User's Manual

Model WE420
Sodium Analyzer

IM 12Y18A02-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 12Y18A02-01EN
1st Edition

Introduction

Thank you for purchasing the WE420 Sodium Analyzer.

This Instructor's Manual contains all essential information for the user to make full use of WE420.

Please read the following respective documents before installing and using the WE420.

The related documents are listed as follows.

General Specifications

Contents	Document number	Note
Model WE420 Sodium Analyzer	GS 12Y18A02-01EN	Online manual

"EN" in the document number is the language code.

User's Manual

Contents	Document number	Note
WE410, WE420, WE430, WE440 WET CHEMISTRY ANALYZER Safety Precautions and Protection of Environment	IM 12Y18A00-01EN	Attached to the product (printed manual)
Model WE420 Sodium Analyzer	IM 12Y18A02-01EN	Online manual (This manual)

"EN" in the document number is the language code.

An exclusive User's Manual might be attached to the products whose suffix codes or option codes contain the code "Z" (made to customers' specifications). Please read it along with this manual.

You can download the latest documents from our website. Scan QR code.

http://www.yokogawa.com/an/wet-chemistry-analyzers/download/

Media No. IM 12Y18A02-01EN 1st Edition : Oct. 2019 (YK)

Notes on Handling User's Manuals

- Please provide the user's manuals to your end users so that they can keep the user's manuals for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
- No part of the user's manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- YOKOGAWA reserves the right to make improvements in the user's manuals and product at any time, without notice or obligation.
- If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

Drawing Conventions

Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.

Some screen images depicted in the user's manual may have different display positions or character types (e.g., the upper / lower case). Also note that some of the images contained in this user's manual are display examples.

Trademark Acknowledgments

- All other company and product names mentioned in this user's manual are trademarks or registered trademarks of their respective companies.
- We do not use TM or ® mark to indicate those trademarks or registered trademarks in this user's manual.

Safety Precautions

Safety, Protection, and Modification of the Product

- In order to protect the system controlled by the product and the product itself and ensure safe operation, observe the safety precautions described in this user's manual. We assume no liability for safety if users fail to observe these instructions when operating the product.
- If this instrument is used in a manner not specified in this user's manual, the protection provided by this instrument may be impaired.
- If any protection or safety circuit is required for the system controlled by the product or for the product itself, prepare it separately.
- Be sure to use the spare parts approved by Yokogawa Electric Corporation (hereafter simply referred to as YOKOGAWA) when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- The following safety symbols are used on the product as well as in this manual.

WARNING

This symbol indicates that an operator must follow the instructions laid out in this manual in order to avoid the risks, for the human body, of injury, electric shock, or fatalities. The manual describes what special care the operator must take to avoid such risks.

CAUTION

This symbol indicates that the operator must refer to the instructions in this manual in order to prevent the instrument (hardware) or software from being damaged, or a system failure from occurring.

CAUTION

This symbol gives information essential for understanding the operations and functions.

NOTE

This symbol indicates information that complements the present topic.

This symbol indicates Protective Ground Terminal.

Warning and Disclaimer

The product is provided on an "as is" basis. YOKOGAWA shall have neither liability nor responsibility to any person or entity with respect to any direct or indirect loss or damage arising from using the product or any defect of the product that YOKOGAWA can not predict in advance.

◆ CE marking products

■ Authorized Representative in EEA

The Authorized Representative for this product in EEA is Yokogawa Europe B.V. (Euroweg 2, 3825 HD Amersfoort, The Netherlands).

■ Identification Tag

This manual and the identification tag attached on packing box are essential parts of the product.

Keep them together in a safe place for future reference.

■ Users

This product is designed to be used by a person with specialized knowledge.

■ How to dispose the batteries:

This is an explanation about the EU Battery Directive. This directive is only valid in the EU.

Batteries are included in this product. Batteries incorporated into this product cannot be removed by yourself. Dispose them together with this product.

When you dispose this product in the EU, contact your local Yokogawa Europe B.V.office.

Do not dispose them as domestic household waste.

Battery type: Manganese dioxide lithium battery

Notice: The symbol (see above) means they shall be sorted out and collected as ordained in the EU Battery Directive.

Model WE420
Sodium Analyzer

IM 12Y18A02-01EN 1st Edition

CONTENTS

1. General Information

This user guide covers the operation, maintenance and troubleshooting for the WE420 Sodium Analyzer, which offers unmatched reliability in monitoring critical sample streams throughout the power/steam generation and industrial water industry.

Introduction

Monitoring the sodium ion content of steam and water circuits to produce accurate and reproducible results requires a very well designed and maintained system. The system must optimize the fluidic design with the sensing technology to enable low level (ppb) measurement of the contaminants as well as measuring across the linear range of the analyzer.

The WE420 Sodium Analyzer meets all of the criteria for accurate and dependable sodium monitoring and more. The WE420 Sodium Analyzer incorporates innovative technologies that include:

- Premium electrodes
- Accurate and precise flow cell design
- Marquee help screen
- Pump-less reagent addition and DKA calibration system

Markets

- Power
- Semiconductor
- Chemical and petrochemical
- Pulp and paper

Applications

- Feedwater / make-up water
- Boiler feedwater
- Drum boilers
- Demineralized water
- Steam condensate
- Cation exchange breakthrough
- High acid samples

Features and Benefits

Choice of application/reagent packages:
- Flexible configurations for applications ranging from low level detection to high acid samples.

Accurate and precise measurements in the range of 0.1 ppb to 10 ppm:
- Reliable measurements and a wide measurement range with selectable resolution.

Premium reference and sensing electrodes:
- Superior accuracy and stability over a wide temperature range.

Advanced flow cell design with air stirring:
- Automatic sample handling and contamination control with no moving parts.

Patented scrolling marquee:
- Intuitive menu-driven digital user interface.

Data log of previous measurements and calibration:
- View measurement, calibration and error history.

Self diagnostics:
- Ease of maintainability.

Password protection:
- Security and peace of mind for your operation.

Auto-ranging electronics with an easy to read backlit LCD display:

- Analyzer determines the best range.

Application Packages

The WE420 Sodium Analyzer is ideally suited to meet the demanding needs of high purity water measurements and high acid-cation exchange applications, all in one system and all from one of the most trusted names in sodium monitoring.

The WE420 Sodium Analyzer is offered in three application packages that are uniquely designed to accommodate the changing requirements for successful sodium monitoring. Our flexible reagent kits are available in prepackaged bottles for safe and convenient replacement.

- Ammonia Application Package – for general purpose sodium measurements, provides up to 45 days of continuous operation.
- Diisopropylamine (DIPA) Application Package – for low range sodium detection, provides up to 60 days of continuous operation.

Application Packages

Ammonia Application Package (K9705CN)

Reagent:	Ammonia
Range:	0.30 ppb to 200 ppm
Accuracy:	± 5% or 0.3 ppb, whichever is greater (with Double Known Addition calibration)

DIPA Application Package (K9705CP)

Reagent:	Diisopropylamine (DIPA)
Range:	0.10 ppb to 10 ppm
Accuracy:	± 5% or 0.1 ppb, whichever is greater (with Double Known Addition calibration)

Reagent bottle adapter (K9705CN, K9705CP)

Use for installation. Please always order a reagent bottle adapter with the main units at same time.

1.1 Principles of Operation

The sample enters the WE420 Sodium Analyzer and passes through the inlet valve, bypass/needle valve, inlet filter, pressure regulator, flow meter and into the restrictor tubing. The sample then passes through the flow cell manifold into a reagent bottle through a diffusion tubing assembly where pH adjustment takes place. The pH-adjusted sample then flows back through the manifold into the flow cell as air is introduced from the air pump to ensure proper mixing and fast response. The sample then flows into an atmospheric drain via the diverter valve.

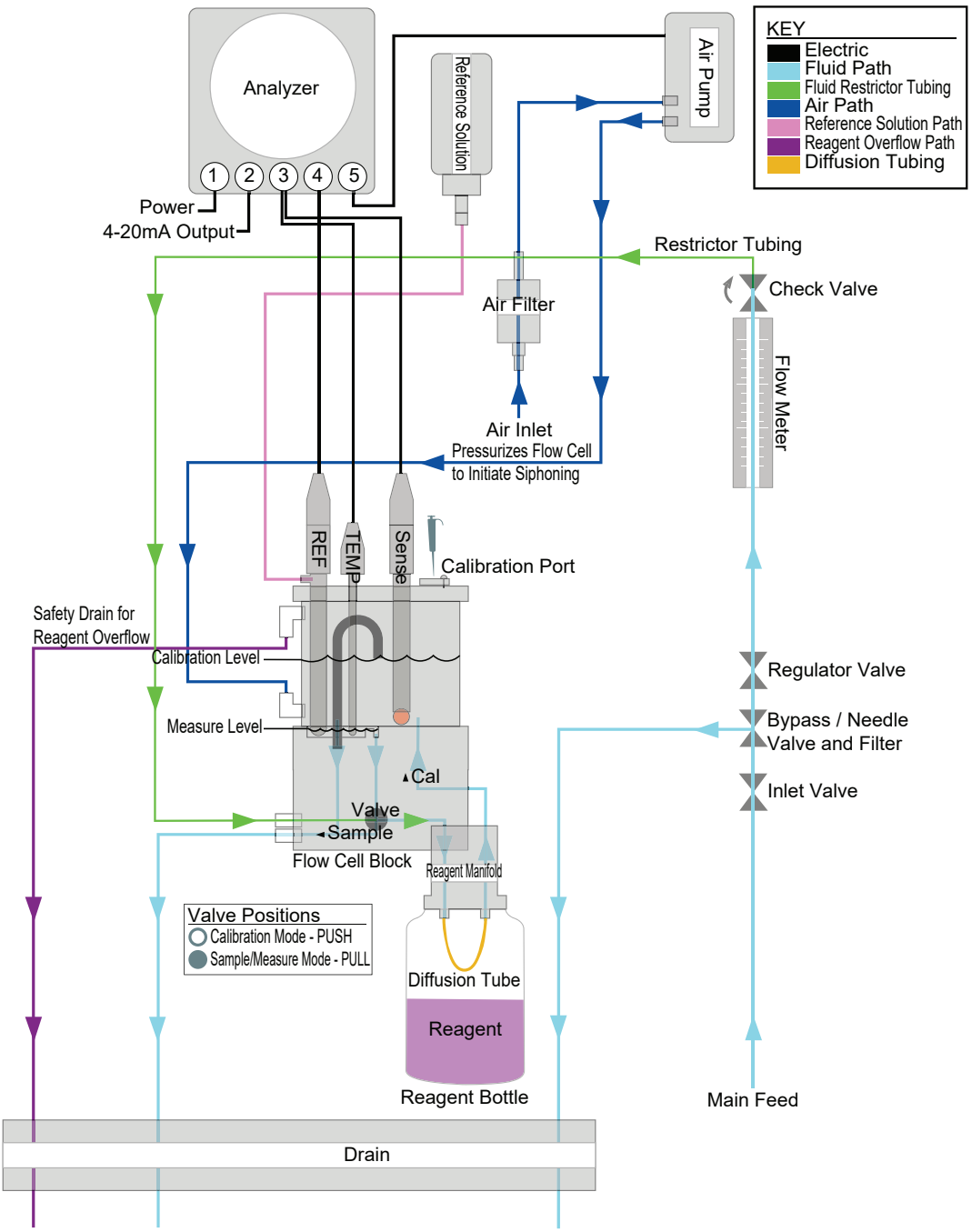

Figure 1.1 WE420 Schematic

The sensing electrode responds logarithmically to changes in the sodium ion concentration. This response is described by the Nernst equation:

$$E = E_0 + 2.3\,(RT/nF)\,\log\,(C/C_{iso})$$

Where:

E = measured electrode potential, mV
E_0 = potential, when C equals C_{iso}, mV
R = ideal gas constant
T = temperature of sample, degrees K
n = valence of ionic species (+1 for sodium ion)
F = Faraday's constant
C = effective sodium ion concentration (activity)
C_{iso} = concentration (activity) of sodium ion where potential E is temperature independent (isopotential point)

E_0 default: 0.0 mV

Low limit of E_0: - 60 mV

High limit of E_0: + 60 mV

Slope default: 59.15 mV/decade

Slope range: 45.0 mV/decade to 62.0 mV/decade

C_{ISO}: 169 ppb

The above equation indicates that the measured potential varies with both temperature and the concentration of the ion of the interest. In order to eliminate error caused by fluctuations in sample temperature, the WE420 microprocessor constantly updates temperature corrections from data supplied by the ATC probe.

From the Nernst equation, the theoretical response of a sodium ion selective electrode to a ten-fold change in concentration at 25 °C is 59.16 mV. This is referred to as the electrode slope (S). Most electrodes, however, do not exhibit a theoretical slope. Therefore, the analyzer is calibrated to determine its actual value. Two standards are used to provide information necessary for the microprocessor to compute the actual slope and E_0 for use during sample analysis.

In order to eliminate interference from hydrogen ions, which can become significant when measuring low levels of sodium, the WE420 Sodium Analyzer raises the sample pH. This pH adjustment is accomplished by the patented passive-diffusion process wherein the sample passes through a length of tubing contained in the reagent bottle. The reagent diffuses through the tube wall and mixes with the sample, which raises the sample pH.

1.2 Principles of Calibration

Calibration procedures for analytical instruments are important and must be performed carefully. The calibration procedure used in the WE420 Sodium Analyzer is a variation of Double Known Addition (DKA) using advanced electrode and flow cell technology in combination with the passive diffusion system. This method has the distinct advantages of being fast, easy, and accurate.

1.2.1 Double Known Addition (DKA)

Before calibration begins, the diverter valve is pushed in to divert flow from the measure drain, allowing the flow cell to fill.

At the beginning of the DKA calibration the actual concentration in the sample is unknown. The analyzer measures the potential (E_s) and stores this value in the microprocessor. A known amount of standard 1 solution is added to the flow cell, which increases the concentration (C_s) with a corresponding known amount (dC_1). During this process, air is pumped into the flow cell, thoroughly mixing sample and standard in a closed-loop system. The new potential (E_1) is measured and stored automatically when stability is reached. Adding standard 2, preferably 10 times more concentrated than standard 1, increases the concentration (dC_2) in the sample reservoir. Again, the new potential (E_2) is measured and stored when the reading is stable. Now, we have the following three unknowns:

$$E_s = E_0 + S(T_s/298.15) \log (C_s/C_{iso})$$

$$E_1 = E_0 + S(T_1/298.15) \log [(C_s + dC_1)/C_{iso}]$$

$$E_2 = E_0 + S(T_2/298.15) \log [(C_s + dC_1 + dC_2)/C_{iso}]$$

S is the Slope at 25 °C (298.15 K)

T is the temperature in Kelvin, measured when the potential E is measured.

E_s, E_1, E_2 have been determined during the calibration procedure. The microprocessor solves these three equations, to obtain the values of S and E_0. The calibration result is stored for use during online monitoring to convert the measured potential and temperature in the sample into concentration values in either ppm or ppb.

When the calibration is complete the flow cell drains as the sample flow returns. The flow cell volume returns to the measurement level. After allowing approximately 30 minutes for concentrated calibration solution to be flushed from the system, the WE420 Sodium Analyzer can begin sample measurement again.

In addition to Double Known Addition (DKA), the WE420 Sodium Analyzer also allows the operator the ability to perform an offline calibration.

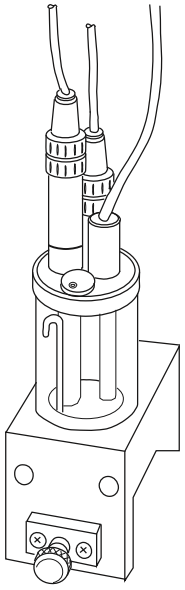

Figure 1.2 Flow Cell Volume for DKA

1.2.2 Offline Calibration

The offline calibration feature of the WE420 Sodium Analyzer allows the operator to adjust the analyzer to values determined by alternate methods used in their laboratory such as elemental spectroscopy and ion chromatography.

The offline calibration is essentially a one point calibration. To perform an offline calibration, a sample is taken from the bypass of the analyzer; the sample concentration value is stored in memory; the sample is analyzed by an alternate method of choice; the previously stored reading is adjusted to the lab method result; and the analyzer is then returned to the analysis mode. The term “offline calibration” refers only to the fact that a sample from WE420 Sodium Analyzer bypass is taken “offline” for laboratory analysis; in fact, no downtime is experienced during the procedure and the analyzer remains online throughout.

1.3 Fluidics Diagram

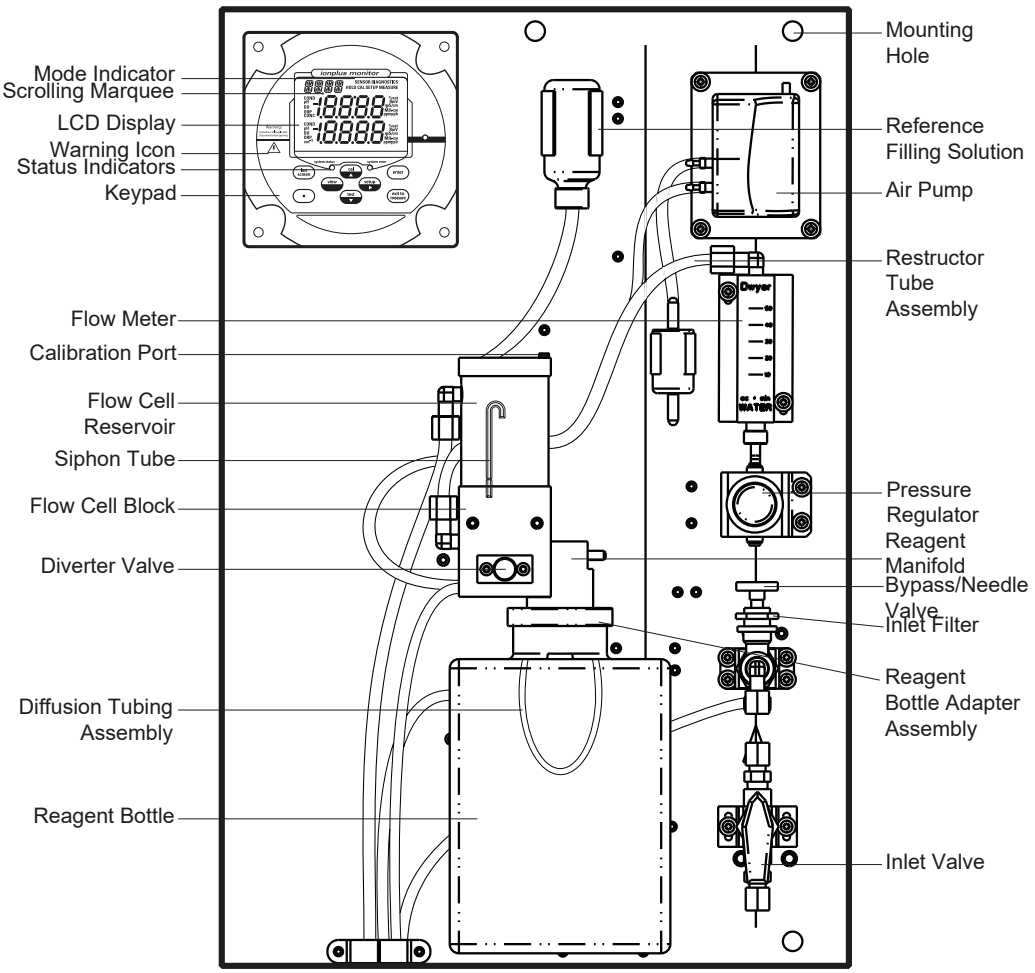

Figure 1.3 Fluidics Diagram

1.4 Glossary

Refer to Figure 1.3.

