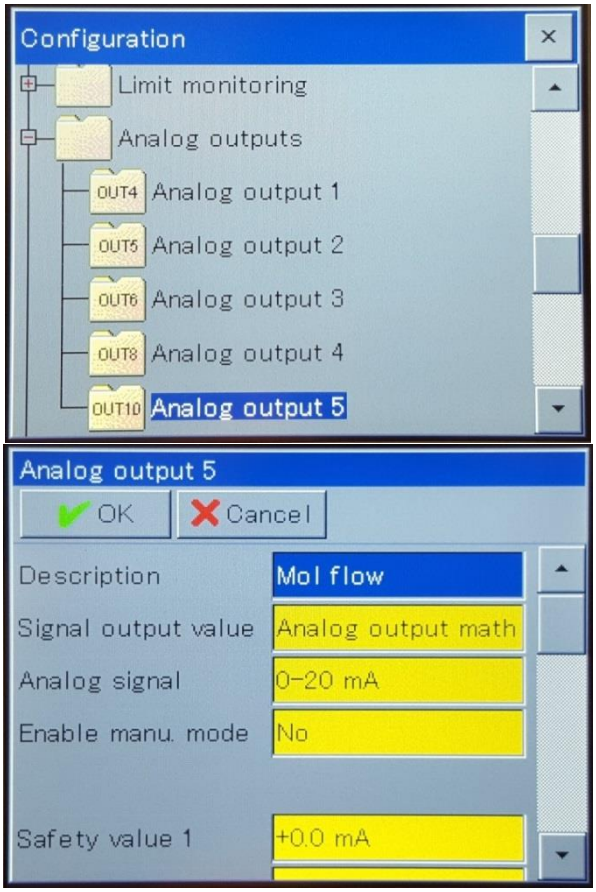
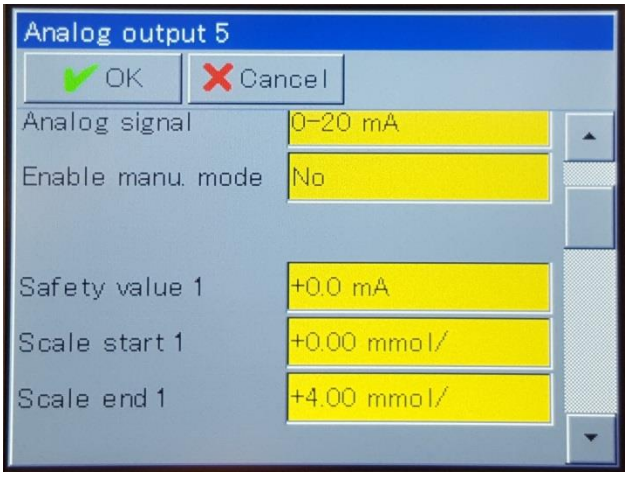
Action	Display
The anaylzer is equipped with multiple analog outputs which can be configured for output type and scaling. In order to change these settings, the user will need to logon. Open the main device menu by pressing the bottom left hand corner of the main display screen.	
Select the configuration menu, and then scroll down to Analog Outputs.	

Select Analog output 1 to bring up the configuration for the Specific Conductivity signal output. Pressing the yellow box to the right of Analog Signal will show a list of available output signal types (4-20mA, 0-20mA, 0-5V, etc).	
Pressing the Scale Start 1 box will allow the user to input a value that will match the low range of the output (4mA). Pressing the Scale End 1 box will allow the user to input a value that will match the high range of the output (20mA). Pressing OK will return to the previous menu and save any changes made to the configuration. Pressing Cancel will return the previous menu without saving any changes that were made.	

