INSTRUCTIONS FOR

Model 6800T
Alkalinity Analyzer

P/N M6800T
Date 9-23-19

DANGER

Toxic gases and or flammable liquids may be present in this instrument.

Personal protective equipment may be required when servicing this instrument.

Hazardous voltages exist on certain components internally which may persist for a time even after the power is turned off and disconnected.

Only authorized personnel should conduct maintenance and/or servicing. Before conducting any maintenance or servicing, consult with authorized supervisor/manager.

Warranty

This equipment is sold-subject to the mutual agreement that it is warranted by us free from defects of material and of construction, and that our liability shall be limited to replacing or repairing at our factory (without charge, except for transportation), or at customer plant at our option, any material or construction in which defects become apparent within one year from the date of shipment, except in cases where quotations or acknowledgements provide for a shorter period. Components manufactured by others bear the warranty of their manufacturer. This warranty does not cover defects caused by wear, accident, misuse, neglect or repairs other than those performed by TI/AI or an authorized service center. We assume no liability for direct or indirect damages of any kind and the purchaser by the acceptance of the equipment will assume all liability for any damage which may result from its use or misuse.

We reserve the right to employ any suitable material in the manufacture of our apparatus, and to make any alterations in the dimensions, shape or weight of any parts, in so far as such alterations do not adversely affect our warranty.

Important Notice

This instrument provides measurement readings to its user, and serves as a tool by which valuable data can be gathered. The information provided by the instrument may assist the user in eliminating potential hazards caused by his process; however, it is essential that all personnel involved in the use of the instrument or its interface, with the process being measured, be properly trained in the process itself, as well as all instrumentation related to it.

The safety of personnel is ultimately the responsibility of those who control process conditions. While this instrument may be able to provide early warning of imminent danger, it has no control over process conditions, and it can be misused. In particular, any alarm or control systems installed must be tested and understood, both as to how they operate and as to how they can be defeated. Any safeguards required such as locks, labels, or redundancy, must be provided by the user or specifically requested of TI/AI at the time the order is placed.

Therefore, the purchaser must be aware of the hazardous process conditions. The purchaser is responsible for the training of personnel, for providing hazard warning methods and instrumentation per the appropriate standards, and for ensuring that hazard warning devices and instrumentation are maintained and operated properly.

Teledyne Instruments/ Analytical Instruments, the manufacturer of this instrument, cannot accept responsibility for conditions beyond its knowledge and control. No statement expressed or implied by this document or any information disseminated by the manufacturer or its agents, is to be construed as a warranty of adequate safety control under the user's process conditions.

Specific Model Information

Instrument Serial Number: _____

Sample: _____

Reagent: _____

Reagent: _____

Safety Messages

Your safety and the safety of others is very important. We have provided many important safety messages in this manual. Please read these messages carefully.

A safety message alerts you to potential hazards that could hurt you or others. Each safety message is associated with a safety alert symbol. These symbols are found in the manual and inside the instrument. The definition of these symbols is described below:

GENERAL WARNING/CAUTION: Refer to the instructions for details on the specific danger. These cautions warn of specific procedures which if not followed could cause bodily Injury and/or damage the instrument.

CAUTION: HOT SURFACE WARNING: This warning is specific to heated components within the instrument. Failure to heed the warning could result in serious burns to skin and underlying tissue.

WARNING: ELECTRICAL SHOCK HAZARD: Dangerous voltages appear within this instrument. This warning is specific to an electrical hazard existing at or nearby the component or procedure under discussion. Failure to heed this warning could result in injury and/or death from electrocution.

Technician Symbol: All operations marked with this symbol are to be performed by qualified maintenance personnel only.

No Symbol

NOTE: Additional information and comments regarding a specific component or procedure are highlighted in the form of a note.

CAUTION: THIS INSTRUMENT SHOULD ONLY BE USED FOR THE PURPOSE AND IN THE MANNER DESCRIBED IN THIS MANUAL.

IF YOU USE THIS EQUIPMENT IN A MANNER OTHER

THAN THAT FOR WHICH IT WAS INTENDED, UNPREDICTABLE BEHAVIOR COULD RESULT POSSIBLY ACCOMPANIED WITH HAZARDOUS CONSEQUENCES.

This manual provides information designed to guide you through the installation, calibration operation and maintenance of your new analyzer. Please read this manual and keep it available.

Occasionally, some instruments are customized for a particular application or features and/or options added per customer requests. Please check the front of this manual for any additional information in the form of an Addendum which discusses specific information, procedures, cautions and warnings that may be peculiar to your instrument.

Manuals do get lost. Additional manuals can be obtained from TI/AI at the address given in the Appendix. Some of our manuals are available in electronic form via the internet. Please visit our website at: www.teledyne-ai.com.

Important Service Information

Use only factory authorized components for repair. Tampering or unauthorized substitution of components may adversely affect the operation of this product and may void the warranty.