Inlet Valve
: Accepts the sample stream via 1/4 inch NPTF connector. The operator must supply the sample with a pressure between 14 and 100 psig.

Inlet Filter
: 60 micron stainless steel filter traps particulate matter in the sample stream.

Bypass/Needle Valve
: Used to redirect flow in the bypass system.

Pressure Regulator
: Adjusts flow on the incoming sample stream.

Flow Meter
: Measures sample flow rate.

Restrictor Tube Assembly
: Used in conjunction with the pressure regulator to lower downstream pressure.

Reagent Manifold
: Directs sample flow in and out of the reagent bottle assembly.

Reagent Bottle Adapter Assembly
: Connects the reagent bottle assembly to the manifold.

Diffusion Tubing Assembly
Semi-permeable tubing through which reagent diffuses into the sample.

Reagent Bottle
Contains water-soluble amine or ammonia reagent that raise the sample pH.

Flow Cell
Contains sodium sensing electrode, reference electrode and ATC probe.

Diverter Valve
Allows the flow cell reservoir to fill during calibration by forming a closed-loop system.

Sodium Sensing Electrode
Senses sodium ions in sample stream and produce an electrical potential dependent on sample concentration.

Reference Electrode
Provides a constant reference potential and completes the measurement circuit.

Reference Electrode Filling Solution Bottle
Provides constant flow of electrolyte solution through reference electrode for maximum stability.

ATC Probe
Measures sample temperature and inputs data to microprocessor for automatic temperature compensation (ATC).

Calibration Port
Allows introduction of standards to the sample reservoir during calibration.

Air Pump
Used to mix the sample during both measurement and calibration.

LCD Display
Provides digital readouts of concentration, temperature, millivolts and error codes.

Keypad
Consists of five mode keys, four prompt indicator lights, two scroll keys and one key for entering data. Mode and error indicators are also incorporated on the keypad.

Status Indicator
Two LED lights that illuminate according to current status of the analyzer.

Green Light:	Indicates that system is in correct working condition.
Yellow Light:	Indicates a warning, system in hold or that maintenance is required.
Red Light:	Indicates that something is seriously wrong.

NOTE

When either the yellow or red LED is lit, there may be an entry in the diagnostics mode that indicates the error. The logging feature must be initiated in the setup mode. Refer to Chapter 3, Use of the Setup Mode for instructions.

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2. Analyzer Preparation

■ Unpacking the Analyzer

YOKOGAWA analyzers are assembled, tested and packaged with great care.

1. Open the outer box. Remove the top four foam corner support pieces.
2. Open the inner box. This box should contain the analyzer and accessories. (Refer to IM 12Y18A00-01EN)
3. Remove the cardboard retaining shell by sliding it over the entire mounting board and the analyzer.
4. Carefully remove the entire mounting board with analyzer from the inner box.

NOTE

Do not lift or pull the analyzer by the fluidics or the electronic components.

5. Unbolt the analyzer from the mounting board by removing the four mounting bolts with a 9/16 wrench. These bolts may be discarded.
6. Carefully place the analyzer at a convenient location until proper installation can be completed.

2.1 Mounting and Plumbing Instructions

WARNING

Do not connect power prior to the mounting and plumbing of the analyzer.

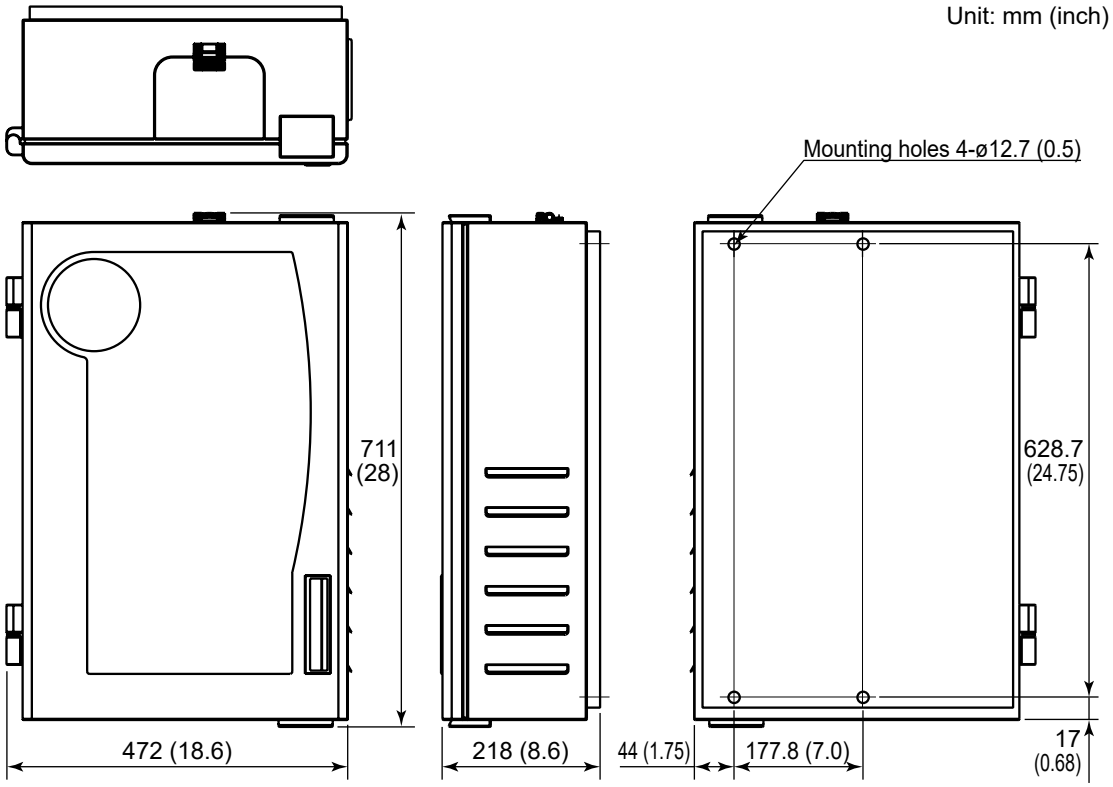


Figure 2.1 Mounting Dimensions

NOTE

- Select a site for the analyzer that allows it to be permanently bolted with ample height for atmospheric drain operation. Be sure that there is ready access to the electronic controls, calibration port and electrodes.
- A clearance of 15 inches (about 40 cm) must be allowed above the flow cell calibration port. Insert the pipet vertically (not angled) during the calibration.
- The analyzer location must permit connections to a sample line, drain and AC power supply and any connections for output devices.
- The analyzer should be mounted as close to the sampling point as possible. This ensures the fastest possible response to a changing sample condition. Refer to the Appendix, Sample Conditions section.
- For proper flow cell operation, the analyzer must be installed straight and level upon its mounting location. Failure to level the analyzer may cause poor siphoning in the flow cell.

Instructions

1. Prepare the mounting holes. Carefully lift the analyzer and bolt it into place. Do not lift the analyzer by holding on to any of the plumbing or fluid handling components.
2. Connect a waste line to the outlet of the analyzer, which is 3⁄4 NPT male. The waste line should be connected to a drain of sufficient capacity, 0.5 inch (1.27 cm) OD is recommended.
3. Connect a sample line to the inlet of the analyzer, which is 1⁄4 NPT female. It is recommended that a shutoff valve be installed at the sampling point.
4. The analyzer must be mounted and leveled vertically for proper operation.

Sample Requirements

Additional information is listed in the Appendix, Specifications section.

Sample inlet connection
: 1/4” NPTF. If particulate matter is present in the sample, pre-filtration is necessary. The 60 micron stainless steel filter located after inlet valve will remove moderate amounts of particulates.

Flow rate
: 40 mL/minute (nominal) for the Ammonia and DIPA Application Packages.

Pressure
: 8 to 100 psig.

Temperature
: Temperature must be between 5 to 45 °C.

Sodium level
: Sodium levels are read directly in ppb or ppm, when calibrated with sodium standards 1 and 2.

Sample alkalinity
: Sample alkalinity should be less than 250 ppm $CaCO_3$ equivalent.

2.2 Electrical Wiring

The warning icon highlights important information that should be strictly followed when using the analyzer for your own safety. Failure to follow these instructions may result in injuries.

WARNING

Read and observe the following safety recommendations.

Safety Requirements

- Prior to wiring, a switch or circuit breaker for disconnecting the analyzer from power supply should be installed.
  - The switch should be in close proximity to the analyzer and with easy reach of the user.
  - The switch should be marked as the disconnecting device for the analyzer.
- To reduce the risk of shock hazard, disconnect the power prior to opening the analyzer.
- Before connecting the analyzer to the main, make sure that the voltage lies within either range: 100-120V 200mA / 200-240V 100mA; 50/60 Hz AC.
- Cutting off the power by disconnecting power source will not reset the analyzer. This analyzer incorporates a non-volatile memory and will maintain calibration and settings after power failure. Battery power is supplied to the display for the date and time functions.
- If a repair is required, or to arrange Return Material Authorization, call Response Center or contact your local authorized dealer.
- Installation and wiring of the analyzer may only be carried out in accordance with applicable local and national codes per this user guide.
- Be sure to observe the technical specifications and input ratings.

Warning Labels and Locations

WARNING

The following section provides important information that should be strictly followed when using the analyzer for your own safety. Failure to follow these instructions may result in injuries.

The safety warning icons are used in two locations on the analyzer.

- Faceplate – Refer to Figure 2.2.

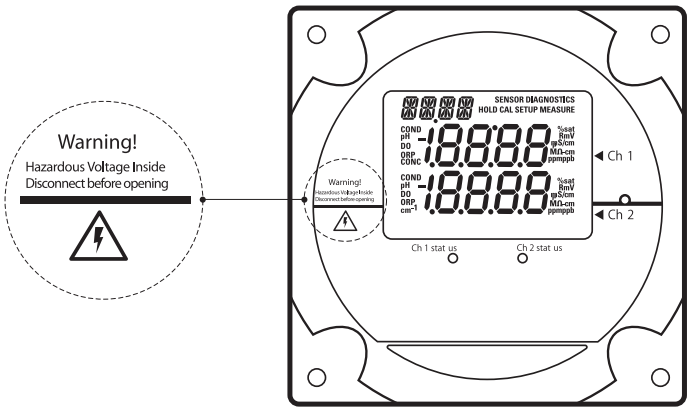


Figure 2.2 Faceplate

- Power supply – Refer to Figure 2.3.

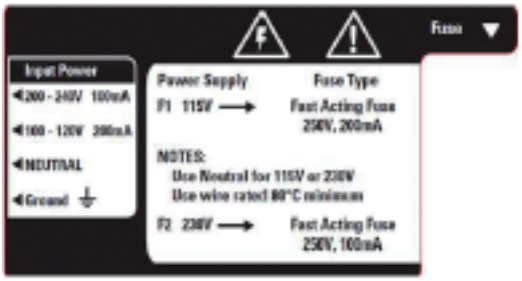


Figure 2.3 Power Supply

NOTE

Replace the fuse only with a fuse of same rating.

2.3 Wiring the Analyzer

WARNING

Read and observe the following requirements. If you install the wrong fuse for your system, you could damage the analyzer. Make sure that you select the correct fuse rating and discard the additional fuses supplied in the fuse kit.

Required Tools

- Options kit – includes fuses, cable glands, conduit fitting and green screw terminal.
- Phillips head screwdriver.
- 2 mm blade flat-head screwdriver.

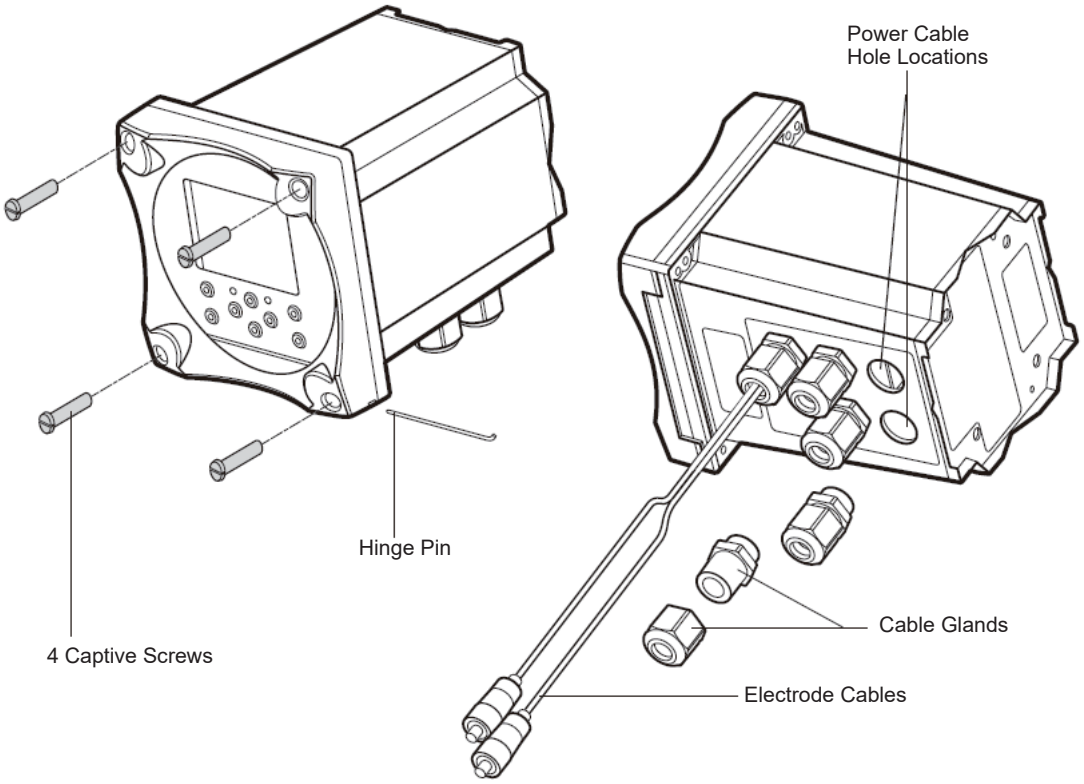


Figure 2.4 Electronics Enclosure with Cable Glands

1. Open the faceplate – loosen the four screws using a Phillips head screwdriver. The electronics faceplate will open via the hinge pin connection.
2. Remove one or two of the two unused cable glands as required for wiring power cable or auxiliary connections. Power cable optional hole locations are shown in Figure 2.4.
3. Select and install the appropriate size cable gland or conduit fitting as required.

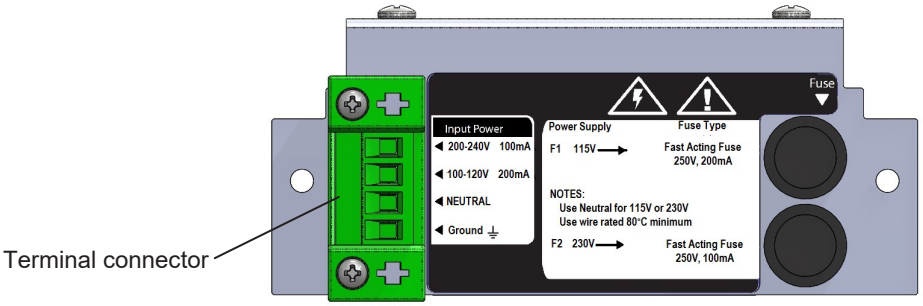


Figure 2.5 Terminal Connector Location

4. Feed the power cable through the conduit or cable glands as required.
5. Wire the power cable to the green screw terminal connector from the options kit. Select correct terminal for hot conductor depending on line voltage. Refer to Figure 2.5 for terminal connector location.
6. Plug the terminal connector into the power supply. Refer to Figure 2.3.
7. Select the correct fuse from the fuse kit. Install by inserting the fuse in the fuse holder and secure it using the twist and lock method. The fuses are clearly labeled with the appropriate voltages for your system. Refer to Figure 2.3. Refer to the table below for fuse selection.

AC Voltage	Fuse Rating
115V	200mA, 250V, Fast Acting
230V	100mA, 250V Fast Acting

2.3.1 Terminal Assignments

Terminal Layout		Terminal Layout		Terminal Layout		Terminal Layout	
1	Sout (mA) sensing signal	9	Relay 1	26	Sensing electrode	28	Do not connect
2	GND common ground	10	Relay 1	27	Do not connect	29	Do not connect
3	Tout (mA) temp. signal	11	Relay 2			30	Preamp power
4	Air pump (ISE only)	12	Relay 2			31	Preamp ground
5	Air pump (ISE only)	13	Relay 3			32	Shield
6	Shield ground for conductivity	14	Relay 3			33	Shield
7	Do not connect	15	Do not connect			34	Jumper to pin 26 when using preamp
8	Do not connect	16	Temperature ground				
		17	Temperature drive				
		18	Temperature sense				
		19	Solution ground				
		20	Conductivity drive +				
		21	Conductivity sense +				
		22	Conductivity sense -				
		23	Conductivity drive -				
		24	Reference electrode				
		25	Jumper to pin 24 when using preamp				

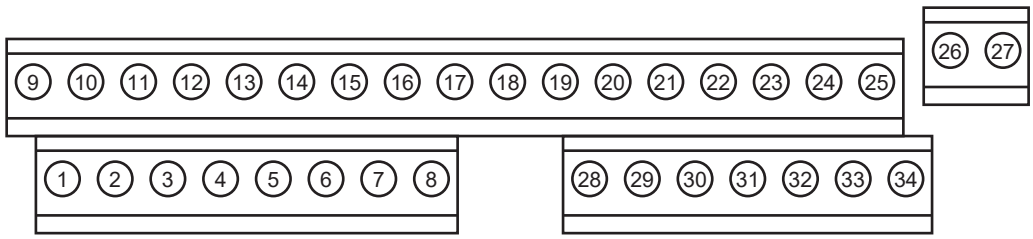


Figure 2.6 Terminal Assignments

2.3.2 Electrode Wiring Assignments

Sodium Electrode		
26	Sensing electrode	Connect clear wire
33	Shield	Connect black wire

Reference Electrode		
24	Reference electrode	Connect clear wire
32	Shield	Connect black wire

2.4 Installation of DIPA Reagent and Diffusion Tubing

WARNING

The diisopropylamine (DIPA) reagent is hazardous. Use protective glasses and gloves. Refer to the bottle label for precautions and work in a well-ventilated area. Installation of DIPA reagent requires a fume hood or well-ventilated area.

Recommendations

If the analyzer is offline or the sample flow is shut off from the analyzer for a prolonged period of time, follow the steps in Chapter 3, Shutdown and Start-Up Procedure.