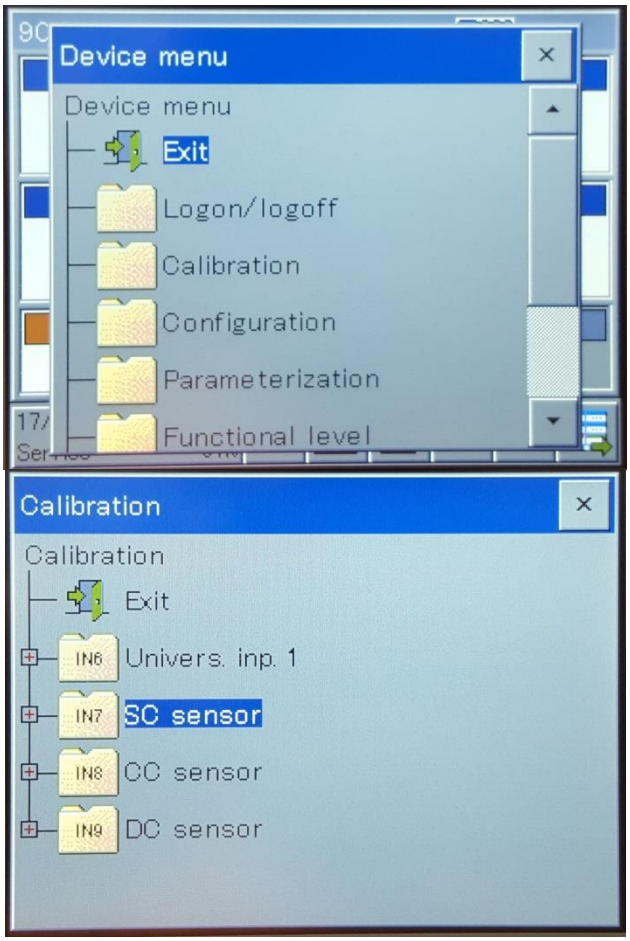
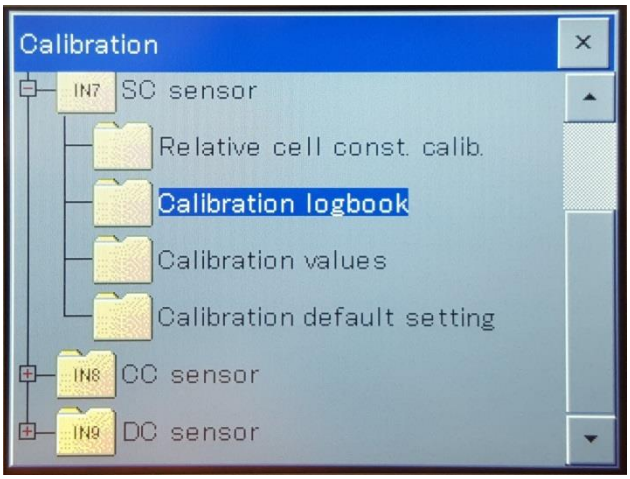
Select Analog output 2 to bring up the configuration for the Cation Conductivity signal output. Pressing the yellow box to the right of Analog Signal will show a list of available output signal types (4-20mA, 0-20mA, 0-5V, etc).	
Pressing the Scale Start 1 box will allow the user to input a value that will match the low range of the output (4mA). Pressing the Scale End 1 box will allow the user to input a value that will match the high range of the output (20mA). Pressing OK will return to the previous menu and save any changes made to the configuration. Pressing Cancel will return the previous menu without saving any changes that were made.	

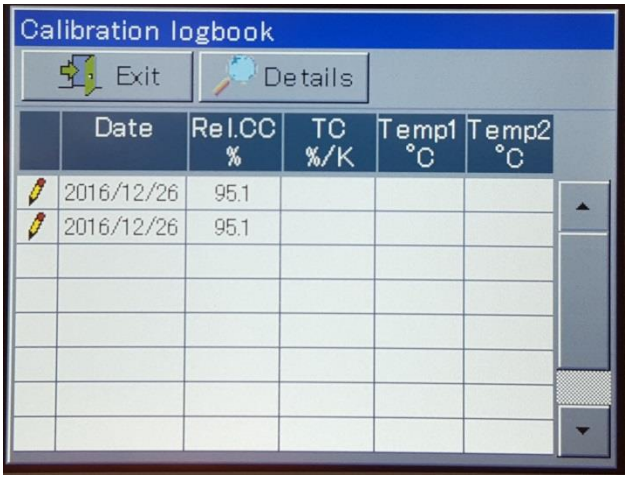
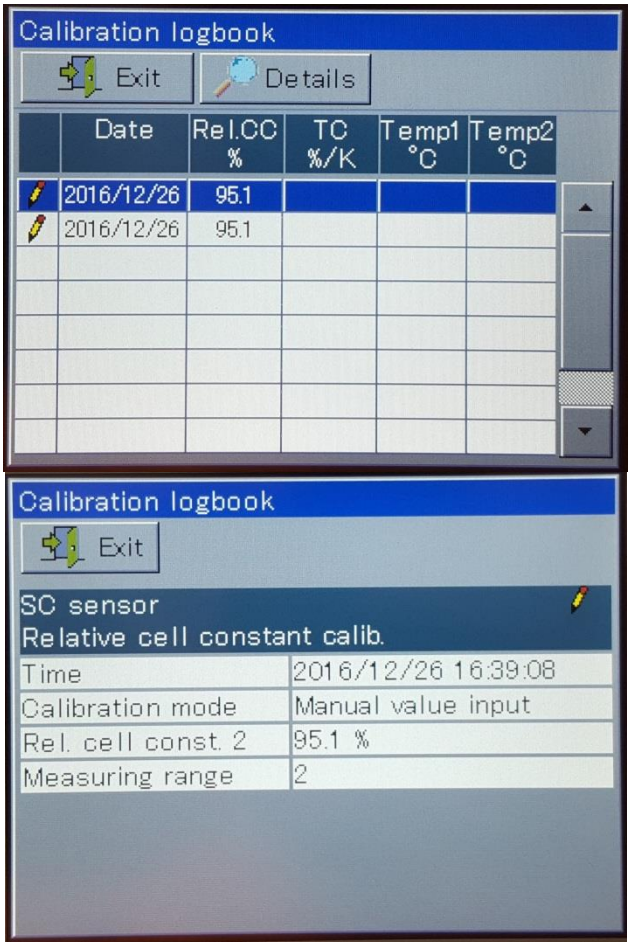
Select Analog output 3 to bring up the configuration for the Degassed Cation Conductivity signal output. Pressing the yellow box to the right of Analog Signal will show a list of available output signal types (4-20mA, 0-20mA, 0-5V, etc).	
Pressing the Scale Start 1 box will allow the user to input a value that will match the low range of the output (4mA). Pressing the Scale End 1 box will allow the user to input a value that will match the high range of the output (20mA). Pressing OK will return to the previous menu and save any changes made to the configuration. Pressing Cancel will return the previous menu without saving any changes that were made.	

