



EXPERTS IN WATER CHEMISTRY SINCE 1903



9092 Chlorine Analyzer User Manual



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.

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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 been 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

Application:	Online measurement of free chlorine
Measuring Range:	0-1000 ug/L, 0-10mg/L
Accuracy:	+/- 3% of reading
Response Time:	T90 = 30 sec
Power Supply:	100VAC - 240 VAC, 50/60 Hz
Mounting:	Wall or Panel Mount
Degree of Protection:	IP54
Dimensions:	33.5 x 8.25 x 6" (850 x 209 x 151 mm)

1.1.2 OPERATING CONDITIONS

Ambient Temperature:	32 – 140° F (0 – 60 °C)
Sample Medium:	Liquid
Sample Temperature:	32 – 131° F (0 – 55 °C)
Sample Flow Rate:	.013 - .079 GPM (3-18L/h)
Sample Pressure:	Maximum of 145 psig (10 bar)
Outlet Sample Pressure:	Atmosphere
Sample Conductivity	>10uS/cm (salt cell required if conductivity is less)
Sample Connections:	Swagelok® tube diameter = 6mm

1.1.3 COMMUNICATIONS & SIGNAL OUTPUTS

Analog Outputs:	0-20mA, 4-20mA (shunt max 500 Ohm)
Serial I/O for Signals:	Serial interface RS232
Alarms:	Flow, calibration, power
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 9092 Chlorine 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.

	<p>Hazard of electrical shock</p> <p>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.</p>
	<p>Hazard of chemical burns</p> <p>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.</p>
	<p>Harmful</p> <p>Specific indication depending on the parameter analyzed and the chemical colorimetric method used.</p>
	<p>Warning of general hazard</p> <p>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.</p>

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:

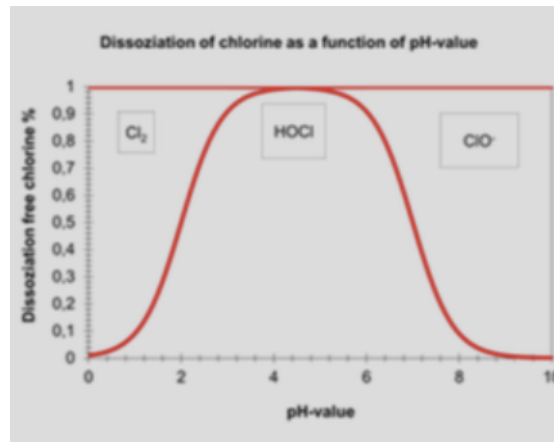
- In all electrical devices that are 110-220 Vac powered, there is a hazard of electrical shock or electrocution.
- To protect all personnel involved in analyzer use and maintenance, the door of the analyzer enclosure is equipped with a special key opening.
- Service qualified personnel will receive the special key to 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.
- 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 9092 Chlorine Analyzer is used for automatic, continuous measurement of dissolved free chlorine (Cl_2) in aqueous media. The analyzer is used for process monitoring and control, and to provide an alarm when limits are exceeded. Applications might include process water treatment, drinking water treatment and water management in swimming pools.

It should be noted that the free Cl_2 in pH depend value (see figure) relates to hypo-chlorous acid (HOCL Hypochlorite) and it's anion.

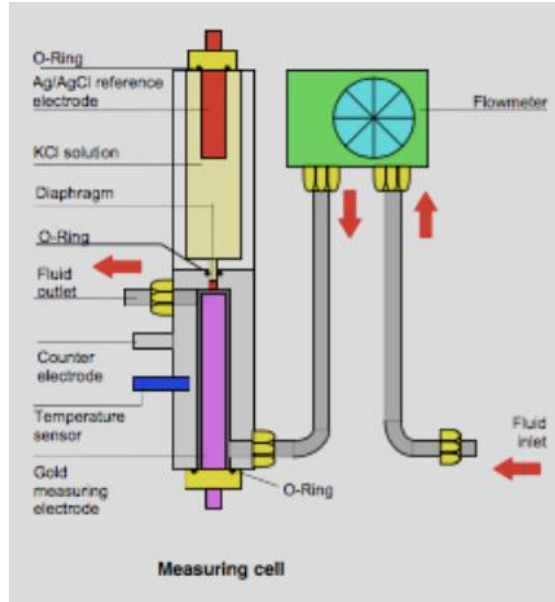


An acidic environment is preferable, because the hypochlorite ion HOCL acts significantly less micro-bicidal than hypochlorite and hypo-chlorine-free. Important for the correct implementation of the disinfection process is an accurate, exact stoichiometric dosage of the required chlorine. By measuring the presence of residual chlorine, the required concentration surplus for a safe disinfection can be maintained.