1. Unscrew the thumbnut and remove the reagent bottle from the reagent manifold.
   - New analyzers will ship with a rubber coated glass reagent bottle and complete diffusion tubing assembly installed. Only installation of the reagent is necessary for first time start-up.
2. Twist open the reagent bottle, separating the glass bottle, reagent bottle adapter assembly and plastic cap to the reagent bottle.

2.4.1 DIPA Diffusion Tubing Assembly

Designed to maximize uptime, our new diffusion tubing assembly can be replaced in a matter of seconds. Our method of snap and connect tubing installation combined with the easy pull off and dispose technique will have your system back online faster than ever before. The newly designed mechanism is precisely engineered to remain connected under variable temperature conditions and pressure fluctuations. The new style diffusion tubing assembly is now suspended in the headspace of the reagent bottle, which decreases the rate of consumption of reagent and saves you time and money.

The diffusion tubing ships fully assembled for quick and easy installation.

- Do not use Teflon tape during installation.
- Twisting of the clear silicone tubing will compromise tubing integrity and may cause ruptures. Be careful to avoid kinks and twisting during installation.

NOTE

The diffusion tube assembly mounts directly to the reagent bottle adapter fittings. The reagent bottle adapter fittings are dedicated to the reagent bottle adapter and do not require change out when installing new diffusion tubing. Be sure to hand tighten these connectors monthly.

2.4.2 Diffusion Tubing Installation

WARNING

Turn off the air pump before beginning this procedure; otherwise, the air pump will splatter the reagent outward as the bottle is removed.

1. Remove the diffusion tubing assembly by unhooking the tubing from the hook, pulling off the two diffusion tubing caps and pulling the tubing off of the connectors, as shown in Figures 2.7a and 2.7b.

NOTE

Ensure the connectors are finger tight to prevent possible leakage of sample into the reagent.

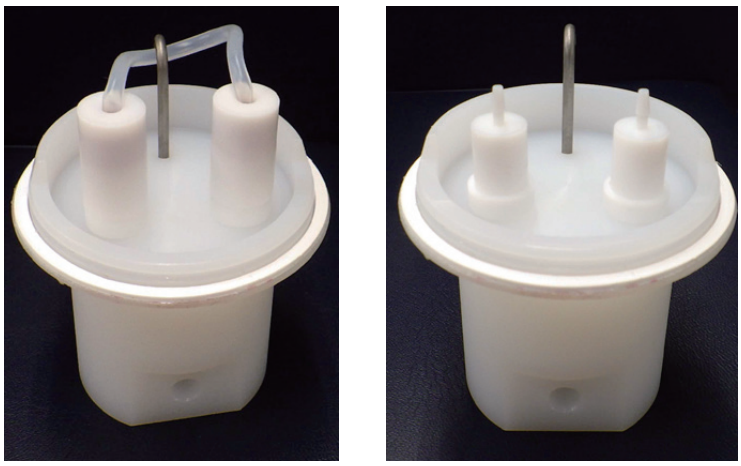


Figure 2.7a and 2.7b Diffusion Tubing Assembly

2. Check the new tubing assembly to make sure no black O-rings are caught in the caps. Remove if required. Press the diffusion tubing onto the connector barbs, as shown in Figure 2.7b. The holes at the tubing ends press onto the barbs.
3. Press the diffusion tubing assembly onto the connector barbs, as shown in Figure 2.8. The holes at the tubing ends press onto the barb fittings.

Figure 2.8

4. Press the diffusion tubing assembly caps onto the adaptors and loop the tubing onto the hook, as shown in Figure 2.9.

NOTE

The length of the tubing should be equally balanced on the hooks to minimize the tubing touching the reagent. If using the 8 inch diffusion tubing, K9705CM, ensure that the tubing is above the DIPA reagent level. The 8 inch diffusion tubing may need to be looped twice onto the hook to keep the tubing above the liquid level.

Figure 2.9

2.4.3 DIPA Reagent Bottle Installation

1. Secure the diffusion tubing assembly to the base of the reagent bottle adapter assembly. The diffusion tubing adapter connectors must be perpendicular and straight when tightened into adapter assembly. Refer to Figure 2.8.
2. Place a new reagent bottle on a flat surface and remove the cap. Ventilation or a hood is recommended for this step.
3. Holding the bottle steady with one hand, install the reagent bottle adapter assembly by tightening its cap onto the bottle. Ensure that the bottle label is oriented so that it will be visible when the entire assembly is mounted to the instrument.
4. Replace the large single gasket in the reagent bottle adapter assembly. Use needle nose pliers if necessary.
5. Replace all three O-rings on the face of the reagent manifold. Refer to Figure 2.10.
6. Slide the reagent bottle adapter assembly over the threaded screw of the reagent manifold. Refer to Figure 2.10.
7. Tighten the thumbnut to secure the connection.

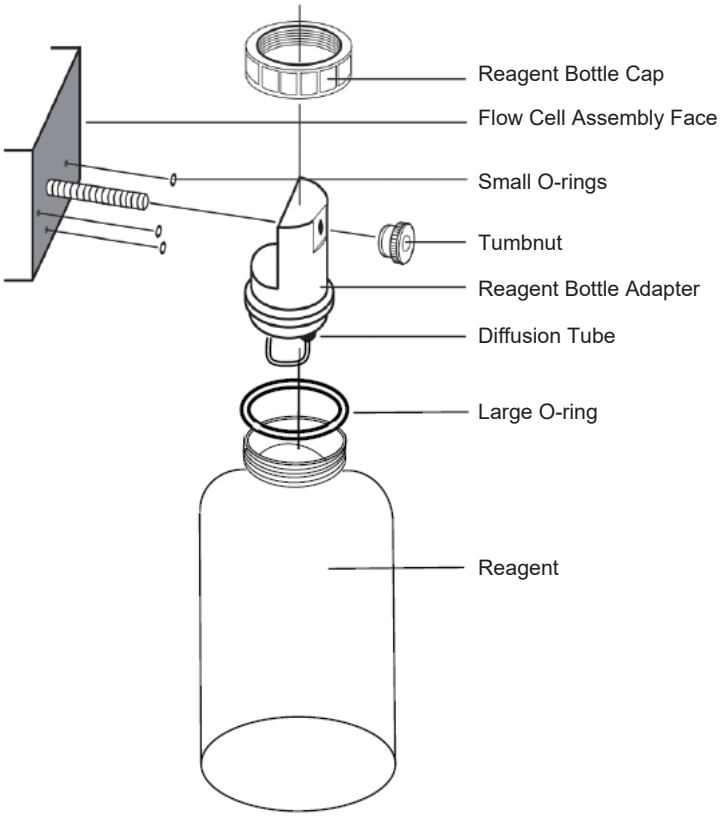


Figure 2.10 Reagent Bottle Assembly

2.5 Installation of Ammonia Reagent and Diffusion Tubing

WARNING

The reagent is hazardous. Use protective glasses and gloves. Refer to the bottle label for precautions and work in a well-ventilated area.

WARNING

Turn off the air pump before beginning this procedure; otherwise, the air pump will splatter the reagent outward as the bottle is removed.

1. Remove the thumbnut and slide the bottle adaptor from the flow cell.
2. Unscrew the cap and lift the bottle adaptor from the reagent bottle.
3. Remove both ends of the old diffusion tubing from the reagent bottle adaptor nipples. Properly dispose of spent reagent and tubing.
4. Fit the ends of the new diffusion tubing over the bottle adaptor nipples.
5. In a hood or outdoors, carefully remove the cap from a new reagent bottle.
6. Make sure that the large O-ring is between the reagent bottle and bottle adaptor. Slide the diffusion tubing loops into the reagent bottle and screw the bottle adaptor onto the new reagent bottle.
7. Ensure that the three small O-rings are in place on the flow cell.
8. Re-attach the bottle adaptor/reagent bottle assembly to the flow cell by sliding it onto the screw and tightening the thumbnut. The bottle adaptor can be rotated to allow correct positioning on the analyzer.

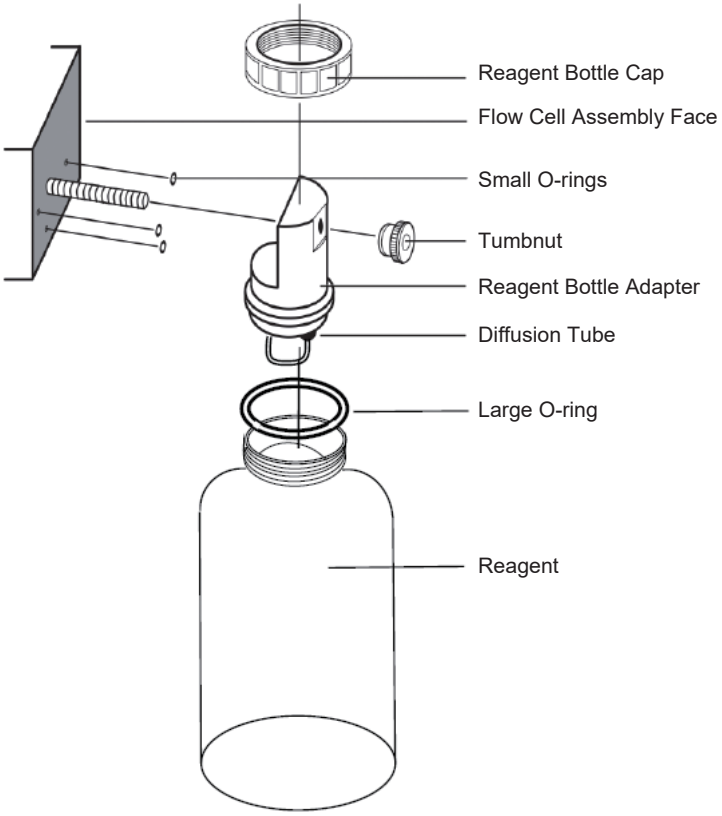


Figure 2.11 Reagent Bottle Assembly

2.6 Installation of New Electrode Cables

1. Unpack the electrode cables.
2. Feed the tinned wires through the cable gland assemblies with the holes (2 or 1).
3. Follow the terminal assignments shown in Figure 2.6 for the proper electrode cable wiring location.

2.7 Conditioning and Installation of a New Sodium Electrode

The sodium electrode (Part number: K9705CC) must be used in conjunction with the reference electrode (Part number: K9705CD).

Reagent: 18113 and 181073 must be purchased directly from Thermo Fisher Scientific.inc.

WARNING

Be sure to read and observe the following requirements. Only the sodium sensing electrode is etched. Do not etch the reference electrode. Use protective glasses and gloves during the entire conditioning procedure. Wear protective gloves while etching the electrode.

1. Unpack the sodium electrode (Part number: K9705CC) and carefully remove the protective cap. Save the cap for future storage of the electrode.
2. Immerse the sodium electrode in the bottle of etch solution (Cat. No. 181113) for one minute.
3. Remove the sodium electrode from the bottle of etch solution and rinse it with deionized water. Gently blot the electrode bulb with a clean lab tissue paper. Rinse the electrode again with deionized water.
4. Insert the sodium electrode into its port in the flow cell cap. Refer to Figure 2.12 for the location.

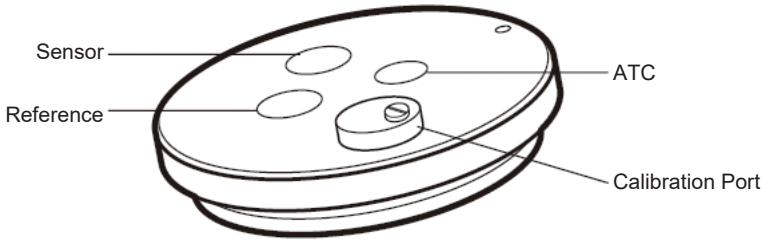


Figure 2.12 Flow Cell Cap

5. Plug the electrode cable marked “Sensing” into the top of the electrode. Be sure to push back the black cap to verify a secure connection between the male and female pin connection prior to tightening.
6. Tighten the screw cap connection to the cable.

Note: Do not twist the cable while tightening the connection. Twisting may cause damage requiring premature replacement of the cable.

7. Wait at least one hour before calibrating the analyzer.

2.8 Installation of the ATC Probe

The automatic temperature compensation (ATC) probe is already connected to the correct terminal for temperature upon delivery.

1. Insert the ATC probe into its port in the flow cell cap. Refer to Figure 2.12 for the location.

2.9 Installation of a New Reference Electrode

1. Unpack the reference electrode (Part number: K9705CD) from the shipping box.
2. Carefully remove the protective caps from the bottom and sidearm of the reference electrode. Save the caps for future storage of the electrode.
3. Shake out as much of the fill solution as possible through the sidearm. Drain the fill solution through the sidearm or use a pipet or syringe.
4. While passing the 1/8 inch tubing into electrode sidearm, slide the 1/4 inch tubing over the sidearm. The outside tubing should extend 3/8 to 1/2 inches over sidearm. Refer to Figure 2.13.
5. Remove the cap and fluid seal from reference electrode fill solution bottle (Cat. No. 181073). Hold the bottle in an upright position. Check that the rubber gasket is properly aligned, and then connect the cap end of the tubing assembly to the bottle. The 1/8 inch tubing should extend into the bottle.
6. Hold the reservoir bottle above the electrode with the bottle cap end down. The electrode should be horizontal with the sidearm pointing up. Gently shake the electrode to allow any trapped air bubbles to rise into the bottle as the electrode fills with solution.

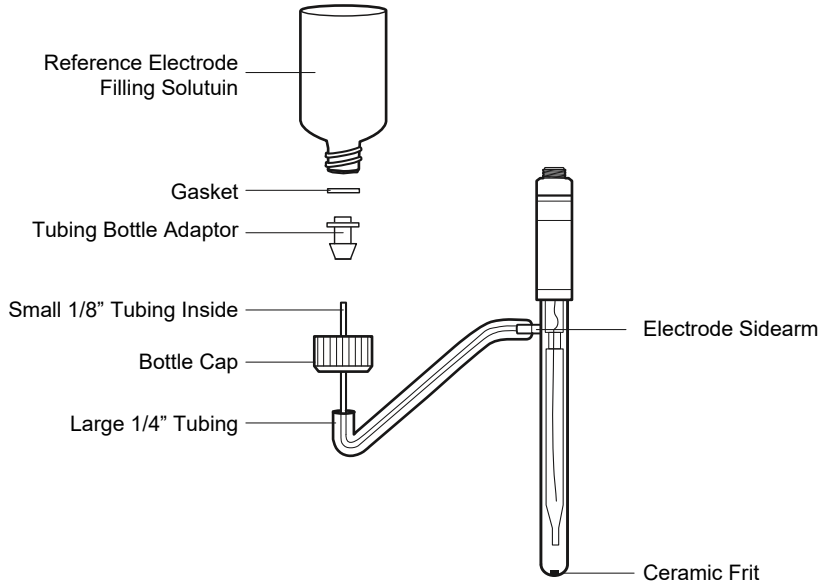


Figure 2.13 Reference Electrode with Filling Solution

7. Dry off the ceramic frit on the base of the electrode with a lint-free wipe. Squeeze the bottle for a few seconds. A small amount of filling solution should bead up on the frit surface, indicating good filling solution flow. If no moisture is visible, the electrode is clogged and should be cleaned or replaced.
8. Invert the electrolyte bottle and snap it into the clip. Refer to Figure 2.14. Use the pushpin supplied with the reference electrode to puncture three air vents on the bottom of the filling solution bottle.

CAUTION

Failure to vent the filling solution bottle will lead to noisy and drifting output signals.

9. Plug the electrode cable marked “Reference” into the top of the electrode, and tighten the screw cap. Be sure to push back the black cap to verify a secure connection between the male and female pin connection prior to tightening.
10. Tighten the screw cap connection to the cable.

CAUTION

Do not twist the cable while tightening the connection. Twisting may cause damage requiring premature replacement of the cable.

11. Insert the reference electrode into its port in the flow cell cap. Refer Figure 2.12 for the location.

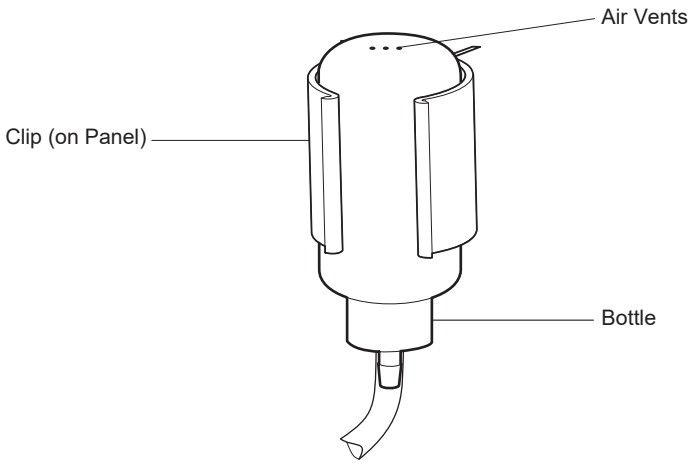


Figure 2.14 Reference Mounting Clip

3. Analyzer Operation

Description of Basic Controls

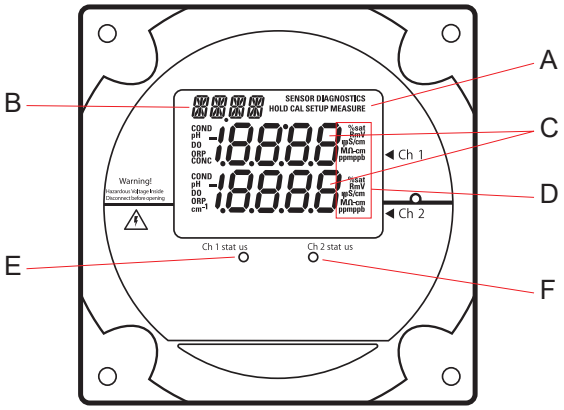


Figure 3.1 Faceplate

	Parameter	Location on Display	Options	Default
A	Mode Indicator	Top right corner of display	HOLD, CAL, SETUP, MEASURE, DIAGNOSTIC	MEASURE
B	Marquee Display	Top left corner of display	Analyzer provides prompts for operator using the scrolling message	
	Temperature Display		Celsius	In the measure mode, if an ATC probe is connected the default is the actual measured temperature and if no ATC probe is connected the default is 25 °C
C	Main Data Display	Middle line and bottom line of display	ISE board: concentration pH/mV board: pH or mV Conductivity board: conductivity, resistivity, salinity, concentration or TDS	Depends on type of board installed and selected measurement parameter
D	Measurement Units	Left and right side of middle and bottom display lines	ISE board: ppm or ppb, auto-ranging pH/mV board: pH or mV Conductivity board: µS/cm or mS/cm (conductivity), MΩ-cm (resistivity), SAL1 or SAL2 in the marquee (salinity), PCT1 or PCT2 in the marquee (concentration) and TDS1 or TDS2 in the marquee (TDS)	Depends on type of board installed and selected measurement parameter
E	Channel 1 Status Indicator	Below display screen, to the left of cal	Green LED indicates that channel is OK Orange LED indicates a channel warning Red LED indicates a channel failure	At initial installation, the red LED indicates that the electrode or probe needs to be installed and calibrated.
F	Channel 2 Status Indicator	Below display screen, to the right of cal	Green LED indicates that channel is OK Orange LED indicates a channel warning Red LED indicates a channel failure	At initial installation, the red LED indicates that the electrode or probe needs to be installed and calibrated.