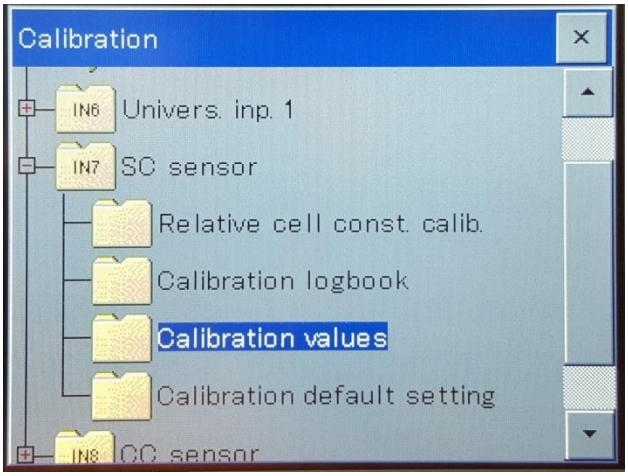
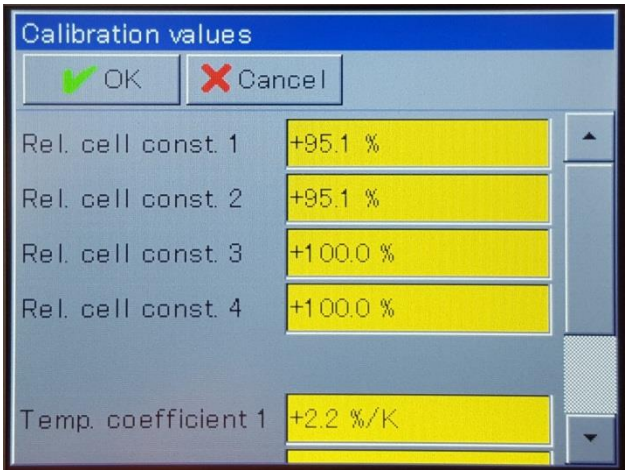
Select Analog output 4 to bring up the configuration for the calculated pH signal output. Pressing the yellow box to the right of Analog Signal will show a list of available output signal types (4-20mA, 0-20mA, 0-5V, etc).	
Pressing the Scale Start 1 box will allow the user to input a value that will match the low range of the output (4mA). Pressing the Scale End 1 box will allow the user to input a value that will match the high range of the output (20mA). Pressing OK will return to the previous menu and save any changes made to the configuration. Pressing Cancel will return the previous menu without saving any changes that were made.	

Select Analog output 5 to bring up the configuration for the resin consumption signal output. Pressing the yellow box to the right of Analog Signal will show a list of available output signal types (4-20mA, 0-20mA, 0-5V, etc).	
Pressing the Scale Start 1 box will allow the user to input a value that will match the low range of the output (4mA). Pressing the Scale End 1 box will allow the user to input a value that will match the high range of the output (20mA). Pressing OK will return to the previous menu and save any changes made to the configuration. Pressing Cancel will return the previous menu without saving any changes that were made.	

5.4.2 CALIBRATION MENU

Action	Display
Open the main device menu by pressing the bottom left hand corner of the main display screen. The Calibration folder contains folders for the Specific Conductivity (SC), Cation Conductivity (CC), and Degassed Cation Conductivity (DC) sensors.	
Select the desired sensor and select Calibration Logbook. The calibration logbook will show the date and result for the sensor's calibration history.	