If service or repair is required, please obtain the serial number(s) or sales order number of the product(s) in question and contact Teledyne Customer Service at:

Teledyne Analytical Instruments
16830 Chestnut Street
City of Industry, California 91748-1020, USA

Tel: +1.626.934.1500
Fax: +1.626.934.1651
Toll free: +1.888.789.8168
Email: ask_tai@teledyne.com

A Return Material Authorization (RMA) number must be obtained from the service department before returning any material to Teledyne.

Additional Safety Messages

Safety Precautions, Instructionsand Hazards

This Manual contains important information required to install, start up and operate the Model 6800T Analyzer. Please read the entire manual carefully installing or placing the analyzer into service!

GENERAL INFORMATION

Pay attention to all Caution and Danger labels present on the analyzer and all Caution and Danger statements written in this manual.

Teledyne shall not be liable for errors contained herein and/or for the incorrect use of the analyzer. The analyzer's users must read the User's Manual before placing the Model 6800T analyzer into service. Observe the instructions and follow all national and local regulations and laws regarding workers health and safety.

The use, maintenance and service of this analyzer is restricted to qualified personnel, fully trained in the analyzer's operations. These personnel are intended to be physically and mentally fit and not under the influence of drugs or alcohol.

When the analyzer is not in use, it should be protected from intentional or unintentional powering up, using a proper power switch.

Failure to do so or non-observance of hazards or dangers warnings could result in death or serious injury to the operators or damage to the analyzer.

Before using the analyzer it is necessary to visually check for damage to the safety devices and to report them to your supervisor even if they do not cause the analyzer to stop or malfunction.

All of the analyzer's components are installed inside a metallic enclosure; a special key is required to open the door, only qualified maintenance personnel should have access to the key.

LIST OF WARNINGS AND POTENTIAL DANGERS

The table below is an additional list of Hazard and Danger/Warning Labels found on the analyzer and/or in this manual. Damaged or illegible labels should be replaced with new ones by the analyzer owner.

Table 0-1: List of Hazards and Dangers

	**Poisonous Substances:** Very hazardous to health when inhaled, swallowed or when they come in contact with the skin. May even lead to death. Danger! Avoid contact with the human body and immediately contact a physician in case of contact.	Involved parts: • fluids section • reagent containers
	**Electrical Shock Hazard** This symbol is used to represent a hazard of severe electric shock or electrocution. All adjustments and maintenance on electrical devices labeled with this symbol should be made by qualified personnel in accordance with national or local regulations. Qualified Personnel means a person who has been fully trained and has professional experience to avoid electrical hazards and dangers. To avoid potentially fatal electrical shock and/or analyzer damage always disconnect input power to analyzer before servicing.	Involved parts: • main power supply • peristaltic pump motor • input terminal
	**Chemical Burn Hazard** This symbol is used to represent a hazard of severe burns or injury due to handling of dangerous chemicals. All handling, maintenance and filling operations of chemicals labeled with this symbol should be made by qualified personnel in accordance with national or local regulations. Qualified Personnel means a person who has been fully trained and has the professional experience to avoid chemical hazards and dangers. Before handling the chemicals or proceeding with service operations, read the material safety data sheets supplied with each chemical and follow all necessary precautions when handling.	Involved parts: • Fluids section • Reagent containers
	**Harmful** Specific warning depending on the parameter analyzed and the amount of reagents.	Involved parts: • Fluids section • Reagent containers

General Hazard Warning

This symbol means that is necessary read the manual before proceeding to any service operation in order to properly perform the operation. Only qualified personnel, fully trained on the analyzers use and maintenance are allowed to proceed with service operations on the unit.

REAGENTS

The Model 6800T Analyzer is based on titration analysis methods, using acids. For the dangers and hazards regarding the chemicals used for the analysis, refer to Chapter 5for reagent preparation.

Make sure that proper safety precautions are taken (e.g. using safety gloves and glasses) during handling the chemical solutions and the reagents containers / bottles.

Read carefully the Material Safety Data Sheets of each chemical.

All bottles of the reagents must be labeled with the specific hazards and dangers labels.

SAMPLE STREAM

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

Table 0-2: List of Materials Used in the Model 6800T Analyzer

Pump tubing	Silicon or Norprene®
Fittings	PP
Connection tubing	Norprene®/ Silicon
Reaction cell	PVC
Pinch valve	Norprene®/ Silicon tubing

WASTE DISPOSAL OF THE LIQUID REAGENTS FOR THE REACTION

The liquid from the drain of the reaction cell may need to be collected in a separate canister. For guidelines on disposal consult the requirements of the Local Authority for chemical waste regulation. Arrange removal by a Disposal Company.

Analyzer General Hazards

Electrical Precautions and Hazards

Power to the 6800T Analyzer must be routed through an ON/OFF power switch.

Pay attention to the electrical shock and/or electrocution labels placed on the analyzer.