Description of Keypad Icons

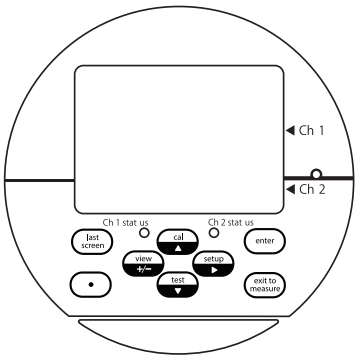


Figure 3.2 Keypad Icons

Key	Parameter/Mode	Action	Operational Selections
cal	Enters calibration mode	Calibration mode with operator prompts	Depends on type of board installed
	Scrolls up digit numbers Scrolls up through a list of options in setup and cal modes	Use to edit numeric values Use to select available options	0 through 9 selectable by digit, first digit sometimes selectable 0 through 19
setup	Enters setup mode	System setup mode at the last parameter used by the operator	PASS, DATE, TIME, LOG,RSET, DISP, CH1, CH2, MDL, MEAS, HOLD, TCMP, TADJ, ALRM, mA1, mA2, mADJ, TEST, CAL, PH, COND, DYN
	Moves to the nextdigit	Use to edit values	When moved to final digit, the system will wrap around to first digit
test	Enters test mode	Use to advance through sequence of displays DIAGNOSTICS will appear in top right of screen	
	Scroll down digit numbers Scroll down through a list of options in setup and cal modes	Use to edit numeric values Use to select available options	0 through 9 selectable by digit, first digit sometimes selectable 0 through 19
view +/–	Enters log view mode	Use to view data in calibration, measure and status logs	
	+/- function	Enters negative/positive sign when editing numbers	
enter	Enter function	Use to accept value orselection displayed on screen and store value or selection in memory	
	Enter function (in test mode only)	Use in test mode to displayadditional information for selected menus	
exit to measure	Exit to measure function	Use to exit setup or cal modes and enter the measure mode	Analyzer automatically enters measure mode when first turned on and after calibration
last screen	Last screen function	Use in setup and test modes to return to the previous screen or menu	
•	Decimal point function	Use to set the decimal point position in certain menus with numbers that require a decimal point	

3.1 Use of the Setup Mode

Before the first sample measurements can be taken, the setup mode should be programmed and a successful calibration must be performed by the operator and stored in the memory of the analyzer.

Navigating Tips for the Setup Mode

- Press setup to enter the setup mode.
- SETUP appears in the mode indicator screen.
- HOLD is displayed while in the setup mode.
- The analyzer will enter the setup mode at the last menu that was used by the operator.
- Press cal and test to loop through the menu options.
- Press enter to select the desired menu option and set the menu option parameters.
- Press cal and test to:
  - Scroll between On and OFF for the selected menu option.
  - Scroll and set the first digit value to 0 through 19.
  - Scroll and set the remaining digit values to 0 through 9.
- Press to setup move to the next digit (scroll right) to set each digit value (4 digits maximum).
- Press enter to save the entered parameter for the selected menu option.
- Press last screen to exit the current screen and return to the previous screen.
- Press exit to measure to exit the setup mode and return to the measure mode. If exit to measure is pressed, last screen will not return the operator to the setup mode. The operator must reenter the setup mode by pressing setup.

Using Password Protection

The default password is 0000 – indicates password protection has not been activated.

System password:
Management secured password protection of setup mode and calibration process.

Calibration password:
Operator secured password for protection of calibration process only.

If password(s) are activated:

- System prompts operator to enter system password:
  - Marquee: ENTER PASSWORD
  - Main display top: PASS
  - Main display bottom: 0000 (flashing)
- Correct password – Allows operator to enter setup mode for custom programming options.
- Incorrect password – Password incorrect or not entered correctly.
- System password:
  - Marquee: SYSTEM PASS INCORRECT
  - Main display: E035
- Calibration password:
  - Marquee: CAL PASS INCORRECT
  - Main display: E034
- Verify password and re-enter it.

If password(s) are de-activated:

- System enters the setup mode at the last setup menu option used by the operator.
- Marquee: Flashes current menu option
- Main display: SEL SCrn

3.2 Setup Mode Overview

The setup mode features programmable menu options. The order of the menu options is dependent on the direction the operator scrolls by pressing test or cal. The menu options are listed below by pressing cal.

General Setup Mode Menu Options

The following menu options are displayed in the main setup mode of one and two channel analyzers.

PASS

Set either of two password options:

- System password – Setup settings protected, accessed by authorized operators only
- Calibration password – Calibration menu data is protected, accessed by authorized operators only
- Default password is 0000 – Disables both passwords
- Forgot your password? Contact Response Center

DATE

Set the date in US or Europe format:

- Enter month, day and year
- Default date – System will continue to keep date and time due to battery back up, operator must set in accordance to local time zone
- If the battery is removed, the system will show 01/01/2000

TIME

Set the time:

- Enter hour and minutes in 24 hour format
- Default time – System will continue to keep date and time due to battery back up, operator must set in accordance to local time zone
- If the battery is removed the system will show 00:01

LOG

Set the data logging interval for measure log (calibration and error logs are accessed in the test mode):

- Set the log interval as hour:minute
- Default log interval is 00:00 – logging disabled
- Minimum log interval is 1 minute, maximum log interval is 99 hours and 59 minutes

RESET

Reset the analyzer to factory defaults for setup parameters:

- Use to troubleshoot the system (a hard reset can be performed if the keypad and software are not responding, refer to "6.4 Resetting the Analyzer")

WARNING

Resetting the analyzer will lose all stored information including relay, logs and calibration settings.

DISP

Set the automatic lighting options for the backlit display:

- AUtO – Brightness will change in response to ambient light source
- On – Backlit display is always on
- OFF – Backlit display is always off
- Default display – AUtO

MEAS

Set the number of significant digits, mV display option and concentration units displayed when in the measure mode:

- Set the number of significant digits displayed measure mode
  - Scroll through 2, 3 or 4 significant digits
  - Default significant digits – 3
- Enable mV values to be displayed on the second line
  - Scroll between On or OFF
  - Default mV setting – OFF
- Set the displayed concentration units
  - Scroll through AUtO (automatically ranges from ppb to ppm), PPb (parts per billion, ppb), or PP (parts per million, ppm)
  - Default displayed concentration units – AUtO

HOLD

Set the time that the system will remain on hold before the actual measurements are displayed after a calibration:

- Once the hold time expires, the system implements any programmed changes to settings in the setup mode
- After a calibration, the hold function allows the operator to rinse the electrodes prior to recording actual measurement values
- Default hold time – 30 minutes

TADJ

Adjust the temperature reading from the ATC probe by ± 5.0 °C:

- Default adjustment – 0.0 °C

ALRM

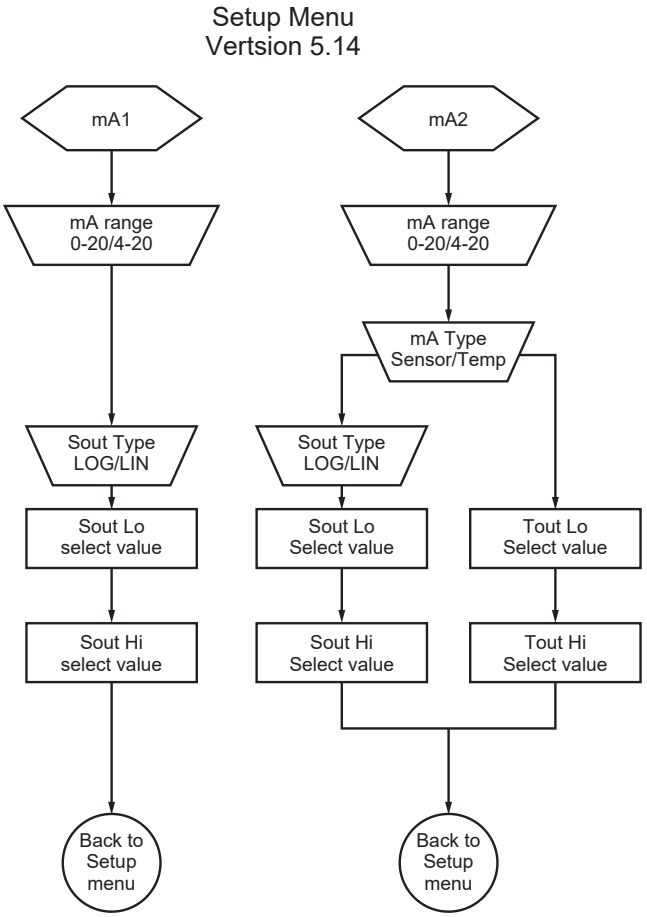
Set up to three alarms – high, low and an error signaling contact:

- Relays 1 and 2 (rLY1, rLY2) are normally open dry contacts used to set high and low alarms for measurement values
  - rLY1 and rLY2 options – OFF, HI, LO
- Relay 3 (rLY3) is normally a closed contact that can be dedicated to errors (will close if power to analyzer is lost), this alarm is influenced by calibration, errors and offline or hold status
  - rLY3 options – OFF, CAL, HOLD, Err
- Default setting for all alarms – OFF

mA1

Set the mA1 analog current output:

- Scroll between 4-20 mA or 0-20 mA current signals
  - The outputs share a common return, but are isolated from the main circuitry of the analyzer
  - Default output current: 4-20 mA
- Scroll between logarithmic (LOg) and linear (LIn) scale.
- Set the low and high limits for the sensor output (SOUt)
  - Default – 1.0 ppb (low) and 100 ppb (high)



mA2

Set the mA2 analog current output:

- Scroll between 4-20 mA or 0-20 mA current signals
  - The outputs share a common return, but are isolated from the main circuitry of the analyzer
  - Default output current: 4-20 mA

Select Sensor or Temperature for this output (SEnS and tEnP)

If Sense -

- Scroll between logarithmic (LOg) and linear (LIn) scale for SOUt
- Set the low and high limits for the sensor output (SOUt)
  - Default – 1.0 ppb (low) and 100 ppb (high)

If Temp -

- Set the low and high limits for the temperature output (tOUt)
  - Default – 5.0 °C (low) and 45.0 °C (high)

mADJ

Set the mA offset adjustment value for the sensor mA1 and mA2 outputs:

- Select OUT1 or OUT2 output
- Scroll the numeric offset value and positive or negative offset value
- Default mA offset – 00.0 mA

TEST

Test relays and analog output lines (DIAGNOSTICS will appear in the mode indicator):

- Method to activate/deactivate relays and outputs to be tested
- Verify the accuracy of the analog outputs when used with an external loop calibrator
- Provides the values and settings for the mA output and relays
- mA output
  - 4-20 or 0-20
  - The low and high values represented by mA1 and mA2
- Relay status
  - Set RLY1, RLY2 and RLY3 status to OFF or On

CAL

Set calibration frequency in hours:

- High limit is 19999 hours
- Low limit is 00000 hours
- Default setting – 720 hours

DKA

Set values for customized Double Known Addition (DKA):

- Programmable for volume (mL) of flow cell, concentration (ppm) and volume (mL) of standard 1, concentration (ppm) and volume (mL) of standard 2 and volume (mL) of additions
  - Default flow cell volume: 95.0 mL
  - Default concentration (Std1): 19.1 ppm
  - Default volume addition (Std1): 0.10 mL
  - Default concentration (Std2): 192.0 ppm
  - Default volume addition (Std2): 0.10 mL

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	SETUP (One Channel Analyzer)			
	Press setup to enter setup mode • SETUP appears as the mode indicator in the mode window • HOLD is displayed while in the setup mode • The system will enter the setup mode at the last saved menu option	PASS DATE TIME LOG RSET DISP MEAS HOLD TADJ ALRM mA1 mA2 mADJ TEST CAL DKA	SEL SCrn	The displayed menu options depend on the measurement capability of the analyzer.
	Press cal to loop through the menu options			
	Press enter to select the desired menu option and enter the submenu to customize setup parameters			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	SETUP (Two Channel Analyzer)			
	Press setup to enter setup mode • SETUP appears as the mode indicator in the mode window • HOLD is displayed while in the setup mode • The system will enter the setup mode at the last saved menu option	PASS DATE TIME LOG RSET DISP CH1 MEAS HOLD TADJ ALRM mA1 mA2 mADJ TEST CAL DKA CH2 MDL HOLD TCMP TADJ ALRM mA1 mA2 mADJ TEST CAL PH	SEL SCrn SEL SCrn SEL SCrn SEL SCrn SEL SCrn SEL SCrn SEL SCrn SEL CH1 SEL CH1 SEL CH1 SEL CH1 SEL CH1 SEL CH1 SEL CH1 SEL CH1 SEL CH1 SEL SCrn SEL CH2 SEL CH2 SEL CH2 SEL CH2 SEL CH2 SEL CH2 SEL CH2 SEL CH2 SEL CH2 SEL CH2	The list of menu options shown for CH2 are examples only. The displayed menu options for CH2 depend on the measurement capability of the channel. If only one board is installed in the analyzer, CH1 and CH2 will not be shown in the scrolling marquee and all of the menu options will be listed in the main setup mode.
	Press cal to loop through the menu options			
	Press enter to select the desired menu option and enter the submenu to customize setup parameters			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	PASS	PASS (flashing)	SEL SCrn	
	Press enter to set new passwords			
0 0 0 0		SET-UP NEW SYSTEM PASSWORD	PASS #### (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	SET-UP NEW SYSTEM PASSWORD	PASS #### (change flashing digit)	Do not scroll first digit above 9
	Press enter to accept the system password and advance to the next screen to set the calibration password			
0 0 0 0		SET-UP NEW CALIBRATION PASSWORD	PASS #### (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the valuesof the remaining digits and press setup to move through the remaining digits	SET-UP NEW CALIBRATION PASSWORD	PASS #### (change flashing digit)	Do not scroll first digit above 9
	Press enter to accept thecalibration password and return to the main setup mode			
		PASS (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	DATE	DATE (flashing)	SEL SCrn	
	Press enter to set the date			
US		SET USA OR EUROPEAN	US (flashing)	
	Press cal / test to scrollbetween US and EUrO	SET USA OR EUROPEAN	US or EUrO (flashing)	
	Press enter to accept the setting and advance to the next screen			
01/01/ 2000		ENTER DATE MM/ DD/YYYY (US) or ENTER DATE DD/ MM/YYYY (EUrO)	##.## (Month. Day) 20## (Year) or ##.## (Day. Month) 20## (Year) (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the valuesof the remaining digits and press setup to move through the remaining digits	ENTER DATE MM/ DD/YYYY (US) or ENTER DATE DD/ MM/YYYY (EUrO)	##.## (Month. Day) 20## (Year) or ##.## (Day. Month) 20## (Year) (change flashing digit)	
	Press enter to accept the date setting and return to the main setup mode			
		DATE (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	TIME	TIME (flashing)	SEL SCrn	
	Press enter to set the time			
00:01		ENTER 24HR TIME HOUR/MINUTE	##:## (hour : minute) (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the valuesof the remaining digits and press setup to move through the remaining digits	ENTER 24HR TIME HOUR/ MINUTE	##:## (hour : minute) (change flashing digit)	Set in 24hour time format
	Press enter to accept the time setting and return to the main setup mode			
		TIME (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	LOG	LOG (flashing)		SEL SCrn
	Press enter to set the log interval			
00:00		SET LOG TIME IN HOUR/ MINUTE	##:## (hour : minute) LOg (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	SET LOG TIME IN HOUR/ MINUTE	##:## (hour : minute) LOg (change flashing digit)	To disable the log enter 0000 for the log interval The minimum log interval is 1 minute and the maximum log interval is 99 hours and 59 minutes
	Press enter to accept the log setting and return to the main setup mode			
		LOG (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

WARNING

The reset command will erase all operator settings, logs and calibration data. The analyzer will need to be set up and calibrated again before it can resume operation.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	RSET	RSET (flashing)	SEL SCrn	
	Press enter to reset theanalyzer			
		PUSH TEST VIEWENTER TO RESET	rSEt ?	
	To Reset the Analyzer:			
	Press test Press view +/- Press enter When the reset is complete, the system will return to the measure mode. The operator will need to re-enter the setup mode to continue programming the setup parameters. Press setup to return to the setup mode.	PUSH TEST VIEWENTER TO RESET	rSEt ?	This command resets all previously set parameters to factory default values. Use this command only to set the analyzer to original factory setup values.
	To Abort the Reset:			
	Press last screen to return to the main setup mode	PRESS TEST VIEW ENTER TO RESET	rSEt ?	
		RSET (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

WARNING

Resetting the analyzer will erase all stored information including relay, logs and calibration settings.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	DISP	DISP (flashing)	SEL SCrn	
	Press enter to set the lighting option for the backlit display			
AUtO		BACK LITE	LItE AUtO (flashing)	
	Press cal / test to scroll through AUtO, OFF and On settings	BACK LITE	LItE AUtO, OFF or On (flashing)	
	Press enter to accept the display setting and return to the main setup mode			
		DISP (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