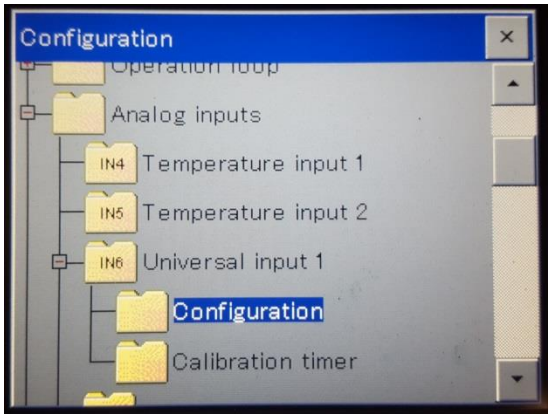
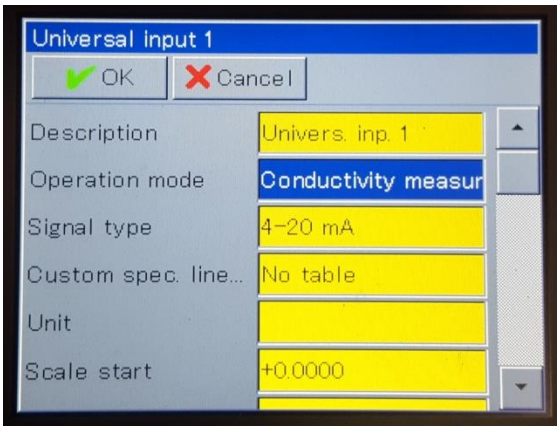
	
Selecting one of the calibrations and pressing the Details button will provide additional information about the date, time, and type of calibration that was performed.	

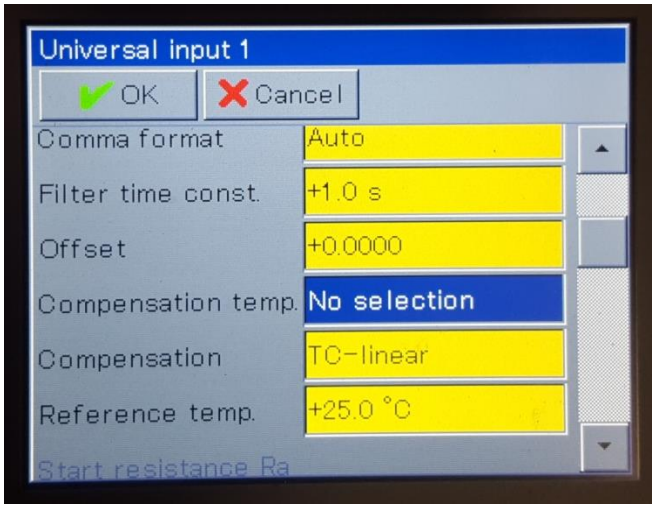
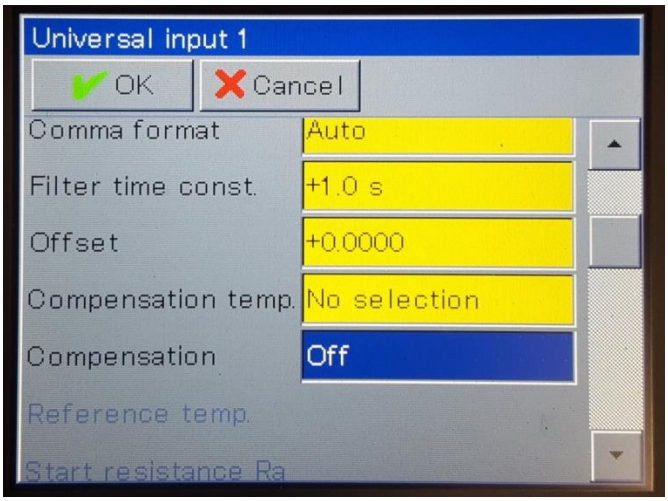
Select Calibration Values to view the cell constant for the conductivity sensor.	
The current cell constants for that conductivity sensor are shown.	

5.5 CONFIGURATION

5.5.1 TEMPERATURE COMPENSATION

To configure temperature compensation on the conductivity measurement depending on chemicals used follow the procedure below.

Action	Display
Configuration of the temperature compensation requires log in access of at least the Service Level. Access the Configuration Menu by pressing the bottom left hand corner of the main display screen to open the main device menu and selecting Configuration.	
From the Configuration menu select Analog Inputs > Universal Input 1 > Configuration.	
Press the yellow box for Operation mode and select Conductivity Measurement from the list of options.	