Monitoring free chlorine levels is also important because chlorine can react with organic substances and ammonia, whereby the amount of available free chlorine fore killing bacteria can be reduce considerably. Furthermore, in the reaction of chlorine with organic compounds secondary products are formed, which can be hygienically dangerous (Chloramine).

2.2 WORKING PRINCIPLE

During the measurement of the dissolved chlorine, the sample flows through a coaxial designed measurement cell by a gold measuring electrode. The electrochemical sensor functions is a potentiostatic mode with an open three-electrodes system (no Membrane). Consequently, exact and reliable measurements can be accomplished at pressures and in areas where pressure spiking take place. This sturdy and reliable measurement system makes it possible to operate accurately even under harsh conditions.



2.3 ANALYZER LAYOUT

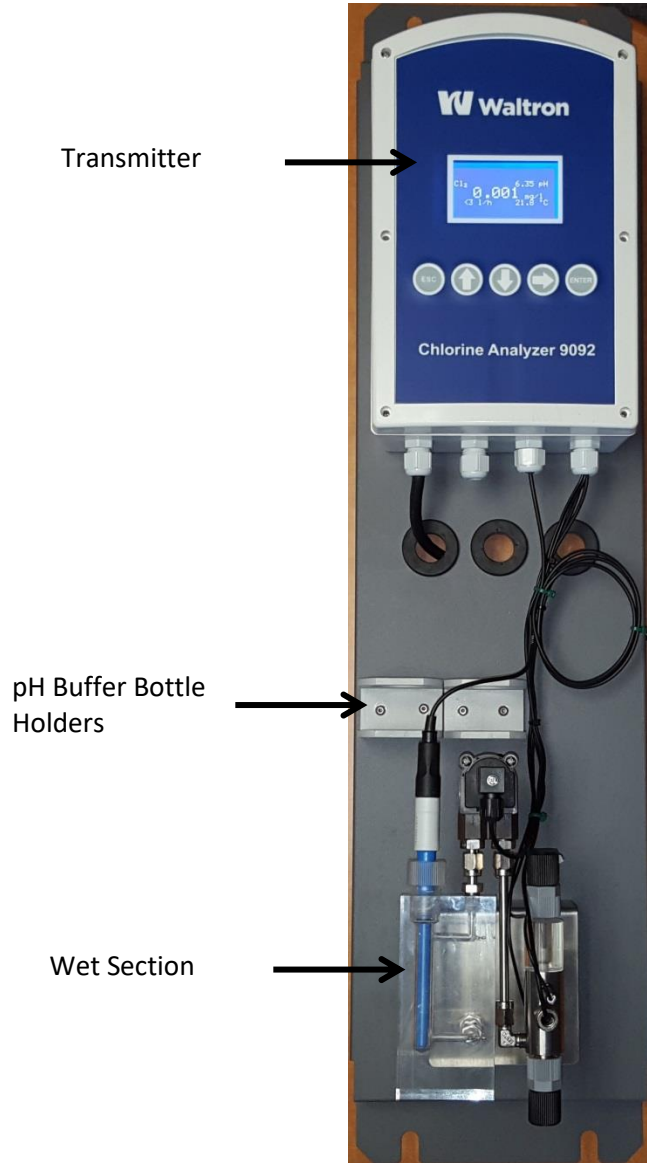


Figure 2.1: Analyzer Layout.