NOTE

The following menu options are for analyzers with two boards installed only. If two channels are used, select the channel number in the main setup mode (CH1 or CH2) and additional menu options will be displayed.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	CH1	CH1 (flashing)	SEL SCrn	CH1 will not be shown in scrolling marquee if only one board is installed
	Press enter to set the channel 1 specific menus in the setup mode			
	Press cal to loop through the channel specific menu options	MEAS (flashing)	SEL CH1	
	Press enter to select a menu option and customize the parameter (refer to the menu option displays that are shown on the following pages for detailed instructions)			
		CH1 (flashing)	SEL SCrn	
	Press cal to scroll tothe next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	CH2	CH2 (flashing)	SEL SCrn	CH2 will not be shown in scrolling marquee if only one board is installed
	Press enter to set the channel 2 specific menus in the setup mode			
	Press cal to loop through the channel specific menu options	MDL (flashing)	SEL CH2	
	Press enter to select a menu option and customize the parameter (when a pH/ORP or conductivity board is installed on channel 2, refer to the Thermo Scientific Orion 2100 Series pH/ORP Analyzer and Conductivity Analyzer User Guide for detailed instructions on the menu option displays)			
		CH2 (flashing)	SEL SCrn	
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	MEAS	MEAS (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set measure parameters			
3		SET NUMBER OF SIGNIFICANT DIGITS	Sig 3 (flashing)	
	Press cal / test to scroll through 2, 3 and 4	SET NUMBER OF SIGNIFICANT DIGITS	Sig 2, 3 or 4 (flashing)	
	Press enter to accept the setting and advance to the next screen			
OFF		SHOW MV ON SINGLE CHANNEL DISPLAY	OFF (flashing)	
	Press cal / test to scroll between OFF and On	SHOW MV ON SINGLE CHANNEL DISPLAY	OFF or On (flashing)	
	Press enter to accept the setting and advance to the next screen			
AUtO		SELECT ISE UNIT	Unit AUtO (flashing)	
	Press cal / test to scroll through AUtO, PPb and PP	SELECT ISE UNIT	Unit AUtO, PPb or PP (flashing)	PP is used as an abbreviation for ppm
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		MEAS (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	HOLD	HOLD (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the hold time			
00:30		ENTER HOLD TIME HOUR/MINUTE	##:## (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER HOLD TIME HOUR/MINUTE	##:## (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
LASt		ENTER HOLD STATELAST OR USER VALUE	LASt (flashing	
	Press cal / test to scroll between LASt and USEr	ENTER HOLD STATELAST OR USER VALUE	LASt or USEr (flashing)	
	Press enter to accept the setting and advance to the next screen			
21.0		ENTER FIXED USER VALUE IN mA	##.# (first digit flashing)	Displayed ifUSEr was selected in previous screen
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER FIXED USER VALUE IN mA	##.# (change flashing digit)	Action required if USEr was selected in previous screen
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER FIXED USER VALUE IN mA	##.# (change flashing digit)	Action required if USEr was selected in previous screen
	Press enter to accept the setting and advance to the next screen			Action required if USEr was selected in previous screen
OFF		HOLD TO 22mA WHEN ERROR	OFF (flashing)	
	Press cal / test to scroll between OFF and On	HOLD TO 22mA WHEN ERROR	OFF or On (flashing)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed fortwo channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		HOLD (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	TADJ	TADJ (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the temperature adjustment value			
0.0 C		TEMPERATURE ADJUSTMENT	AdJ #.# c (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the value of the next digit	TEMPERATURE ADJUSTMENT	AdJ #.# c (change flashing digit)	The maximum temperature adjustment is ± 5.0 °C
	Press view +/- to set a positive or negative temperature value	TEMPERATURE ADJUSTMENT	AdJ - #.# c	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		TADJ (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	ALRM	ALRM (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the alarms			
OFF		SELECT ALARM 1 HIGH LOW OR OFF	rLY1 OFF (flashing)	
	Press cal / test to scroll through OFF, HI and LO	SELECT ALARM 1 HIGH LOW OR OFF	rLY1 OFF, HI or LO (flashing)	
	Press enter to accept the setting and advance to the next screen			
100 ppb	Set the HI or LO value for rLY1: Press • to move the decimal point Press cal / test to set thefirst digit Press setup to move to thenext digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER VALUE	rLY1 ##.## (change flashing digit)	Displayed ifHI or LO was selected for rLY1 in previous screen
	Press enter to accept the setting and advance to the next screen			Action required if HI or LO was selected for rLY1 in previous screen
OFF		SELECT ALARM 2 HIGH LOW OR OFF	rLY2 OFF (flashing)	
	Press cal / test to scroll through OFF, HI and LO	SELECT ALARM 2 HIGH LOW OR OFF	rLY2 OFF, HI or LO (flashing)	
	Press enter to accept the setting and advance to the next screen			
1 ppm	Set the HI or LO value for rLY1: Press • to move the decimal point Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER VALUE	rLY2 ##.## (change flashing digit	Displayed ifHI or LO was selected for rLY2 in previous screen
	Press enter to accept the setting and advance to the next screen			Action required if HI or LO was selected for rLY2 in previous screen
OFF		SELECT CALIBRATION HOLD ERROR OR OFF	rLY3 OFF (flashing)	
	Press cal / test to scroll through OFF, CAL, HOLd and Err	SELECT CALIBRATION HOLD ERROR OR OFF	rLY3 OFF, CAL, HOLd or Err (flashing)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		ALRM (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Configuring the analog output mA1

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	mA1	mA1 (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the analog output 1			
4-20	Press cal / test to scroll between 4-20 and 0-20	SELECT 0-20 OR 4-20	4-20 or 0-20 (flashing)	
	Press enter to accept the setting and advance to the next screen			
	Press cal / test to scroll between LOg and LIn	SELECT LOG OR LINEAR OUTPUT	SOUt LOg or LIn (flashing)	
	Press enter to accept the setting and advance to the next screen			
1 ppb		mA SENSOR OUTPUT LOW VALUE	LO ###.# (first digit flashing)	
	Press • to move the decimal point Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	mA SENSOR OUTPUT LOW VALUE	LO ###.# (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
100 ppb		mA SENSOR OUTPUT HIGH VALUE	HI ###.# (first digit flashing)	
	Press • to move the decimal point Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	mA SENSOR OUTPUT HIGH VALUE	HI ###.# (change flashing digit)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		mA1 (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Configuring the analog output mA2

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	mA2	mA2 (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the analog output 2			
4-20	Press cal / test to scrollbetween 4-20 and 0-20	SELECT 0-20 OR 4-20	4-20 or 0-20 (flashing)	
	Press enter to accept the setting and advance to the next screen			
		AOUT 2 SENSOR OR TEMPERATURE	SEnS (flashing)	
	If choosing Sensor:			
	Press cal / test to scroll between SEnS or tEnP and select SEnS	AOUT 2 SENSOR OR TEMPERATURE	SEnS (flashing)	
	Press enter to accept the setting and advance to the next screen			
LOg	Press cal / test to scroll between LOg and LIn	SELECT LOG OR LINEAR OUTPUT	LOg or LIn (flashing)	
	Press enter to accept the setting and advance to the next screen			
1 ppb		mA SENSOR OUTPUT LOW VALUE	LO ###.# (first digit flashing)	
	Press • to move the decimal point Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	mA SENSOR OUTPUT LOW VALUE	LO ###.# (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
100 ppb		mA SENSOR OUTPUT HIGH VALUE	HI ###.# (first digit flashing)	
	Press • to move the decimal point Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	mA SENSOR OUTPUT HIGH VALUE	HI ###.# (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		mA2 (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			
	If choosing temperature:			
	Press cal / test to scroll between SEnS or tEnP and select tEnP	AOUT 2 SENSOR OR TEMPERATURE	tEnP (flashing)	
	Press enter to accept the setting and advance to the next screen			
05.0 C		mA TEMP OUTPUT LOW VALUE	LO ##.# c (first digit flashing)	

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to set a positive or negative temperature value	mA TEMP OUTPUT LOW VALUE	LO ##.# C (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
45.0 C		mA TEMP OUTPUT HIGH VALUE	HI ##.# c (first digit flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press to move through the remaining digits	mA TEMP OUTPUT HIGH VALUE	HI ##.# c (change flashing digit)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		mA2 (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	mADJ	mADJ (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the sensor and temperature mA offset values			
		SELECT mA1 OR mA2 OUTPUT	OUT1 or OUT2 (flashing)	
	Press cal / test to scroll between OUT1 or OUT2 and select OUT1	SELECT mA1 OR mA2 OUTPUT	OUT1 (flashing)	
	Press enter to accept the setting and advance to the next screen			
0.00		mA1 OUTPUT ADJUSTMENT	AdJ 0.0# (last flashing digit)	
	Press cal / test to set the sensor mA offset value Press view +/- to set a positive or negative sensor mA offset	mA1 OUTPUT ADJUSTMENT	AdJ 0.0# (change flashing digit)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		mADJ (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the sensor and temperature mA offset values			
		SELECT mA1 OR mA2 OUTPUT	OUT1 or OUT2 (flashing)	
	Press cal / test to scroll between OUT1 or OUT2 and select OUT2	SELECT mA1 OR mA2 OUTPUT	OUT2 (flashing)	
	Press enter to accept the setting and advance to the next screen			
0.00		mA2 OUTPUT ADJUSTMENT	AdJ 0.0# (last flashing digit)	
	Press cal / test to set the temperature mA offset value Press view +/- to set a positive or negative temperature mA offset	mA2 OUTPUT ADJUSTMENT	AdJ 0.0# (change flashing digit)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		mADJ (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	TEST	TEST (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to test the mA outputs (4-20) and relays (rLY)			
	To Test OUT2			
4-20	Press cal / test to scroll between 4-20 and rLY settings and select 4-20	SELECT mA OR RELAY	tESt 4 - 20 (flashing)	
	Press enter to test 4-20 outputs			
		SELECT mA1 OR mA2 OUTPUT	4 - 20 OUT1 or OUT2 (flashing)	
	Press cal / test to scroll between OUT1 and OUT2 settings and select OUT2	SELECT mA1 OR mA2 OUTPUT	4 - 20 OUT1 or OUT2 (flashing)	
	Press enter to display the OUT2 low			
Actual low value displayed		mA TEMP OUTPUT LOW VALUE	LO #.# c	4.0 mA are sourced at output terminal 11
	Press enter to display the OUT2 high			
Actual high value displayed		mA TEMP OUTPUT HIGH VALUE	HI #.# c	20 mA are sourced at output terminal 11
	Press enter to accept the test and return to the main setup mod			
		CH1 or CH2 (flashing)	SEL SCrn	Display for two channel analyzer only
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer only
		TEST (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to test the mA outputs (4-20) and relays (rLY)			
	To Test mA1:			
4-20	Press cal / test to scroll between 4-20 and rLY settings and select 4-20	SELECT mA OR RELAY	tESt 4 - 20 (flashing)	
	Press enter to test 4-20 outputs			
		SELECT mA1 OR mA2 OUTPUT	4 - 20 OUT1 or OUT2 (flashing)	
	Press cal / test to scroll between OUT1 and OUT2 settings and select OUT1	SELECT mA1 OR mA2 OUTPUT	4 - 20 OUT1 (flashing)	
	Press enter to display the mA1 low value			
Actual low value displayed		mA SENSOR OUTPUT LOW VALUE	LO #.#	4.0 mA are sourced at output terminal 9
	Press enter to display the mA1 high			
Actual high value displayed		mA SENSOR OUTPUT HIGH VALUE	HI #.#	20.0 mA are sourced at output terminal 9
	Press enter to accept the test and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Display for two channel analyzer only
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer only

Default	Operator Action	Scrolling Marquee	Main Display	Notes
		TEST (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to testthe mA outputs (4-20) and relays (rLY)			
	To Test rLY			
4-20	Press cal / test to scroll between 4-20 and rLY settings and select rLY	SELECT mA OR RELAY	tESt rLY (flashing)	
Actual rLY1 status	Press enter to test relay outputs Press cal / test to set the rLY1 setting OFF or On	USE ARROWS TO TOGGLE RELAY 1	rLY1 OFF or On	Relay contact according to screen indication
	Press enter to accept the rLY1 test and move to the rLY2 test			
Actual rLY2 status	Press cal / test to set the rLY2 setting OFF or On	USE ARROWS TO TOGGLE RELAY 2	rLY2 OFF or On	Relay contact according to screen indication
	Press enter to accept the rLY2 test and move to the rLY3 test			
Actual rLY3 status	Press cal / test to set the rLY3 setting OFF or On	USE ARROWS TO TOGGLE RELAY 3	rLY3 OFF or On	Relay contact according to screen indication
	Press enter to accept the rLY3 test and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Display for two channel analyzer only
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer only
		TEST (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	CAL	CAL (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set the required calibration frequency			
0720		ENTER CALIBRATION FREQUENCY IN HOURS	CAL #### (first digit flashing)	To disable the calibration alarm, set the value to 0000
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER CALIBRATION FREQUENCY IN HOURS	CAL #### (change flashing digit)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Display for two channel analyzer only
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		CAL (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	DKA	DKA (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press enter to set custom DKA settings for the electrode calibration			
95.0 mL		ENTER FLOW CELL VOLUME IN mL	FCEL ###.# (flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	ENTER FLOW CELL VOLUME IN mL	FCEL ###.# (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
19.1 ppm		SET STD1 CONCENTRATION	COnC ###.# (flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	SET STD1 CONCENTRATION	COnC ###.# (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
0.10 mL		SET STD1 VOLUME IN mL	Std1 ##.## (flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	SET STD1 VOLUME IN mL	Std1 ##.## (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
192.0 ppm		SET STD2 CONCENTRATION	COnC ###.# (flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	SET STD2 CONCENTRATION	COnC ###.# (change flashing digit)	
	Press enter to accept the setting and advance to the next screen			
0.10 mL		SET STD2 VOLUME IN mL	Std2 ##.## (flashing)	
	Press cal / test to set the first digit Press setup to move to the next digit Press cal / test to set the values of the remaining digits and press setup to move through the remaining digits	SET STD2 VOLUME IN mL	Std2 ##.## (change flashing digit)	
	Press enter to accept the setting and return to the main setup mode			
		CH1 or CH2 (flashing)	SEL SCrn	Displayed for two channel analyzer

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Press enter to return to the channel specific menu options in the setup mode			Action required for two channel analyzer
		DKA (flashing)	SEL SCrn	SEL CH1 or SEL CH2 on main display of two channel analyzer
	Press cal to scroll to the next menu			

3.3 Shutdown and Start-Up Procedure

The following steps should be taken if a loss of sample flow is expected for more than one day. These procedures will prevent possible build-up of caustic reagent vapors in the analyzer.

■ Shutdown

● Air Pump Shutdown

WARNING

Turn off the air pump prior to removing reagent bottle. The air pump will spatter caustic reagent outward as bottle is removed. Wear rubber gloves and safety goggles to avoid possible injury from reagent residues in the system.

1. To access air pump, press setup.
2. Press cal/test to scroll though parameters until TEST appears in marquee window.
3. Press enter to access the TEST menu.
4. Press cal/test to scroll through the TEST menu until AIr appears in the main display.
5. Press enter.
6. Press cal/test to toggle between On and OFF settings for the air pump power. Select the OFF setting. Changing the air pump setting to On or OFF will be indicated by a click sound.
7. Press enter to accept the setting and return to the TEST menu.
8. Press exit to measure to return to the measure mode.

● Analyzer Shutdown

1. Shut off sample flow prior to the analyzer inlet. Refer to Chapter 4, Flow Regulation.
2. Disconnect the power. Refer to "2.3 Wiring the Analyzer".
3. Drain the flow cell.
4. Remove the reagent bottle and store it in a well-ventilated area such as a laboratory fume hood.
5. Carefully pull the sodium and reference electrodes out of the top of the flow cell and let them hang by their connectors.
6. Locate the protective cap from reference electrode kit and place it on the base of the reference electrode to prevent it from drying out.

Start-Up

1. Replace the diffusion tubing if the sample flow was off for more than a few days. Tubing becomes brittle with long-term exposure to the reagent. If the age of the reagent is not known, replace it and note the date in the maintenance records. Re-install the reagent bottle on the analyzer.
2. Etch the sodium electrode. Rinse the sodium electrode with deionized water and carefully re-install the electrode on the analyzer. Refer to Chapter 2, Conditioning and Installation of a New Sodium Electrode.
3. Restore sample flow to the analyzer. If necessary, adjust pressure and flow rate through the analyzer to 40 mL/minute for the Ammonia and DIPA Application Packages and 25 mL/minute for the Cation/High Acid Application Package.
4. Remove the protective cap from the reference electrode. Re-install the electrodes on the analyzer. Be careful not to disconnect the reservoir tubing from the reference electrode sidearm.
5. Allow the analyzer to stabilize for approximately 1 hour and then recalibrate. Refer to "4.4 Performing a DKA Calibration".

4. Calibration

4.1 Calibration Setup

The WE420 Sodium Analyzer provides simple and fast calibration cycles using Double Known Addition (DKA) that quickly have your system back online with security and confidence. The WE420 Sodium Analyzer is offered with three application packages that are uniquely designed to accommodate the changing requirements for successful sodium monitoring. Each application package requires a specific reagent to provide the most accurate and reliable results during calibration and analysis.

Prior to performing a calibration, refer to Chapter 3, Use of the Setup Mode for instructions on how to properly configure the WE420 Sodium Analyzer. The concentration values of the calibration standards, volumes of the calibration standards and the volume of the flow cell must be entered in the setup mode.

Standards should be selected based on the required measurement range. Refer to the chart below for the standard concentration and volume values based on your measurement range and application. To calibrate the WE420 Sodium Analyzer, use the sodium standard solution kit (Cat No. 181140).

Input the flow cell volume according to the precise factory calibration volume that is printed on the side of each flow cell.

Application	Range	DKA Standard (Setup Mode)	Standard Concentration	Standard Volume	Standard Cat. No.
• Feedwater/ make-up water • Boiler feedwater • Demineralized water • Steam condensate	Low Range 0.1 ppb to 100 ppb	Std1	19.1 ppm	0.1 mL	181140 (Low Level Standard 1)
		Std2	192.0 ppm	0.1 mL	181140 (Low Level Standard 2)

Reagent: 181140 must be purchased directly from Thermo Fisher Scientific.inc.

4.2 Flow Cell Operation

The sample reservoir in the flow cell, as shown in Figure 4.1, has two sample volumes: a normal operation volume of 20 mL and a highly accurate and individually calibrated flow cell volume of approximately 95 mL. The lower volume results in fast system response while online and the higher volume ensures accuracy in calibration.

Calibration level and measure level can be switched by pushing/pulling in the diverter valve on the flow cell.

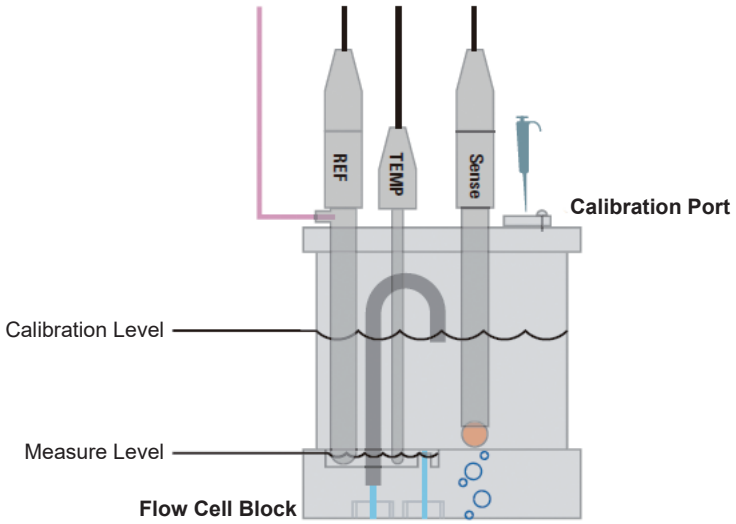


Figure 4.1

Recommendations

When the WE420 Sodium Analyzer is first commissioned, it is advisable to flush out fluidics system overnight prior to initial calibration and use. The electronics need not be turned on at this time. Refer to Chapter 4, Rinsing the Flow Cell.

- For accurate volume displacement install the ATC probe, sodium sensing electrode and reference electrode in their respective flow cell cap ports. Refer to Chapter 2, Installation of a New Sodium Electrode; Chapter 2, Installation of the ATC Probe and Chapter 2, Installation of a New Reference Electrode.
- Close the calibration port.
- When rinsing the flow cell before a low level standard calibration, be sure to rinse off the inside of the reservoir lid with deionized water to prevent build up of sodium contamination along the lid.
- To ensure the analyzer achieves stability and minimize interference during calibration, the operator should minimize activity on system during calibration.