Press the yellow box next to Compenstation temp. to select the analog input of the compensation thermometer from the list.	
Press the yellow box next to compensation to select the type of temperature compensation from the list. The options are as follows: TC linear, TC-curve, natural water, natural water with expanded temperature range, ASTM neutral, ASTM acid, ASTM alkaline, NaOH 0 to 12 %, NaOH 25 to 50 %, HNO3 0 to 25 %, HNO3 36 to 82 %, H2SO4 0 to 28 %, H2SO4 36 to 85 %, H2SO4 92 to 99 %, HCL 0 to 18 %, HCL 22 to 44 %	
Pressing the OK button will save configuration changes. Pressing Cancel will return to the previous screen without saving any of the changes made.	

6 OPERATION

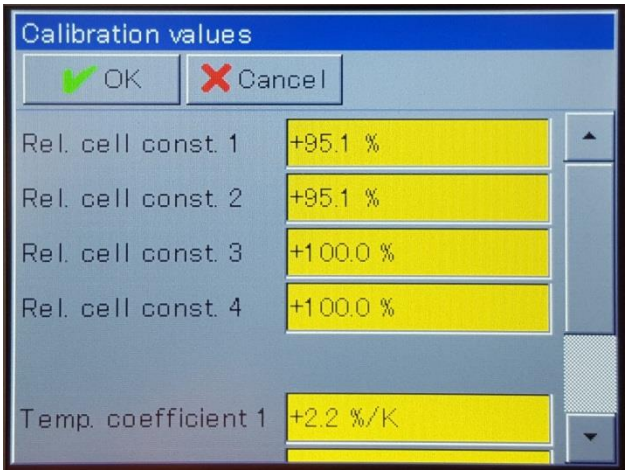
The analyzer is always in “online” mode and disaplying current conductivity measurements.

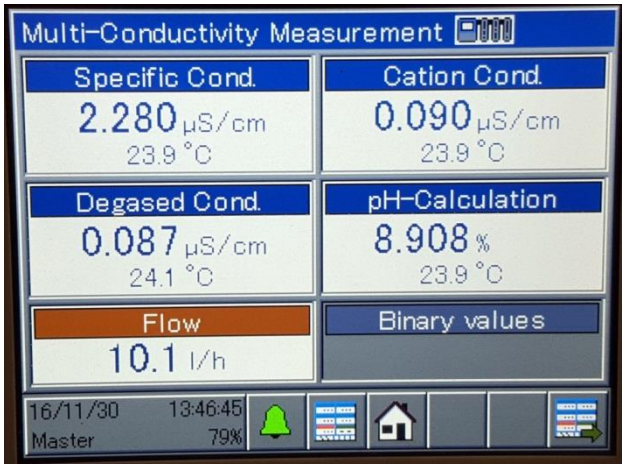
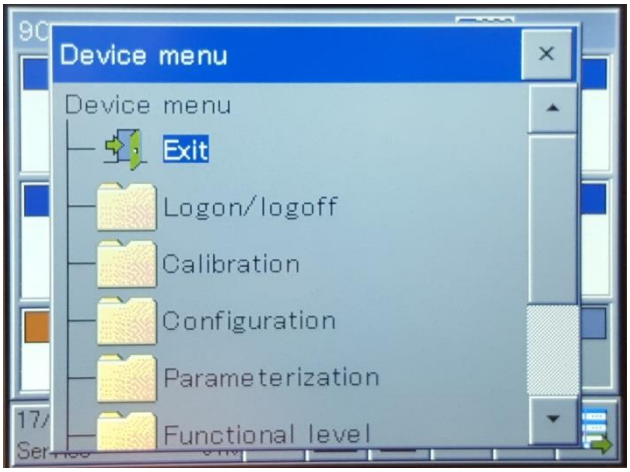
6.1 CALIBRATION