2.4 WET-SECTION

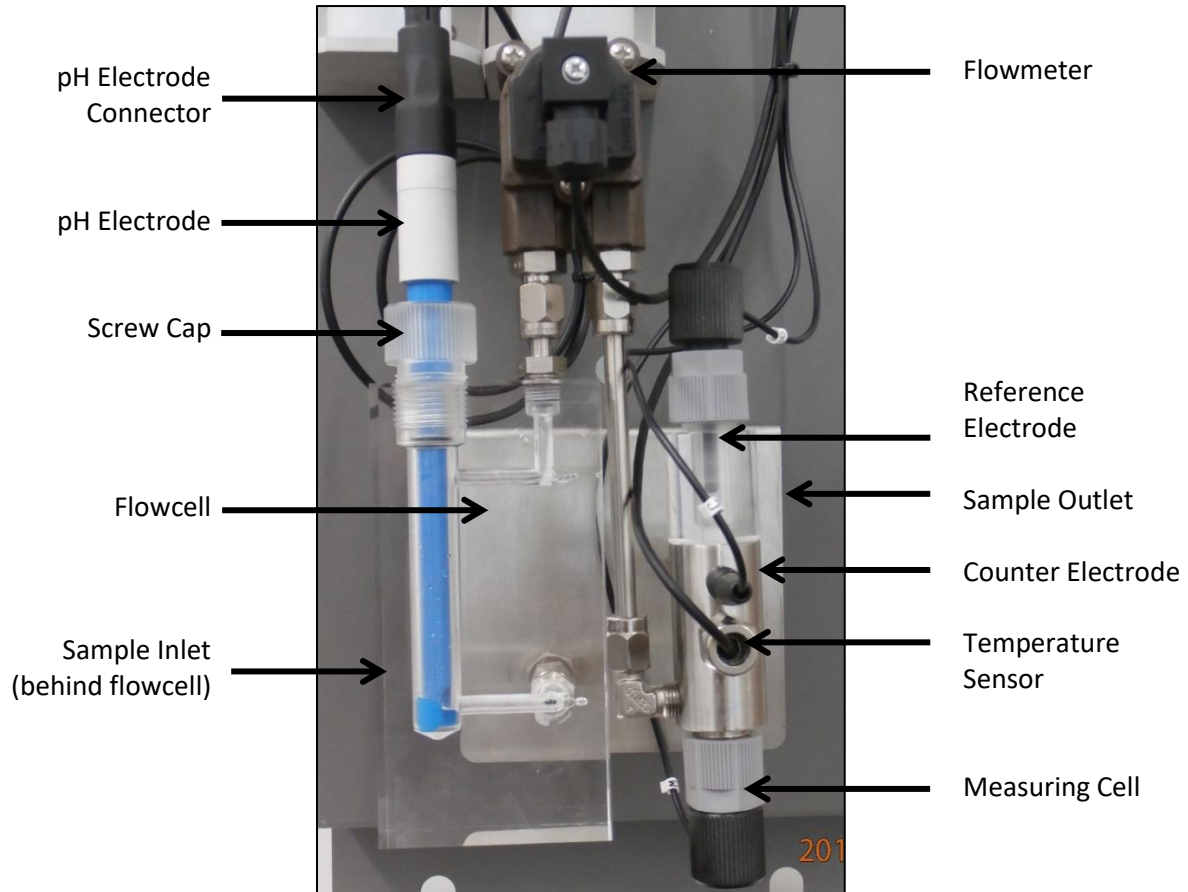


Figure 2.2: Analyzer Wet Section.

2.5 ELECTRONICS

The microprocessor and its PCB assembly are located in the electronic section. It provides to control 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 apparatus to dialogue with the user touchscreen interfaces and transfer data equipments. The connections for the external communications are shown in Section 3.6.



3 INSTALLATION

3.1 RECEIVING

The Waltron 9092 Chlorine 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 packing list included.

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 hydraulic parts of any liquids.

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 5 and 50°C at max 80% relative humidity. If the temperature is below 5°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