Rinsing the Flow Cell

WARNING

Be sure to follow the procedure for rinsing the flow cell.

1. Open the sample inlet valve, see A.
   - Position the valve with the pointed end facing up for open position.
2. Open the bypass/needle valve by turning it counterclockwise, see B.
   - Check for the appropriate sample flow.
   - Adjust the pressure regulator if required. See step 3.
3. Adjust the knob on the pressure regulator, see C, so the ball in the flow meter indicates the correct flow rate reading, see D. The flow rate should be adjusted to 40 mL/minute for the Ammonia and DIPA Application Packages.
   - Pull out the knob to unlock the setting and allow adjustment of the flow rate.
   - Turn the knob clockwise to increase the flow rate.
   - Turn the knob counterclockwise to decrease the flow rate.
   - Push in the knob to lock the setting.
4. Push in the diverter valve on the flow cell.
   - The flow cell will begin to fill.
5. Flush the flow cell for up to 60 minutes. The sample will drain from the siphon tube into the siphon drain to the waste.
6. Begin a DKA calibration. Refer to "4.3 Before Performing a DKA Calibration".

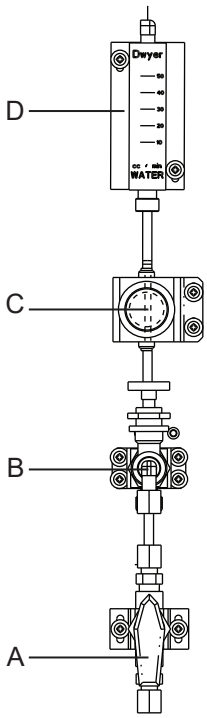


Figure 4.2

Air Regulation

The WE420 Sodium Analyzer utilizes pressure, gravity and fluid dynamics as the principal force of operation for the fluidic system.

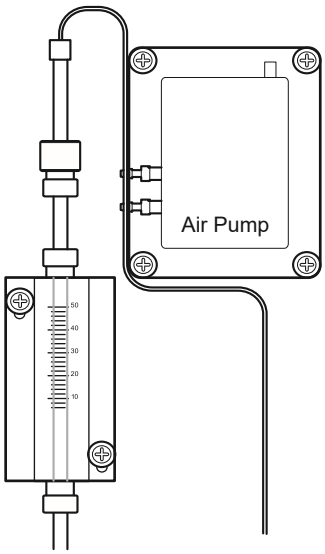


Figure 4.3

4.3 Before Performing a DKA Calibration

Maximum system accuracy is ensured through a fast, easy and accurate calibration performed in the expected sample range.

Recommendations

- Perform monthly maintenance procedures including conditioning of the electrode.
- Wait at least one hour after changing the reagent or etching the sodium electrode. Calibration must be initiated within 2 to 3 hours of the sodium electrode etching to ensure faster response.
- Check that the present sample concentration is equal or less than that of standard 1. If not, calibration can still be performed with a loss in accuracy as long as background concentration is not significantly larger than the concentration of standard 1.
- Proper pipet technique is crucial to the calibration. If the operator is not familiar with pipet equipment or technique, refer to the Appendix, Pipet Operation section.
- Do not touch the pipet tip with bare fingers. Risk of contamination is possible. Use powder free gloves to prevent contamination.
- When using a pipet to inject standards during calibration, use a fresh pipet tip for each standard and each injection.
- When a fresh tip is installed, rinse the tip with the same concentration standard as the intended injection.
- Fill the tip and dispense the standard 1 to 3 times before injecting the standard into the flow cell. Be sure to discard the standard in the drain between rinses.
- Wipe any excess liquid from the outside of the tip with out touching the opening.
- Insert the pipet tip into calibration port on flow cell cap.
- Be sure to hold the pipet completely vertical while dispensing. Do not inject the standard on the side of the flow cell, as a film may be retained on the inside of the wall, resulting in errors in precision of calibration. Refer to Figure 4.4.

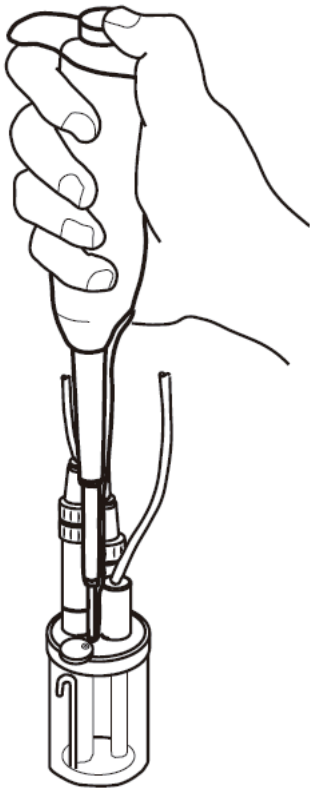


Figure 4.4 Pipet Dispensin

4.4 Performing a DKA Calibration

- To begin a DKA calibration, the system starts from the measure mode.
- The calibration port must be closed for proper flow cell pressure.
- The values of the calibration standards, volumes of the calibration standards and the volume of the flow cell must be entered in the setup mode prior to performing a calibration. Refer to Chapter 3, Use of the Setup Mode and Chapter 4, Calibration Setup.

Step	Operator Action	Scrolling Marquee	Main Display	Notes
1	Make sure that the analyzer is in the measure mode.	Actual temperature reading	Actual concentration reading	
2	Press cal to initiate the calibration.			CAL appears as mode
3	If the calibration passwordis active, enter the calibration password by pressing cal / test to set the first digit, setup to move to the next digit, cal / test to set the values of the remaining digits and setup to move through the remaining digits. Press enter to accept the password.	ENTER PASSWORD	PASS ####	
4		CH1 or CH2 (flashing)	CAL CHnL	Displayed for two channel analyzer
5	Press cal / test to select the channel that will be calibrated and press enter to begin the calibration.	CH1 or CH2 (flashing)	CAL CHnL	Action required for two channel analyzer
6		DKA or OFFL (flashing)	CAL tYPE	
7	Press cal / test to select DKA and press enter to accept the setting.	DKA (flashing)	CAL tYPE	
8	Follow the sodium electrode etching procedure in Chapter 2 and press enter once the electrode is reinstalled in the flow cell.	ETCH SENSOR PRESS ENTER	EtCH SEnS	
9	Check that the calibration port on the flow cell cap is closed. Push the diverter valve in.Wait 60 minutes.	CHECK CAL PORT CLOSED PUSH DIVERTER VALVE IN WAIT 60 MINUTES	Actual concentration reading	The minutes will be counted down on marquee. After 60 minutes the marquee will display PRESS ENTER.
10	Press enter.	PRESS ENTER	Actual concentration reading	
11	When the liquid level in the flow cell begins to drop, turn the inlet valve off. Open the calibration port on the flow cell cap. Press enter.	WHEN LIQUID LEVEL BEGINS TO DROP TURN INLET VALVE OFF OPEN CAL PORT PRESS ENTER	FLO OFF	
12	Wait 2 minutes.	STARTING CALIBRATION MEASURING BACKGROUND WAIT 2 MINUTES	Actual readings flashing	System circulates sample. Minutes will be counted down on the marquee.
13	Wait 0 to 8 minutes.	AWAITING DATA STABILITY	Actual readings flashing	System continuously evaluates the data until a stable condition is met. If there is a calibration error, the appropriate error message will be displayed.
14	Add standard 1 through the calibration port.	ADD STD1 PRESS ENTER	Add Std1	
15	Press enter.	ADD STD1 PRESS ENTER	Add Std1	

Step	Operator Action	Scrolling Marquee	Main Display	Notes
16	Wait 2 minutes.	MEASURING STD1 CIRCULATING WAIT 2 MINUTES	Actual readings flashing	System circulates sample. Minutes will be counted down on the marquee.
17	Wait 0 to 8 minutes.	AWAITING DATA STABILITY	Actual readings flashing	System continuously evaluates the data until a stable condition is met. If there is a calibration error, the appropriate error message will be displayed.
18	Add standard 2 through the calibration port.	ADD STD2 PRESS ENTER	Add Std2	
19	Press (enter).	ADD STD2 PRESS ENTER	Add Std2	
20	Wait 2 minutes.	MEASURING STD2 CIRCULATING WAIT 2 MINUTES	Actual readings flashing	System circulates sample. Minutes will be counted down on the marquee.
21	Wait 0 to 8 minutes.	AWAITING DATA STABILITY	Actual readings flashing	System continuously evaluates the data until a stable condition is met. If there is a calibration error, the appropriate error message will be displayed.
22	No action necessary.			System calculates new E_0 and slope and checks for errors. If there is a calibration error, the appropriate error message will be displayed.
23	Press (enter) to accept the new slope and E_0 values or Press (exit to measure) to abort the calibration. The new slope and E_0 values will not be saved. The last saved calibration prior to the aborted calibration will be used in the measure mode.	NEW CALIBRATION SLOPE AND E_0 PRESS ENTER TO ACCEPT OR PRESS EXIT TO ABORT WITHOUT SAVING	Calculated Slope and E_0	If is pressed, refer to the Calibration Abort Steps section.
24	Pull the diverter valve out. Turn the inlet valve on. Close the calibration port on the flow cell cap.	PULL DIVERTER VALVE OUT TURN INLET VALVE ON CLOSE CAL PORT PRESS ENTER	FLO On	
25	Press (enter).	PULL DIVERTER VALVE OUT TURN INLET VALVE ON CLOSE CAL PORT PRESS ENTER	FLO On	
26	System will proceed to measure mode.	Actual temperature reading	Actual concentration reading	System enters measure mode, but will remain on hold until the hold timer expires. Default hold time is 30 minutes.

4.5 Calibration Abort Steps

The system allows the operator to abort the calibration or return to the calibration when exit to measure is pressed at any point during the calibration.

The following table lists the calibration abort steps with their marquee display and required operator actions.

Step	Operator Action	Scrolling Marquee	Main Display	Notes
Calibration Abort Exit Steps – If exit to measure is pressed at any point during the calibration, proceed with the following steps				
Exit 1		ARE YOU SURE? PRESS ENTER TO ABORTOR PRESS LAST SCREEN TO BACKUP	SUrE ?	
Exit 2	Press enter to abort the calibration. or Press last screen to return to the last screen used in the calibration sequence prior to when exit to measure was pressed. Continue to follow the calibration steps according to the marquee and main display directions.	ARE YOU SURE? PRESS ENTER TO ABORTOR PRESS LAST SCREEN TO BACKUP	SUrE ?	
Exit 3		CALIBRATION ABORTED PRESS ENTER	CAL Abrt	
Exit 4	Press enter to abort the calibration.	CALIBRATION ABORTED PRESS ENTER	CAL Abrt	
Exit 5	Pull the diverter valve out. Turn the inlet valve on. Close the calibration port on the flow cell cap.	PULL DIVERTER VALVE OUT TURN INLET VALVE ONCLOSE CAL PORT PRESS ENTER	FLO On	
Exit 6	Press enter.	PULL DIVERTER VALVE OUT TURN INLET VALVE ONCLOSE CAL PORT PRESS ENTER.	FLO On	
Exit 7	No operator action needed. The system will enter the measure mode and remain on hold until the hold timer expires (default hold time is 30 minutes).	Actual temperature reading	Actual concentration reading	

4.6 Calibration Error Codes

At any point during a calibration, the appropriate error message will be displayed if there is a calibration related error.

The following table lists common calibration error codes with their marquee display and required operator actions.

Step	Operator Action	Scrolling Marquee	Main Display	Notes
Stability Time Out Error				
Error 41	Press enter to continue the calibration despite the reading instability. or Press exit to measure to abort the calibration and refer to Exit 3. Repeat the calibration or refer to the troubleshooting section.	READINGS WERE UNSTABLE PRESS ENTER TO CONTINUE CALIBRATION OR PRESS EXIT TO ABORT	E041	The required system stability was not reached and a time out error occurred. Perform electrode cleaning, conditioning and troubleshooting.
Calibration Errors				
Error 42	Press enter to abort the calibration and refer to Exit 3. Verify that the correct standards were used during the calibration, the standard values were entered correctly and in the right order and the electrodes are working properly and then repeat the calibration.	INVALID SLOPE PRESS ENTER	E042	The calculated slope was invalid. Standard values were likely entered in the wrong sequence or wrong standard values were entered.
Error 107	Press enter to abort the calibration and refer to Exit 3.	CALIBRATION DATA TOO CLOSE TOGETHER PRESS ENTER	E107	Use new standards. Perform electrode cleaning, conditioning and troubleshooting.
Error 109	Press enter to continue the calibration despite the bad slope. or Press exit to measure to abort the calibration and refer to Exit 3.	CH1 BAD SLOPE PRESS ENTER	E109	The calculated slope was outside of the recommended range. Perform electrode cleaning and conditioning, refer to the troubleshooting section and repeat the calibration.
Error 110	Press enter to continue the calibration despite the bad slope. or Press exit to measure to abort the calibration and refer to Exit 3.	CH2 BAD SLOPE PRESS ENTER	E110	The calculated slope was outside of the recommended range. Perform electrode cleaning and conditioning, refer to the troubleshooting section and repeat the calibration.
Error 125	Press enter to abort the calibration and refer to Exit 3. Verify that the correct standards were used during the calibration, the standard values were entered correctly and in the right order and the electrodes are working properly and then repeat the calibration.	CH1 BAD OFFSETPRESS ENTER	E125	Use new standards. Perform electrode cleaning, conditioning and troubleshooting.
Error 126	Press enter to abort the calibration and refer to Exit 3. Verify that the correct standards were used during the calibration, the standard values were entered correctly and in the right order and the electrodes are working properly and then repeat the calibration.	CH2 BAD OFFSETPRESS ENTER	E126	Use new buffers or standards. Perform electrode cleaning, conditioning and troubleshooting.

4.7 Calibration At Custom Concentrations Using DKA

The WE420 Sodium Analyzer software has default values to accommodate 0.1 mL additions of standard 1 and standard 2 and flow cell volume of approximately 95 mL.

The operator has the option to use alternate standards by changing, in the setup mode, the flow cell volume, the standard 1 and standard 2 values and the volumes to be used.

Let V_C = Flow cell volume Default: 95.0 mL

C_1 = Standard 1 concentration Default: 19.1 ppm

C_2 = Standard 2 concentration Default: 192 ppm

V_1 = Volume of standard 1 added Default: 0.1 mL

V_2 = Volume of standard 2 added Default: 0.1 mL

dC_1 = Concentration change due to the first addition

dC_2 = Concentration change due to the second addition

$dC_1 = C_1 \times V_1 / (V_1 + V_C)$

$dC_2 = C_2 \times V_2 / (V_1 + V_2 + V_C)$

For Maximum Accuracy

- dC_1 should be at least twice the normal concentration in the sample
- dC_2 should be about ten times of dC_1
- dC_1 should not be less than 10 ppb

4.8 Span Check Procedure

The WE420 Sodium Analyzer remains in the sample mode during the entire procedure.

1. The electrode must be etched within 2 to 3 hours of this procedure.
2. Fill the flow cell to the calibration level (V_0, approximately 95 mL).
3. Record the concentration that is displayed when the reading is reasonably stable (C_0).
4. Add standard 1, volume V1, with concentration C_1.
5. When the reading is reasonably stable, record the concentration (C_S).
6. The recorded value should be within ± 10% of the calculated value according to:
   $C_S = (C_0 \times V_0 + C_1 \times V_1) / (V_0 + V_1)$
   - C_1 should be the concentration actually in the standard bottle.

4.9 Offline Calibration Procedure

The offline calibration feature is simply a one point calibration without slope change. The term “offline calibration” refers only to the fact that a sample from WE420 Sodium Analyzer bypass is taken “offline” for laboratory analysis; in fact, no downtime is experienced and the analyzer remains online throughout the procedure.

Step	Operator Action	Scrolling Marquee	Main Display	Notes
1	Open the bypass/needle valve to redirect the sample flow.	Actual temperature reading	Actual concentration reading	
2	Press cal to initiate the calibration.			HOLD and CAL appear as mode.
3	If the calibration password is active, enter the calibration password by pressing cal / test to set the first digit, setup to move to the next digit, cal / test to set the values of the remaining digits setup and to move through the remaining digits. Press enter to accept the password.	ENTER PASSWORD	PASS ####	
4		CH1 or CH2 (flashing)	CAL CHnL	Displayed for two channel analyzer
5	Press cal / test to select the channel that will be calibrated and press enter to begin the calibration.	CH1 or CH2 (flashing)	CAL CHnL	Action required for two channel analyzer
6		DKA or OFFL (flashing)	CAL tYPE	
7	Press cal / test to select OFFL and press enter to accept the setting	OFFL (flashing)	CAL tYPE	
8	Wait 1 to 10 minutes.	MEASURING SAMPLE WAIT 1 MINUTE AWAITING DATA STABILITY	Actual readings flashing	System continuously evaluates the data until a stable condition is met.
9	Take a QC sample from the 2111XP analyzer bypass for laboratory analysis. Press enter.	TAKE SAMPLE FROM BYPASS DRAIN PRESS ENTER TO USE METER THEN PRESS CAL TO ENTER LAB RESULTS	LAb	
10	Perform laboratory analysis on QC sample and return with results.	Actual temperature reading	Actual concentration reading	System will return to measure mode and operate as normal. CAL and MEASURE appear as mode.
11	Press cal to resume the calibration.			HOLD and CAL appear as mode.
12	If the calibration password is active, enter the calibration password as described in step 3. Press enter to accept the password.	ENTER PASSWORD	PASS ####	
13		CH1 or CH2 (flashing)	CAL CHnL	Displayed for two channel analyzer.
14	Press cal / test to select the channel that will be calibrated and press enter to begin the calibration.	CH1 or CH2 (flashing)	CAL CHnL	Action required for two channel analyzer.
15	Press cal / test to select OFFL and press enter to accept the setting.	OFFL (flashing)	CAL tYPE	

Step	Operator Action	Scrolling Marquee	Main Display	Notes
16	Enter the concentration value of the QC sample obtained from laboratory analysis: Press (•) to move the decimal point and set the value as ppm or ppb. Press (cal ▲) / (test ▼) to set the first digit. Press (setup ▶) to move to the next digit. Press (cal ▲) / (test ▼) to set the values of the remaining digits and press (setup ▶) to move through the remaining digits. Press (enter) to save the value.	LAB ANALYSIS READY INPUT CONC VALUE FROM LAB PRESS ENTER TO CONTINUE OR PRESS EXIT TO ABORT	COnC ###.# (change flashing digit)	
17		NEW CALIBRATION E_0 PRESS ENTER TO ACCEPT OR PRESS EXIT TO ABORT	Actual E_0 value	The system will display the recalculated the E_0.
18	Press (enter).			The system willreturn to the measure mode. Only MEASURE should appear as mode.

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5. Analyzer Maintenance

5.1 Maintenance Schedule

The WE420 Sodium Analyzer is designed for simple maintenance. Follow the instructions in this section to ensure proper operation of your analyzer.

Recommendations

To ensure proper maintenance and good analyzer performance, a service logbook should be kept.