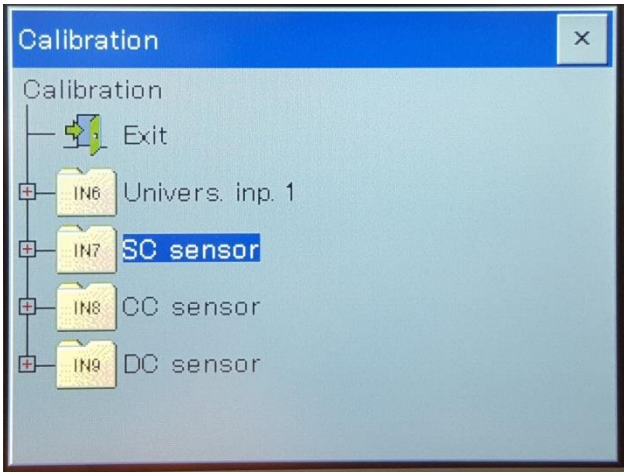
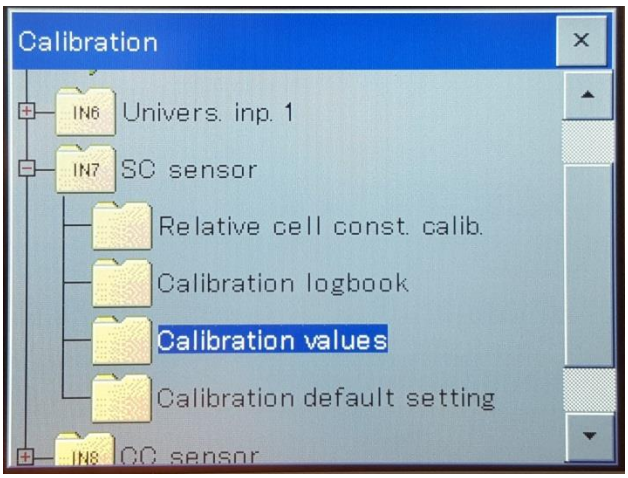
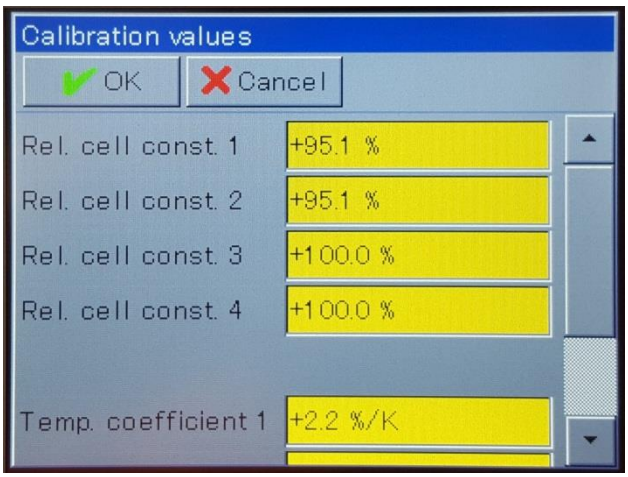
A process calibration can be performed for both the specific and cation conductivity sensors of the analyzer. The calibration will require the known specific and cation conductivity readings of the measured sample in uS/cm from a secondary measurement device. These readings will be used to calculate the new cell constant which can then be input into the analyzer. The formula for calculating the new cell constant is as follows:

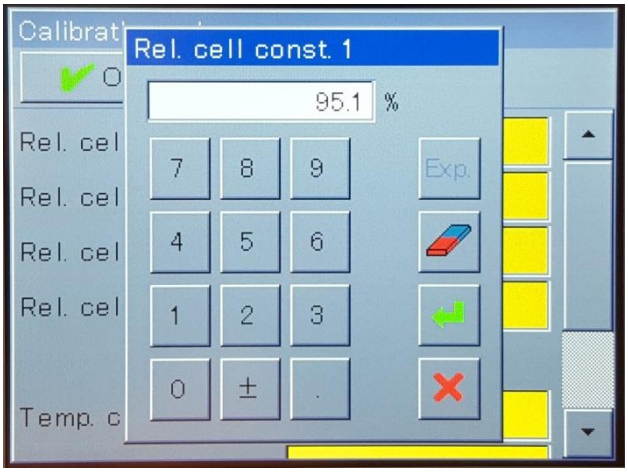
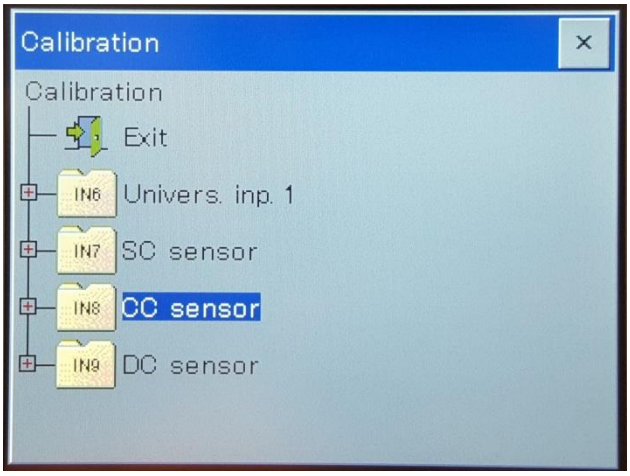
$$k_{new} = k_{old} * (\frac{\kappa_{new}}{\kappa_{old}})$$

where k_{new} is the new cell constant that will be calculated, k_{old} is the existing cell constant programmed into the analyzer, κ_{new} is the known conductivity reading from the secondary measurement device, and κ_{old} is the conductivity reading that the analyzer is currently displaying.

Action	Display
Determine the current cell constant value of the conductivity sensor. Follow the instructions in section 5.4.2 for the calibration menu of the user interface to acess the calibration values page. The percentage listed for Rel. cell const. 1 should be noted and will be the value for k_{old} in the equation.	
Obtain the known conductivity of the measured sample (in uS/cm). This will be the value for κ_{new} in the equation.	Use of a secondary conductivity measurement device is required.