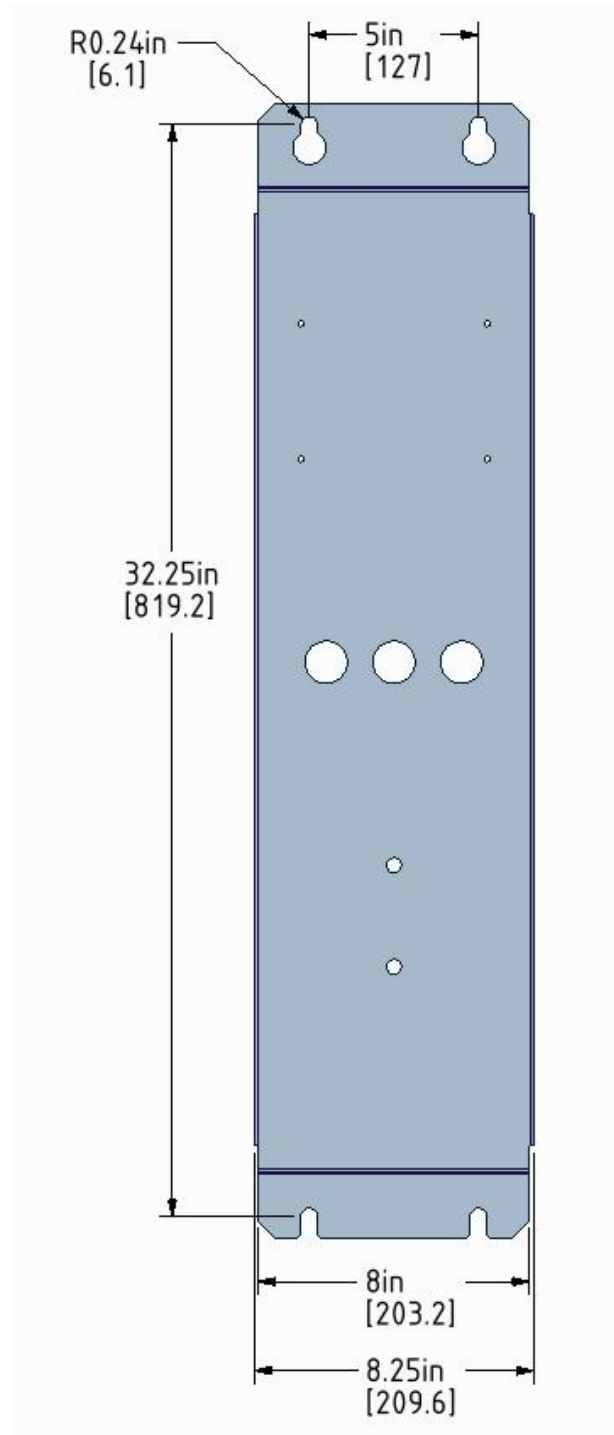


Figure 3.1: The dimensions for mounting the analyzer.