- Record the maintenance date and the type of service work completed.
- Mark the date and the fluid levels of the reagent and the date when it was replaced.
- Tag each electrode cable with the installation date of the electrode.

5.2 Weekly Maintenance

1. Check that the sample flow rate is 35 to 45 mL/minute when using the Ammonia and DIPA Application Packages and 20 to 30 mL/minute when using the Cation/High Acid Application Package. To alter the flow rate, pull out the locking knob of the pressure regulator, and then rotate the black knob to increase (clockwise) or decrease (counterclockwise) sample flow. Push in the knob to lock the rate.
2. Inspect the analyzer for leakage. Diffusion tubing leakage is indicated by a rise in the level of reagent.
3. Check that there are no error indications and that the current concentration level is reasonable.
4. Check that the reference filling solution is adequate.
5. If required, wipe the analyzer with a damp cloth to remove dirt and dust particles.

5.3 Monthly Maintenance

WARNING

Use protective glasses and gloves during the entire conditioning procedure. Read and follow the MSDS precautions. Only the sodium sensing electrode is etched. Do not etch the reference electrode.

5.3.1 Conditioning the Sodium Electrode

1. Immerse the sodium sensing electrode in the bottle of etch solution for one minute.
2. Remove the electrode and rinse it with deionized water.
3. Replace the electrode into the sensing port in the flow cell cap.

5.3.2 Calibration

Calibration frequency is operator dependent for the most accurate and precise measurements at low levels.

- Etching of the sodium electrode is required for effective calibration. Calibration must be completed within 2 to 3 hours of etching the electrode for optimal results.
- Replacement of the reagent requires calibration. Refer to "4.4 Performing a DKA Calibration".
- Calibration intervals can be programmed using the setup mode. This will prompt the operator to recalibrate after a specific amount of time has passed. Refer to Chapter 3, Use of the Setup Mode.

5.3.3 Replacement of Reference Electrode Filling Solution

Refer to Chapter 2, Installation of a New Reference Electrode.

The reference electrode filling solution is meant to be a several month supply. Therefore, if the reservoir is less than one quarter full, replace the solution. This should be checked each month to ensure that the electrode does not run dry.

1. Remove the spent filling solution bottle from the clip. Unscrew the cap and discard the bottle.
2. Remove the cap and seal from a new reference electrode filling solution bottle. Check that the rubber gasket is properly aligned, and then connect the cap and tubing assembly to the bottle. The 1/8” tubing should extend into the bottle.
3. Invert the filling solution bottle and snap it into the clip.
4. Use the pushpin to puncture three air vents in the bottom of the bottle.

5.3.4 Replacement of Sample Inlet Filter

1. If sample flow can be adjusted with the pressure regulator to 50 mL/minute or more, skip this procedure.
2. Turn off sample flow by turning the inlet valve to the right.
3. Remove the filter hex cap using a 1 inch open-ended wrench.
4. Separate the filter cap with bypass/needle valve assembly from the filter body, retaining the ring.
5. Remove the filter element and soft gasket (if necessary).
6. Replace the gasket and press a new sintered element into the filter body.
7. Replace the hex cap and bypass/needle valve assembly and reposition the bypass drain line into the drain assembly.
8. Retighten the hex cap to approximately 75 pound-inch in torque.
9. Turn on sample flow by turning the inlet valve left.
10. Check for leaks.

5.3.5 Replacement of DIPA Reagent and Diffusion Tubing Assembly

WARNING

Replacement of DIPA reagent is dependent on operating conditions and usage. Replacement may occur as long as 60 days from installation. Be sure to monitor the DIPA levels weekly to assess the proper replacement schedule. DIPA is hazardous. Use protective glasses and gloves. Refer to the bottle label and MSDS for precautions. Work in a well-ventilated area.

WARNING

Turn off the air pump before beginning procedure; otherwise, the air pump will spatter caustic reagent outward as bottle is removed. Refer to Chapter 3, Use of the Setup Mode for instructions on how to turn the air pump on and off.

1. Remove the thumbnut and slide the reagent bottle and adaptor from the manifold assembly.
2. Unscrew the bottle cap and lift the adaptor from the bottle.
3. Remove the diffusion tubing assembly by unhooking the tubing from the hook, pulling off the two diffusion tubing caps and pulling the tubing off of the connectors, as shown in the figures below.

NOTE

Ensure the reagent bottle adapter connectors are finger tight to prevent possible leakage of sample into the reagent.

4. Press the diffusion tubing assembly onto the connector barbs, as shown in the figure below. The holes at the tubing ends press onto the barb fittings.

5. Press the diffusion tubing assembly caps onto the adaptors and loop the tubing onto the hook, as shown in the figure below.

NOTE

If using the 8 inch diffusion tubing, K9705CM, ensure that the tubing is above the DIPA reagent level. The 8 inch diffusion tubing may need to be looped twice onto the hook to keep the tubing above the liquid level.

6. Properly dispose of the spent reagent and tubing.
7. Replace the reagent bottle cap adapter O-ring.
8. Follow the instructions in Chapter 2, Installation of DIPA Reagent and Diffusion Tubing.

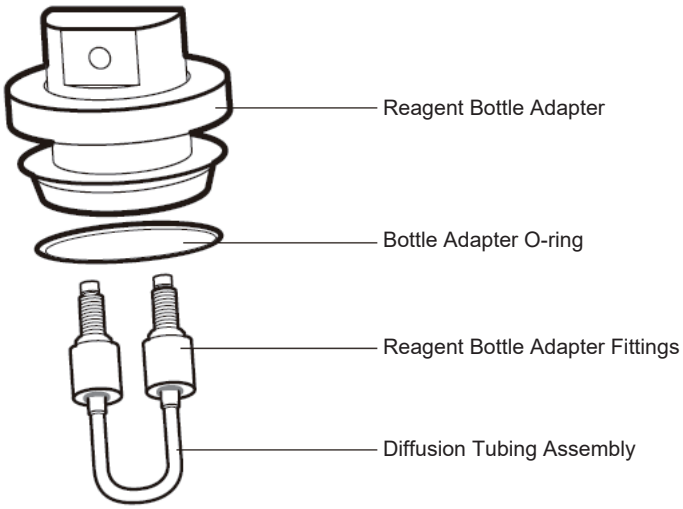

Figure 5.1 Exploded View

Notes on DIPA

DIPA reagent will last 2 months if the temperature is less than 25 °C. Higher temperatures will require bottle change out sooner, about 6 weeks. Generally, change reagents when the level is less than 1 inch remaining. The reagent bottle can be used almost to dryness, less than 50 mL remaining, if readings are not extremely low, less than 0.5 ppb. It is imperative that the bottle doesn't go completely dry or the system will be compromised.

5.3.6 Replacement of Reagent Manifold Face O-rings

Refer to Figure 5.2 for the replacement of reagent manifold face O-rings. .

1. Remove the reagent bottle adapter assembly.
2. Remove all three O-rings from the face of the manifold.
3. Insert the new O-rings.

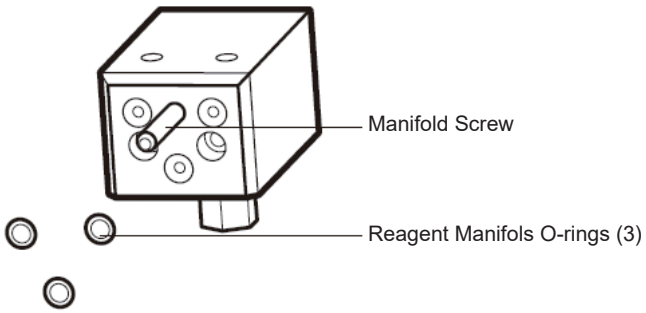

Figure 5.2 Reagent Manifold O-ring Location

5.3.7 Replacement of Ammonia Reagent and Diffusion Tubing Assembly

WARNING

The reagent is hazardous. Use protective glasses and gloves. Refer to the bottle label for precautions and work in a well-ventilated area.

NOTE

Turn off the air pump before beginning this procedure; otherwise, the air pump will splatter the reagent outward as the bottle is removed.

1. Remove the thumbnut and slide the bottle adaptor from the flow cell.
2. Unscrew the cap and lift the bottle adaptor from the reagent bottle.
3. Remove both ends of the old diffusion tubing from the reagent bottle adaptor nipples. Properly dispose of spent reagent and tubing.
4. Fit the ends of the new diffusion tubing over the bottle adaptor nipples.
5. In a hood or outdoors, carefully remove the cap from a new reagent bottle.
6. Make sure that the large O-ring is between the reagent bottle and bottle adaptor. Slide the diffusion tubing loops into the reagent bottle and screw the bottle adaptor onto the new reagent bottle.
7. Ensure that the three small O-rings are in place on the flow cell.
8. Re-attach the bottle adaptor/reagent bottle assembly to the flow cell by sliding it onto the screw and tightening the thumbnut. The bottle adaptor can be rotated to allow correct positioning on the analyzer.

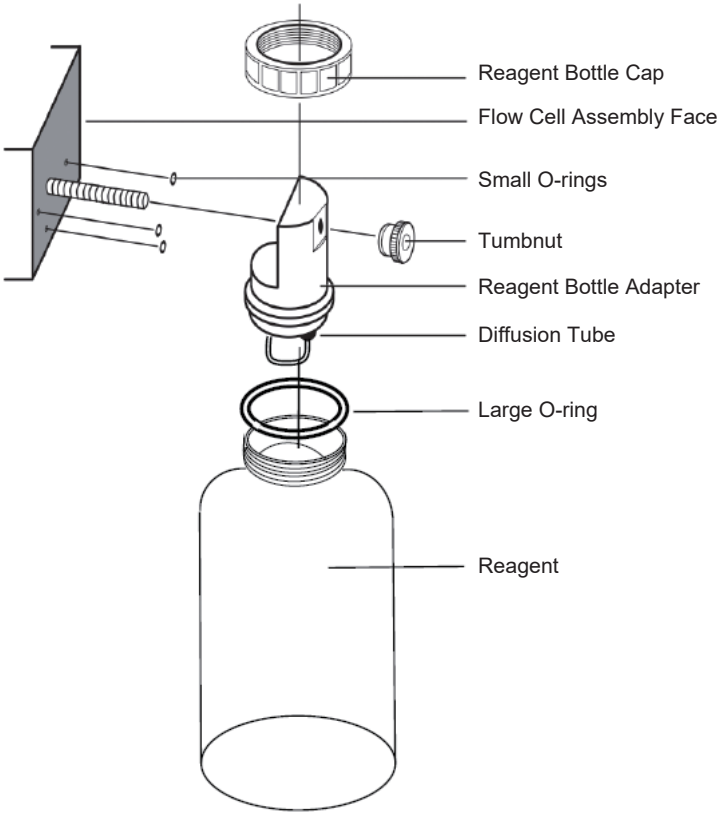

Figure 5.3 Reagent Bottle Assembly

5.4 Yearly Preventive Maintenance

5.4.1 Electrodes

1. Replace the reference electrode (Part number: K9705CD). Refer to Chapter 2, Installation of a New Reference Electrode for step-by-step instructions.
2. Replace the sensing electrode (Part number: K9705CC). Refer to Chapter 2, Installation of a New Sodium Electrode for step-by-step instructions.
3. Replace all of the calibration and etching solutions (Cat. No. 181140)

Dispose of all old solutions according to the MSDS instruction. The MSDS files can be downloaded at www.thermo.com/water.

5.4.2 Diverter Valve O-rings

Valve Stem O-rings

1. Remove the two screws that hold the valve stem assembly in place.
2. Gently pull on the valve stem to remove.
3. Slide off the two old O-rings and replace them. It is not necessary to remove the retaining ring.
4. Place the assembly back into the manifold block and tighten screws.

NOTE

Do not use O-ring grease.

Manifold Face O-rings

1. Remove the reagent bottle assembly.

2. Remove the three O-rings from the face of the flow cell manifold.
3. Insert the new O-rings.

Reagent Bottle Assembly O-ring

1. When the reagent bottle is removed, replace the O-ring between the bottle and adaptor.

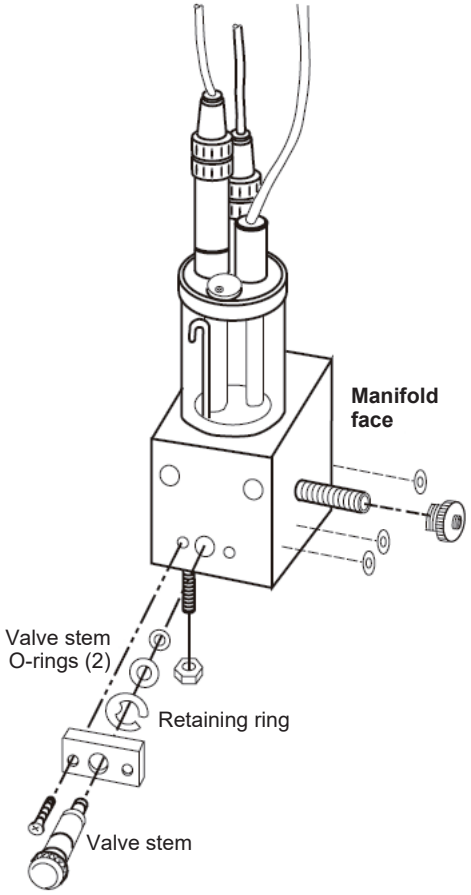

Figure 5.4 Flow Cell Assembly

5.4.3 Replacement of the Restrictor Tubing

Use the restrictor tube assembly. Refer to Figure 5.5 for restrictor tubing connections.

1. Close the inlet valve to stop sample flow through analyzer.
2. Loosen the restrictor tube fitting connection from the top of the flow meter.
3. Loosen the restrictor tube fitting from the left side of the flow cell block.
4. Pull out the restrictor tube assembly at each end.
5. Unscrew the clip behind flow cell that holds the restrictor tube to panel.
6. Replace with new restrictor tubing assembly.
7. Be sure all fittings are secure, to prevent leaks.
8. Open the inlet valve to start sample flow through analyzer.

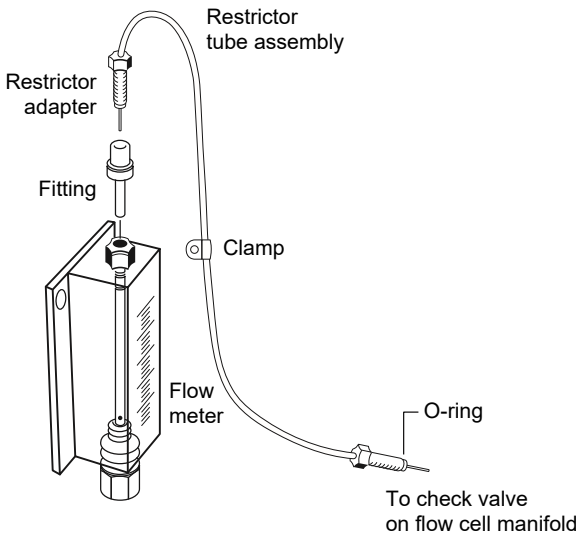

Figure 5.5 Restrictor Tubing

6. Troubleshooting

6.1 Diagnostics Mode

- From the measure mode, press test to enter the diagnostics mode. The test key allows access to menus used for system diagnostics.
- Each menu is sequential. Press enter to scroll through the diagnostics menu selections.
- exit to measure can be pressed at any time to return to the measure mode.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Diagnostics			
	Press test while in the measure mode to enter the diagnostics mode. The system will enter the diagnostics mode at the calibration log menu. Press enter to stepthrough the menu items.	CH1 CALIBRATION SLOPE AND E_0 CH2 CALIBRATION CELL CONSTANT CH1 ERROR LIST PRESS VIEW CH2 ERROR LIST PRESS VIEW CH1 – SELECT TIME/DATE TOVIEW MEASUREMENT LOG CH2 – SELECT TIME/DATE TO VIEW MEASUREMENT LOG SELECT TIME/DATE TO VIEW STATUS LOG SOFTWARE REV NUMBER CH1 SERIAL NUMBER CH2 SERIAL NUMBER CH1 MODEL NUMBER CH2 MODEL NUMBER CH1 MEASURE mV AND NOISE CH2 MEASURE mV AND NOISE CH1 mA1 and mA2 OUTPUT VALUES SENSOR/TEMP CH2 mA1 and mA2 OUTPUT VALUES PRESS ENTER FOR THE DISPLAY TEST PRESS ENTER TO CONTINUE PRESS ENTER TO CONTINUE KEYPAD TEST PRESS ALL KEYS ONE AT A TIME	The display will change with each menu.	If only one board is installed in the analyzer, only one menu option will be shown in the scrolling marquee instead of CH1 and CH2 menu options.

6.1.1 Calibration Log

- Displays up to the last twelve calibrations using three screens:
  1. Slope and E_0 (analyzers with a pH board or ISE board installed), mV offset (analyzers with an ORP board installed) or cell constant (analyzers with a conductivity board installed)
  2. Date and Time
  3. Temperature
- Press view +/– to scroll between the three information screens for each calibration
- Press cal / test to view the last twelve calibrations

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Calibration Log			
	Press test while in the measure mode to enter the diagnostics mode			
	or	CALIBRATION SLOPE AND E_0	##.# (Slope) ##.# (E_0)	
	or	CALIBRATION OFFSET	###.# (mV offset)	
	or	CALIBRATION CELL CONSTANT	#.### (Cell Constant)	
	Press view +/– to display the calibration time and date	CALIBRATION TIME/DATE	HH:MM MM/DD or DD/MM	Press cal / test to scroll through the last 12 calibrations

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Press view +/– to display the calibration temperature and electrode response	CALIBRATION TEMP	# # . # c (Temperature)	Press cal ▲ / test ▼ to scroll through the last 12 calibrations
	Press enter to proceed to the next menu			

6.1.2 Error List

- Displays a list of system events, warnings, and error codes that cause the yellow or red LED to light.
- The top line of the main display shows the error code and the bottom line shows the number of error codes (1-5 indicates that one of five error codes is being displayed).
- Press cal ▲ / test ▼ to scroll through the error list.
- Press view +/– to display a description of each error code on the marquee.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Error List			
		ERROR LIST PRESS VIEW	E### # - #	
	Press view +/– to display the description of the error code on the marquee	Actual description of error code	E### # - #	
	Press cal ▲ / test ▼ to scroll through the error list	Actual description of error code	E### # - #	
	Press enter to proceed to the next menu			

6.1.3 Measurement Log

- Displays logged measurements according to log interval entered in setup mode.
- Press view +/– to toggle between the measurement value and the data and time.
- Press cal ▲ / test ▼ to scroll through the log entries.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Measurement Log			
		SELECT TIME/DATE TO VIEW MEASUREMENT LOG	HH:MM MM/DD or DD/MM	
	Press cal ▲ / test ▼ to scroll through the log entries	SELECT TIME/DATE TO VIEW MEASUREMENT LOG	HH:MM MM/DD or DD/MM	
	Press view +/– to scroll between the measurement log and the data and time display	Actual temperature value for logged measurement	Concentration and mV values for logged measurement	
	Press enter to proceed to the next menu			

6.1.4 Status Log

- Displays a list of system events.
- Press cal / test to scroll through the log entries.
- Press view +/– to toggle between the log code and the data and time.