Record the current specific or cation conductivity reading (depending on which of the sensors is being calibrated) that the analyzer currently displays on the main screen. This will be the value for κ_{old} in the equation.	
Calculate the new cell constant using the calibration formula. Once the new cell constant is calculated, the value must be input into the analyzer.	$$k_{new} = k_{old} * \left(\frac{\kappa_{new}}{\kappa_{old}}\right)$$ $$New\ Cell\ Constant = Current\ Cell\ Constant \left(\frac{Known\ Conductivity\ Measurement}{Current\ Conductivity\ Reading}\right)$$
Open the main device menu by pressing the bottom left hand corner of the main display screen. The Calibration folder contains folders for the Specific Conductivity (SC), Cation Conductivity (CC), and Degassed Cation Conductivity (DC) sensors.	

	
Select Calibration Values for the sensor that is being calibrated.	
Pressing the yellow box for Rel. Cell const. 1 will bring up a number pad which can be used to input the new cell constant value that was calculated. Press the green enter button to confirm the input. The new cell constant value must also be input into the Rel. Cell const. 2 field. Once both fields have been updated with the new value, press the OK button to save. Pressing cancel will exit the menu without	

saving any changes that were made.	
The entire procedure above can be repeated for the Cation Conductivity sensor. Note: the DC sensor relies on the CC sensor calibration and does not need to be calibrated individually.	

6.2 FLOWMETER CALIBRATION

1. Set flow to analyzer and ensure a constant flowrate.
2. Record the flowrate measured by the analyzer ($Flow_{display}$)
3. Place outlet drain tubing into graduated cylinder and start timer.
4. After 1 minute, remove drain tubing from graduated cylinder and record volume of water.
5. Convert the measured volume from mL/min to L/hr ($Flow_{measured}$).
6. Login to the transmitter with the Service password of 3000.
7. From the main menu, select Configuration -> Flow -> Flow 1.
8. Use the formula below to calculate the new flow meter calibration value.

$$k_{new} = k_{current} \times \left(\frac{Flow_{display}}{Flow_{mesaured}}\right)$$

9. Set new calibration value (k factor).
10. Exit the menu back to the main display screen to save the calibration value.

7 MAINTENANCE

7.1 SCHEDULED MAINTENANCE

Basic maintenance of the Waltron 9096 Analyzer requires that the cation resin bottle and soda lime cartridge be replaced periodically. In addition, the user should perform a regular 'visual overall-check' of the wet section for immediate corrective measures, e.g. in case of leaks etc. Cleaning of the analyzer components is best performed using a soft, non-aggressive cleaner.

The use of a logbook for cataloging consumable replacement, corrective measures and scheduled maintenance is strongly recommended.

During the performance of the basic maintenance work, as described in this chapter, the analyzer can not be operational. Prior to the maintenance work, all necessary precautions regarding personal safety (protective clothing, safety glasses etc.) are to be taken into consideration. Always be sure to label and rinse all connected tubing with water prior to removal.

List of scheduled maintenance:

Visual checks

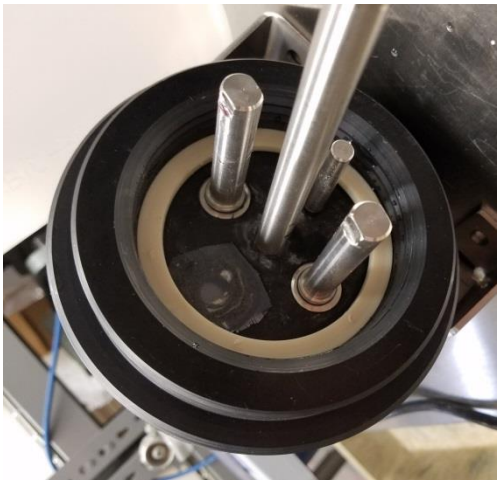
- Visually check for leaks in the system
- Visually check status of the cation resin and soda lime by monitoring color change

Monthly

- Replace cation resin bottle (see section 7.2)
- Replace soda lime cartridge (see section 7.3). The soda lime should change from white to a light purple color as it is consumed.

7.2 REPLACING CATION RESIN

Step	Illustration	Description
1		Note the date and time you are exchanging the resin
2		Press and hold the maintenance switch on the bottom of the transmitter for 2 seconds to hold the 4-20mA outputs and reset the remaining resin counter.
3		Turn off sample flow to the analyzer and remove the old resin bottle from the analyzer.
4		Remove cap from new bottle of resin. Resin has been pre-rinsed.