3.5 SAMPLE CONNECTIONS

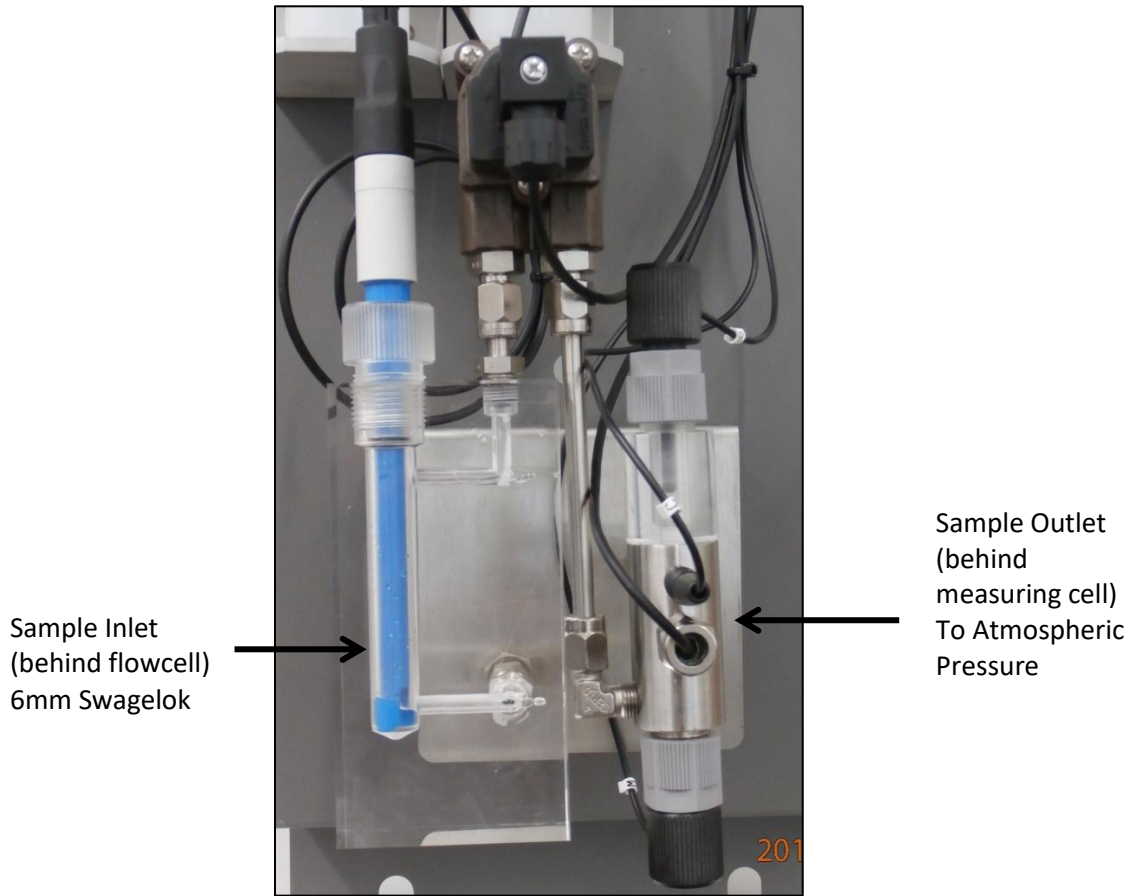


Figure 3.2: Sample Connections.

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. 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.

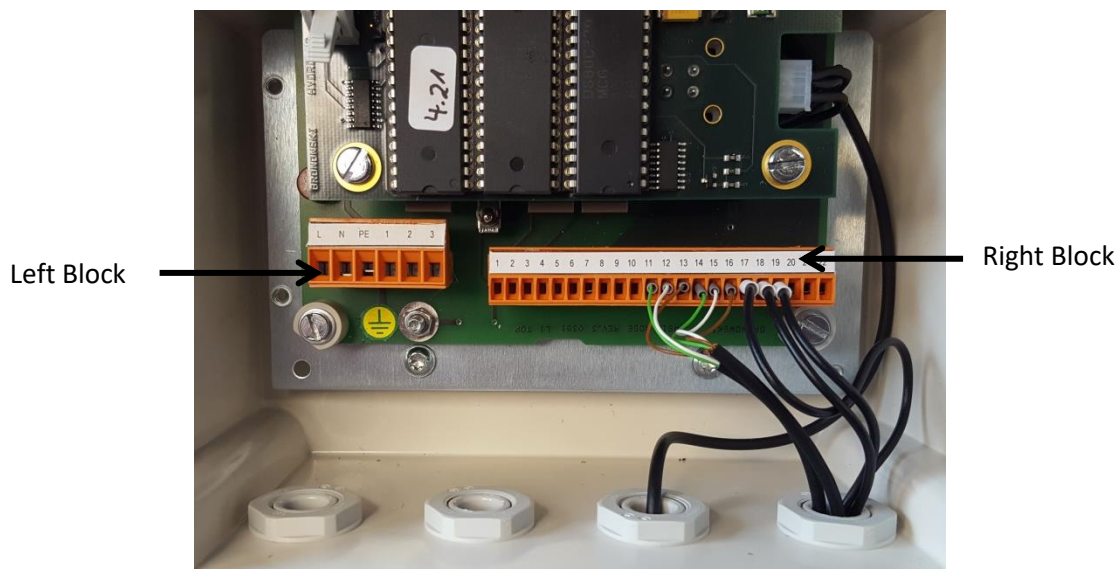


Figure 3.4: Electrical connections inside the transmitter housing.

3.6.2 AC POWER CONNECTION

The Waltron 9092 Chlorine Analyzer is designed for operation with 100VAC - 240 VAC, 50/60 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.

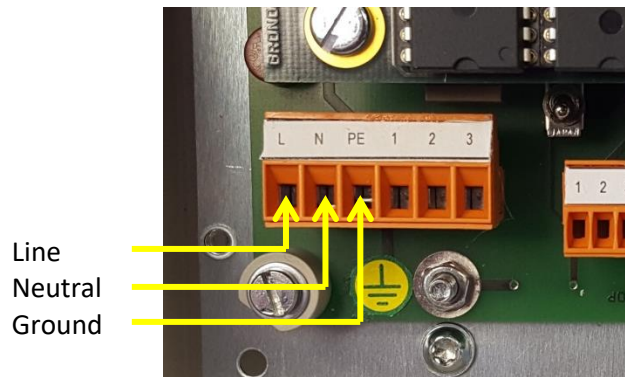


Figure 3.6: Power connections inside the transmitter housing.

3.6.3 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 outputs and monitor alarm relays.