6.1.5 Software Revision

- Displays the software revision numbers of the two processors.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Status Log			
		SELECT TIME/DATE TO VIEW STATUS LOG	HH:MM MM/DD or DD/MM	
	Press cal / test to scroll through the log entries	SELECT TIME/DATE TO VIEW STATUS LOG	HH:MM MM/DD or DD/MM	
	Press view +/– to scroll between the log code and the data and time	PRESS UP/DOWN KEY TO VIEW STATUS LOG	Event Code	
	Press enter to proceed to the next menu			
	Software Revision			
		SOFTWARE REV NUMBER	r # . # # r # . # #	
	Press enter to proceed to the next menu			

6.1.6 Electronics Serial Number

- Displays the serial number of the electronics assembly.

6.1.7 Model Number

- Displays the model number of the system.

6.1.8 mV and Noise Measurements

- Displays the current mV measurement value and the noise associated with the measurement.

6.1.9 mA Output Values

- Displays current mA values for sensor and temperature outputs.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Electronics Serial Number			
		SERIAL NUMBER	# # # # # #	
	Press enter to proceed to the next menu			
	Model Number			
		MODEL NUMBER	# # # # # # # #	
	Press enter to proceed to the next menu			
	mV and Noise Measurements			
		MEASURE mV AND NOISE	Current mV measurement and noise	
	Press enter to proceed to the next menu			
	mA Output Values			
		mA OUTPUT VALUES mA1/ mA2	Current mA output values for mA1 and mA2	
	Press enter to proceed to the next menu			

6.1.10 Display Test

- Press enter to start display test.

1. All the display segments will light up and the system will cycle through the LED colors.
2. Verify that all the display segments are on and that the LED colors are functional and press enter.
3. All the display segments will turn off except for the marquee display, which should show PRESS ENTER TO CONTINUE.
4. Verify that all the display segments are off and press enter.
5. The system will show a counting number pattern on both lines of the main display.
6. Verify that the display segments are functional and press enter to proceed to the keypad test.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Display Test			
		PRESS ENTER FOR THE DISPLAY TEST	dISP tESt	
	Press enter to start the test			
	Verify that all of the display segments are on and that the LED colors are functional	All segments on	All segments on	System will cycle through the LED colors
	Press enter to proceed to the next part of the test			
	Verify that all of the display segments are off	PRESS ENTER TO CONTINUE	All segments off	
	Press enter to proceed to the next part of the test			
	Verify that all of the numeric display segments are functional	PRESS ENTER TO CONTINUE	Count pattern Count pattern	
	Press enter to proceed to the next menu			

6.1.11 Keypad Test

- The main display will show 0 and the marquee will display KEYPAD TEST PRESS ALL KEYS ONE AT A TIME.
- Press all eight keys one at a time in any order.

* After the first key is pressed Error E033 will be displayed if a new key is not pressed within 10 seconds.

Default	Operator Action	Scrolling Marquee	Main Display	Notes
	Keypad Test			
		KEYPAD TEST PRESS ALL KEYS ONE AT A TIME	0	
	Press all keys one at a time in any order	KEYPAD TEST PRESS ALL KEYS ONE AT A TIME	Display will show numbers 1 through 8 as keys are pressed	After the first key is pressed error E033 will be displayed if a new key is not pressed within 10 seconds
	No operator action needed The system will enter the measure mode if the keypad test is passed			

6.2 Slope Problems

6.2.1 Low Slope

Slope less than 45 mV/decade

- Check the electrode function, etch the electrode, recalibrate the analyzer, and if the analyzer continues to read low, replace the electrode.
- Check electronics to read mV input correctly. Use electronic test kit procedure for checking electronics function.

Ion-selective electrodes (ISE) can be shown as DC-voltage sources

with 50 to 1000 Megohm; a very high output impedance. ISEs respond to ion concentration changes with a voltage change of approximately

59 mV/decade for monovalent cations such as sodium. Knowing electrode and analyzers parameters like offset potential, slope, etc allows testing of various instruments by applying a known mV voltage.

Input Signal	Expected Reading: ± (0.5 mV + 0.1%)
0 mV	- 0.5 mV to + 0.5 mV
- 1000 mV	-1001.5 mV to – 998.5 mV
+ 1000 mV	+ 998.5 mV to + 1001.5 mV

- Background concentration too high for the standards used.
- Standards contaminated or incorrectly made – verify calibration with fresh standards.
- Standard 1 and standard 2 interchanged – check the values on the standards and repeat the calibration. If using custom standards, verify the values for each standard.
- Standard 1 and standard 2 added in wrong sequence – check the sequence of the standards and repeat the calibration.
- pH adjustment is not correct – check the level and flow of the reagent. Replace the reagent if it is contaminated or the level is less than 50 mL. Refer to "2.4 Installation of DIPA Reagent and Diffusion Tubing" or "2.5 Installation of Ammonia Reagent and Diffusion Tubing".

6.2.2 High Slope

Slope greater than 63 mV/decade

- Improper calibration technique – refer to "4.4 Performing a DKA Calibration".
- Calibration standards contaminated – repeat the calibration using fresh standards.
- Electronics failure – reset the analyzer. Refer to "6.4 Resetting the Analyzer".
- Improper pipet technique – refer to the Appendix, Pipet Operation and Technique section.
- Background concentration too high for the standards used.
- Cables interchanged – verify wiring of cable connections to terminal strip. Refer to "2.3 Wiring the Analyzer".
- Check the connection of the cable markers for the corresponding electrode. Cable markers are the white tape at the cap connector on the cable.
- “Ref” for the reference electrode
- “Sensing” for the sodium electrode
- Sensing electrode coated – etch or replace the sensing electrode.

6.2.3 Troubleshooting Matrix

Malfunction	Possible Cause	Remedy
Noisy	Blocked junction on reference electrode	Make sure electrolyte is flowing properly.
	Sodium or reference electrode failure	Check the cable connections and location of wiring to terminal strip. Refer to Chapter 2.
	Temperature probe failure	Disconnect ATC. Temperature should read 25 °C (E101). Replace if necessary.
	Air pump failure	Check the air flow for a steady stream of bubbles and replace if necessary.
	Calibration standard carryover	Disconnect the air pump intake tube. Rinse the flow cell and electrodes with deionized water by lifting the flow cell cap. Reconnect the air pump.
	Faulty electrode cables	Replace electrode cables.
Excessive Drift	Sample concentration varying	Check sample status. Perform a span check and if span check passes, the analyzer is okay.
	Blocked junction on reference electrode	Make sure the electrolyte is flowing properly and the bottle is vented.
	Sodium or reference electrode failure	Check the cable connections and location of wiring to terminal strip. Refer to Chapter 2.
	Slow sodium electrode response	Etch the sodium electrode. Replace if necessary.
	Reference electrode filling solution empty or incorrect solution used	Use Cat. No. 181073 reference electrode filling solution.
	Diffusion tubing burst	Observe the liquid level in the reagent bottle. If the liquid level rises, replace the reagent and diffusion tubing. The tubing connector may need replacement. Refer to Chapter 2.
	Temperature probe failure	Disconnect ATC. Temperature should read 25 °C (E101). Replace if necessary.
Low Flow Rate	Sample pressure below 8 psi	Check the sample pressure. If it is less than 8 psi, increase the pressure. Refer to Chapter 2.
	Pressure regulator set too low	Increase the pressure by pulling on the red locking ring and turning the black knob clockwise. Refer to Chapter 2.
	Inlet filter clogged	Replace or clean the filter.
	Restrictor tubing crimped or clogged	Replace the restrictor tubing. Refer to Chapter 2.
No Air Bubbles	Air line crimped or disconnected	Check the air line and repair as required.
	Air pump failure	Replace if necessary.
Does Not Calibrate Properly	Contaminated standards, pipet or pipet tips	Use new standard solutions. Replace the pipet tips.
	Standards interchanged	Repeat calibration using standards in the correct sequence.
	Temperature probe failure	Disconnect ATC. Temperature should read 25 °C (E101). Replace if necessary.
	Background concentration too high for standards	Repeat calibration using custom, higher concentration standards. Refer to Chapter 4.
	Pipet technique error	Use the correct pipet techniques. Refer to the Appendix section.
	Reagent diluted or contaminated	Replace the reagent. Refer to Chapter 2.
	Flow cell contaminated	Rinse the flow cell with deionized water. Flush the flow cell overnight at calibration liquid level. Refer to Chapter 4.
	Electronics failure or bad setup	Reset the analyzer. Refer to Chapter 4.
High Readings	Analyzer out of calibration	Recalibrate the analyzer. Refer to Chapter 4.
	Flow cell contaminated	Rinse the flow cell with deionized water. Flush the flow cell overnight at calibration liquid level. Refer to Chapter 4.
	Inlet filter just replaced	Flush the analyzer for one hour. Refer to Chapter 4. If an offline calibration was performed, verify accuracy of alternate method value. Refer to Chapter 4.
	Reagent spent or diluted	Replace the reagent. Refer to Chapter 2.

Malfunction	Possible Cause	Remedy
Over-Range Readings	Electrode connections loose or bad	Verify the electrode connections to the electrode cables.
	Electrode wiring	Electrodes not properly wired to terminal strip. Refer to Chapter 2.
	Blocked junction on reference electrode	Make sure electrolyte is flowing properly.
	Sodium or reference electrode failure	Electrode is shorted, cracked or damaged. Install a new electrode. Refer to Chapter 2.
	Electronics failure or bad setup	Reset the analyzer. Refer to Chapter 4.
	Analyzer out of calibration	Recalibrate the analyzer. Refer to Chapter 4.
Low Readings	Analyzer out of calibration	Recalibrate the analyzer. Refer to Chapter 4.
	Sample is very pure	Check sample status. Perform a span check and if span check passes, the analyzer is okay.
	Electronics failure	Try resetting the analyzer. Refer to Chapter 4 or consult Response Center.
Default	Battery failure	Consult Response Center.
	Electronics failure	Reset the analyzer. Refer to Chapter 4.

6.3 Error/Event Codes

Error/event codes will be in the format “E###”. Some of these are errors, some are warnings, and some are purely informational. The first digits identify the type of error or event as identified in the table below.

Displayed Event Code	Description	Cause	Troubleshooting
System Status Codes			
A711	ALARM1 CH1 ON	Alarm 1 channel 1 engaged (closed)	
A712	ALARM2 CH1 ON	Alarm 2 channel 1 engaged (closed)	
A713	ALARM3 CH1 ON	Alarm 3 channel 1 engaged (open)	
A714	AIR PUMP ON	Air pump engaged	
A721	ALARM1 CH2 ON	Alarm 1 channel 2 engaged (closed)	
A722	ALARM2 CH2 ON	Alarm 2 channel 2 engaged (closed)	
A723	ALARM3 CH2 ON	Alarm 3 channel 2 engaged (open)	
A811	ALARM1 CH1 OFF	Alarm 1 channel 1 disengaged (open)	
A812	ALARM2 CH1 OFF	Alarm 2 channel 1 disengaged (open)	
A813	ALARM3 CH1 OFF	Alarm 3 channel 1 disengaged (closed)	
A814	AIR PUMP OFF	Air pump disengaged	
A821	ALARM1 CH2 OFF	Alarm 1 channel 2 disengaged (open)	
A822	ALARM2 CH2 OFF	Alarm 2 channel 2 disengaged (open)	
A823	ALARM3 CH2 OFF	Alarm 3 channel 2 disengaged (closed)	
C500	CAL MODE	Calibration mode entered	
R400	MEAS MODE	Measure mode entered	
S600	SETUP MODE	Setup mode entered	
E028	POWER FAIL	Brown out or power failure and system has stopped processing	Verify custom settings
E033	KEYPAD FAILURE	User did not press the keys during a diagnostic mode keypad test or keypad broken	Repeat diagnostic mode keypad test
E034	CAL PASS INCORRECT	User entered incorrect calibration password	Verify password
E035	SYSTEM PASS INCORRECT	User entered incorrect system password	Verify password
E036	USER VALUE INCORRECT	User entered a value that is out of range	Verify value and re-enter
E037	POWER RETURN	System started processing after brown out or power failure	Verify custom settings
E040	BLANK INCORRECT	Blank greater than 1ppb	Verify scrolled blank value is corect and less than 1ppb. Repeat DKA if needed.
E041	CALIBRATION TIMEOUT	The electrode has not reach stability within the specified time	The system code may be due to out of range measurements or an invalid previous calibration
E042	INVALID SLOPE	Invalid slope obtained during calibration	Check electrodes, electrode cables and connectors for defects or shorts. Replace electrodes, if necessary. Recalibrate using new standards in the correct calibration sequence.
System Event/Error Codes - Yellow LED			
E004	DEFAULT VALUES	Analyzer has been reset or is new out of box	Calibrate the analyzer
E021	HARDWARE FAULT	System error	Contact Response Center
E101	CH1 TEMP OUT OF RANGE	Temperature sensor on channel 1 out of range (5 °C to 45 °C) for ISE	Check ATC cable and probe connections. Replace if needed.
E102	CH2 TEMP OUT OF RANGE	Temperature sensor on channel 2 out of range (5 °C to 45 °C) for ISE	Check ATC cable and probe connections. Replace if needed.

Displayed Event Code	Description	Cause	Troubleshooting
E111	CH1 CAL DUE	User calibration required on channel 1. No calibration has been performed in user specified time interval.	Recalibrate the analyzer.
E112	CH2 CAL DUE	User calibration required on channel 2. No calibration has been performed in user specified time interval.	Recalibrate the analyzer.
E127	CH1 SOUT mA OVER RANGE	Measured sensor value above Sout high limit value on channel 1	Verify user selectable Sout high limit value in setup mode
E128	CH1 SOUT mA UNDER RANGE	Measured sensor value below Sout low limit value on channel 1	Verify user selectable Sout low limit value in setup mode
E129	CH1 TOUT mA OVER RANGE	Measured temperature value above Tout high limit value on channel 1	Verify user selectable Tout high limit value in setup mode
E130	CH1 TOUT mA UNDER RANGE	Measured temperature value below Tout low limit value on channel 1	Verify user selectable Tout low limit value in setup mode
E131	CH2 SOUT mA OVER RANGE	Measured sensor value above Sout high limit value on channel 2	Verify user selectable Sout high limit value in setup mode
E132	CH2 SOUT mA UNDER RANGE	Measured sensor value below Sout low limit value on channel 2	Verify user selectable Sout low limit value in setup mode
E133	CH2 TOUT mA OVER RANGE	Measured temperature value above Tout high limit value on channel 2	Verify user selectable Tout high limit value in setup mode
E134	CH2 TOUT mA UNDER RANGE	Measured temperature value below Tout low limit value on channel 2	Verify user selectable Tout low limit value in setup mode
System Error Codes - Red LED			
E001	HARDWARE FAULT	System error	Contact Response Center
E002	HARDWARE FAULT	System error	Contact Response Center
E018	HARDWARE FAULT	System error	Contact Response Center
E019	HARDWARE FAULT	System error	Contact Response Center
E020	HARDWARE FAULT	System error	Contact Response Center
E024	HARDWARE FAULT	System error	Contact Response Center
E026	HARDWARE FAULT	System error	Contact Response Center
E027	HARDWARE FAULT	System error	Contact Response Center
E029	HARDWARE FAULT	System error	Contact Response Center
E030	HARDWARE FAULT	System error	Contact Response Center
E038	HARDWARE FAULT	System error	Contact Response Center
E103	CH1 MEAS OVER RANGE	Measurement is over range on channel 1, the display should also be flashing ‘9999’	Check if electrode is not connected, electrode cables are faulty or electrode junction is fouled
E104	CH2 MEAS OVER RANGE	Measurement is over range on channel 2, the display should also be flashing ‘9999’	Check if electrode is not connected, electrode cables are faulty or electrode junction is fouled
E109	CH1 BAD SLOPE	Last calibration produced a bad slope on channel 1. Slope is less than 43 mV/decade or more than 63 mV/ decade or the calibration standards may have been interchanged.	Recalibrate the analyzer using fresh standards. Recalibrate using the correct sequence of standards.
E110	CH2 BAD SLOPE	Last calibration produced a bad slope on channel 2. Slope is less than 43 mV/decade or more than 63 mV/ decade or the calibration standards may have been interchanged.	Recalibrate the analyzer using fresh standards. Recalibrate using the correct sequence of standards.
E113	CH1 CAL OVERDUE	Calibration is overdue on channel 1 by more than 50% of the user specified time interval	Recalibrate the analyzer
E113	CH2 CAL OVERDUE	Calibration is overdue on channel 2 by more than 50% of the user specified time interval	Recalibrate the analyzer
E121	CH1 TEMP BROKEN	Temperature sensor on channel 1 broken or out of range	Check ATC cable connections and probe for damage. Replace if needed.
E122	CH2 TEMP BROKEN	Temperature sensor on channel 2 broken or out of range	Check ATC cable connections and probe for damage. Replace if needed.

Displayed Event Code	Description	Cause	Troubleshooting
E125	CH1 BAD OFFSET	Last calibration produced a bad E_0 offset on channel 1	Recalibrate the analyzer using fresh standards. Check electrode connections. Replace electrode, if needed.
E126	CH2 BAD OFFSET	Last calibration produced a bad E_0 offset on channel 2	Recalibrate the analyzer using fresh standards. Check electrode connections. Replace electrode, if needed.

6.4 Resetting the Analyzer

The WE420 Sodium Analyzer allows the user to reset the analyzer through the setup mode or by a hard reset. Resetting the analyzer will restore all settings in the setup mode to factory default values.

WARNING

Resetting the analyzer will erase all data logs including calibration, and password protection settings for setup and calibration.

The analyzer will reset setup parameters to factory default settings.

Operator Action	Scrolling Marquee	Main Display	Notes
Press setup in the measure modeto enter the setup mode			
	Last menu used in setup mode	SEL SCrn	SETUP appears as mode
Press cal / test until RSET appears in the marquee			
	RSET (flashing)	SEL SCrn	
Press enter to reset the analyzer			
	PRESS TEST VIEWENTER TO RESET	rSEt ?	
Press test Press view +/- Press enter When the reset is complete, the system will return to the measure mode. The operator will need to re-enter the setup mode to continue programming the setup parameters. Press setup to returnto the setup mode.	PRESS TEST VIEWENTER TO RESET	rSEt ?	This command resets all previously set parameters to factory default values. Use this command only to set the analyzer to original factory setup values.

6.4.1 Hard Reset

A hard reset should be performed if the analyzer becomes unresponsive or the status indicators are flashing. Perform the following sequence:

- Carefully open the front cover of the electronics case (loosen the four corner screws).
- Press the small button located on the raised portion of the PCB to reset the electronics.
- Close the front cover of the electronics case and tighten the screws.

System settings and calibrations are preserved and analyzer returns to the measure mode. The actual value for concentration and temperature will be displayed if the electrodes are properly installed.

6.4.2 Serial Number and Software Revision

In the event you require technical assistance, please have the serial number available when calling for assistance along with the software version.

- The software revision is accessed through the diagnostics mode.

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Revision Record

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