5		Inspect the gasket in the analyzer bottle holder assembly and replace if necessary. Make sure that the gasket and bottle holder assembly mating surfaces are free of resin beads.
6		Install the new bottle of resin by screwing the bottle into place. Tighten about ¼ turn after the top of the bottle contacts the gasket. Note: If it leaks slightly, it can be tightened further until it stops leaking.
7		Turn on sample flow to the analyzer and wait for approximately one hour for the Cation Conductivity and Degassed Cation Conductivity readings to drop to the expected value.

7.3 REPLACING DECARBONIZATION CATRIDGE

Step	Illustration	Description
1		Note the date and time that you are exchanging the soda lime.
2		Unscrew the exisiting cartridge from the housing block.
3		Remove plugs covering the inlet (bottom or cartrdige) and outlet (top of cartridge) holes of the new cartridge.
4		Screw the new cartridge into place.

8 SPARE PARTS

Table 8.1: Consumables Parts Listing.

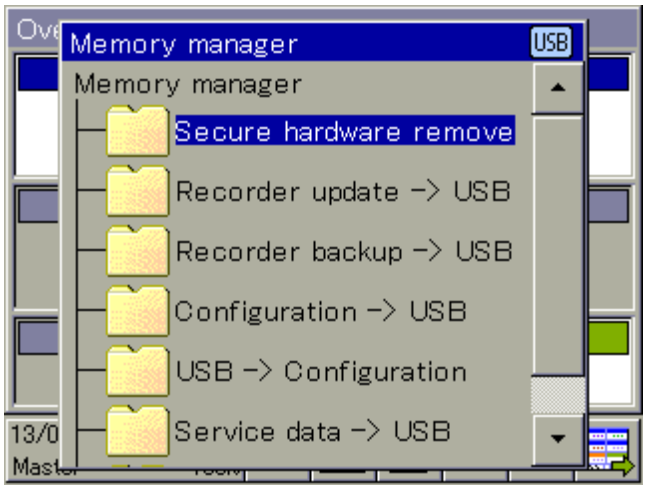
Description	Part Number
Soda Lime Replacement Cartridge (with soda lime)	W1234-606A
Pre-Rinsed Resin Bottle (with resin)	W1234-609

Table 8.2: Spare Parts Listing.

Description	Part Number
Air Pump Exchange Set	P1000-210
Flowmeter	L1000-015
Water Pump Exchange Set	P1000-220
USB Data Logging Interface Adapter	P1000-230

9 APPENDIX A: USB DATA LOGGER EXTRACTION (OPTIONAL)

Data is transferred between the transmitter and a USB flash drive via the memory manager. To open the memory manager, close all windows and insert the USB flash drive into the USB host interface. The memory manager will then open automatically. You require the relevant user rights for access to the menu options "USB->Configure devices and "Software update". The factory settings authorize the "Master" and "Service" users for this.



9.1 MEMORY MANAGER MENU ITEMS:

- **Safely remove hardware:** To prevent hardware damage or loss of data, it is necessary to select this menu item before removing and inserted USB flash drive. Please follow the instructions on the device's display.

- **Recorder Update -> USB:** Use this function for **regular retrieval of recorder data** and **continuous archiving** of measured-data histories. Measurement data that have not yet been retrieved are stored on the flash drive together with their configuration data. The measurement data are stored in DAT files and the configuration data in SET files. These files can be opened and evaluated with the aid of the evaluation software. Data that has been read out is marked internally as retrieved and the available memory display is reset to 100 %.

CAUTION: Ensure that recorder updates are performed in a timely manner! When the ring memory is full (display of remaining memory in device reads 0 %), measurement data in the ring memory is lost (starting with the oldest).

- **Recorder Backup -> USB:** This function is used to **back up** the recorder data to **prevent data loss**. All measurement data in the ring memory (also data already retrieved) are transmitted to the flash memory together with their configuration data. The measurement data are stored in DAT files and the configuration data in SET files. These files can be opened and evaluated with the aid of the evaluation software. In contrast to Recorder Update, there is no internal marking of recorder data and no resetting of the available memory display.

NOTE: The "Recorder Update" and "Recorder Backup" functions are available only if the extra code "Recording" is enabled.

NOTE: A measuring data recording session is closed by changing configuration data that are relevant to the data monitor or registration function (e.g. scaling or description of an analog channel). The measurement data accumulated since the beginning of the current recording session are stored in the device in a file with the extension "DAT" together with an additional file with the extension "SET". A new recording session begins as soon as the new configuration goes into effect. One DAT file and one SET file are created for each recording session when recorder data are retrieved via Update or Backup.

- **Device Config. -> USB:** The complete, current configuration of the device is transmitted to the flash drive and saved in a file with the name "KONF304.SET". If the flash drive already contains a configuration file, a security prompt appears asking whether you are sure you want to overwrite this file. Pressing the "OK" button saves the current configuration to the flash drive and overwrites the previous file.