Table 3.1: Terminal block pin locations.

Terminal Block	Position	Description
Left	L	Line 100-230V 50/60Hz
	N	Neutral 100-230V 50/60Hz
	PE	Ground (earth)
	1	Limit (common)
	2	Limit On
	3	Limit Off
Right	1	Auto Changing (common)
	2	Auto Changing Range 2
	3	Auto Changing Range 1
	4	Alarming (common)
	5	Alarming on
	6	Alarming off
	7	4-20 mA -
	8	4-20 mA +
	9	Cal. Electrode + (A)
	10	Cal. Electrode - (K)
	11	Flow (signal)
	12	Flow -
	13	Flow +
	14	Temp Sensor (common)
	15	Temp Sensor (common)
	16	Temp Sensor +
17	Reference Electrode (R)	
18	Counter Electrode (C)	
19	Measure Electrode (M)	
20	TxD (RS 232)	
21	GRD (RS 232)	
22	RxD (RS 232)	

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 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 3-18L/hr . The analyzer will begin to display measurement readings for the chlorine, pH and temperature.

It is recommended that the pH electrode be calibrated upon initial start-up (see section 6.1).

5 USER INTERFACE

5.1 MAIN SCREEN NAVIGATION



Figure 5.1: User interface main display screen.

The main screen displays:

- Free Chlorine Measurement
- pH measurement
- Flowrate
- Temperature

Using the keypad below the display screen, the user can navigate the menu structure and access and user input fields.

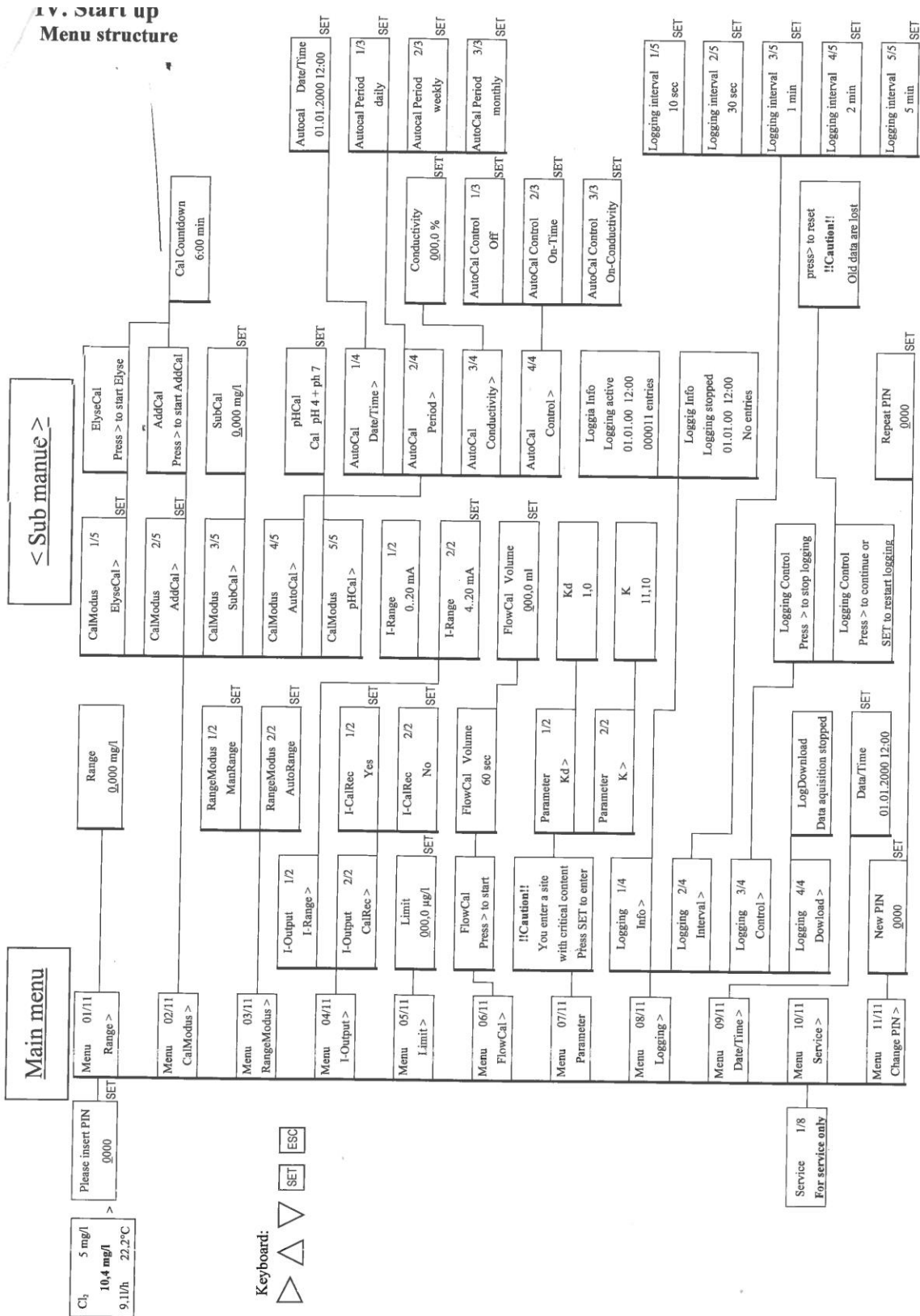
Action	Display
<p>Pressing the right arrow key will ask the user to input a PIN number to gain access to the menu structure. The default password is 0000.</p>	

Pressing enter will confirm the password and grant access to the menu structure.





5.2 MENU STRUCTURE



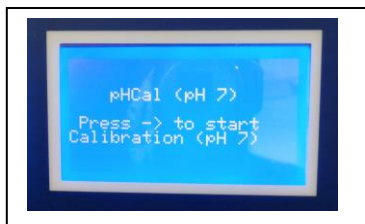
6 OPERATION

The analyzer is always in “online” mode and displaying chlorine measurements.

6.1 CALIBRATION OF PH SENSOR

The 2-point calibration of the pH sensor is carried out with two standard solutions with a defined pH value of 7 and 4. Follow the steps below to perform the calibration.

1. Remove the pH electrode from the flow-through cell by loosening the screw cap. The electrode then pulls out of the seat. Do not remove the cable from the connector.
2. Rinse the pH electrode with deionized water.
3. Go to the main menu of the chlorine analyzer to CalModus >. From there, call the submenu pHCal >.



4. Immerse the pH electrode into the standard solution pH 7 and swirl the electrode gently in solution.
5. Press the right arrow button on the front of the transmitter to start the calibration process for standard the solution pH 7. It runs a countdown of 150 s down. For reference, the electrode voltage is also displayed. If there is a constant measured value within 10 seconds, the measured value is stored.
6. Once the 7 pH calibration is complete, the display shows the request to prepare the standard solution pH 4.
7. Rinse the pH electrode with deionized water and immerse the electrode in the standard solution pH 4 and swirl the electrode gently in solution.
8. Press the right arrow button on the front of the transmitter to start the calibration process for standard the solution pH 4. If there is a constant measured value within 10 seconds, the measured value is stored and the message pHCal ok appears.
9. The pH calibration is complete and the pH electrode can be rinsed and returned to the flowcell. Finger-tighten the screw cap to hold the electrode in place.

6.2 CALIBRATION OF CHLORINE SENSOR

Calibration of the chlorine sensor requires a secondary chlorine measurement to act as a reference measurement, such as a photometric measurement using the DPD method (DPD = N, N-diethyl-1,4-phenylenediamine). The actual concentration of free chlorine, which was determined by the secondary reference measurement is input using the transmitter keyboard to access the main menu CalModus> and then in the submenu SubCal >. Repeatedly pressing the ESC key will return to measurement mode.

7 MAINTENANCE

7.1 SCHEDULED MAINTENANCE

Basic maintenance of the Waltron 9092 Chlorine Analyzer requires that the reference solution be refilled periodically. In addition, the user should perform a regular 'visual overall-check' of the wet part for immediate corrective measures, e.g. in case of leakages etc. Cleaning of the analyzer cabinet 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

Monthly

- Check level of reference solution and refill as necessary.

8 SPARE PARTS

Table 10.1: Consumables Parts Listing.

Description	Part Number
Reference Solution (3M KCl)	L1000-002
pH 7 Buffer Solution	L1000-034
pH 4 Buffer Solution	L1000-035
Cleaning Material	L1000-008

Table 10.3: Spare Parts Listing.

Description	Part Number
pH Electrode	L1000-036
Reference Electrode	L1000-004
Measuring Electrode (Gold)	L1000-005