All electrical devices powered by 110/220 VAC present the hazard of electrical shock or electrocution.

The analyzer enclosure is equipped with a door that requires a special key for opening to protect all the personnel involved in analyzer use and maintenance.

Only Qualified Service Personnel should have access to the key that opens the analyzer.

Before servicing the analyzer or any parts that are electrically powered, turn off the power to avoid the risk of electrocution.

Inside the analyzer's lower level, the electrical protection is IP2X. Analyzer's enclosure is IP54.

Protection against electrical shock is guaranteed by the grounding of all isolated metal surfaces. The grounding terminal/screw is located inside the electrical enclosure, in Upper Left position.

It is the user's responsibility to periodically check the efficacy of analyzer's electrical ground.

In case of loss of power, the analyzer stops and automatically restarts as soon as power is returned.

Operating Precautions and Hazards

HAZARD: Mechanical hazards caused by moving parts such as the peristaltic pump, the motor...

PREVENTIVE ACTIONS:

To avoid risks the analyzer's moving parts have been designed, built and located in an enclosure with a special key. When present inside the enclosure, these parts have protection covers to avoid any contact and physical injuries to users.

HAZARD: Hazard of burns and poisoning caused by contact with dangerous chemicals

PREVENTIVE ACTIONS:

To avoid risks, the analyzer's parts that can cause contact with chemicals have been designed, built and located in closed enclosure with a special opening key. Before servicing the liquids section, read the material safety data sheets supplied with each chemical and take all the necessary precautions when handling. Wear eye protections, gloves, mask and protective clothing if necessary.

HAZARD: Hazard of poisoning caused by waste gas leaking from the hydraulic parts or waste collector.

PREVENTIVE ACTIONS:

Install the analyzer in location of adequate dimensions and in a well ventilated area.

HAZARD: Hazard of electric shock and/or electrocution inside the electrical enclosure.

PREVENTIVE ACTIONS:

The analyzer's electric equipment complies with EN 60204 requirements.

To avoid risks, the analyzer's parts that can cause hazard of electric shock and/or electrocution have been designed, built and located in an enclosure with a special key. When working inside the enclosure, these parts have protective covers and warning labels to avoid any contact and serious injuries or death to users.

Note: Electrical equipment, input power and grounding must comply with all national and local regulations and laws.

Check that the source voltage to be used corresponds with that requested by the analyzer.

Check periodically the power cord as well as the analyzer grounding.

Chemical and waste gas hazards

The analyzer has been designed, built and equipped to avoid risks caused by physical and chemical factors such as noise, vibrations, radiations, dust, waste gas etc.

Table of Contents

List of Figures

List of Tables

DANGER
COMBUSTIBLE GAS USAGE WARNING

This is a general purpose instrument designed for use in a non-hazardous area. It is the customer's responsibility to ensure safety especially when combustible gases are being analyzed since the potential of gas leaks always exist.

The customer should ensure that the principles of operating this equipment are well understood by the user. Misuse of this product in any manner, tampering with its components, or unauthorized substitution of any component may adversely affect the safety of this instrument.

Since the use of this instrument is beyond the control of Teledyne Analytical Instruments, referred as TAI, no responsibility by TAI, its affiliates, and agents for damage or injury from misuse or neglect of this equipment is implied or assumed.

Introduction

1.0 OVERVIEW

The Model 6800T Alkalinity Analyzer was designed and manufactured to be an easy-to-use, high-sensitivity and low-cost measuring instrument. With regular care and maintenance this Analyzer should give you many years of reliable and problem-free operation.

This document is the Operating Manual for the Analyzer. We recommend that you supply the information marked as XXX . . . below for future reference.

Product Name: MODEL 6800T ALKALINITY Analyzer

Product Model: MODEL 6800T ALKALINITY ANALYZER

Purchase Date: XXX XX 201X

Serial No.: XXXXXX

Warranty Period, Begin-End Dates 1 year from date of shipment

Password: XXXXXX

Contact Details: XXXXXX

Distributor: XXXXXX

Phone: XXX XXX-XXXX

Internet:

Contact Details:

Teledyne Analytical Instruments
16830 Chestnut Street
City of Industry, California 91748-1020, USA

Tel: +1.626.934.1500
Fax: +1.626.934.1651
Toll free: +1.888.789.8168
Email: ask_tai@teledyne.com

CONTENTS:

3. 1 Reagent Bottle
4. MODEL 6800T ALKALINITY ANALYZER Instruction Manual

1.1 Analyzer Description

This manual provides general information regarding the principles of operation, the proper installation and operation of the Model 6800T Analyzer.

The Model Model 6800T is an on-line sequential sampling analyzer (a sequence of sampling, analysis and result processing), using titration methods.

The analyzer is assembled in two separated sections with two lockable doors. See Figure 1-1. The bottom section is the LIQUIDS section. It includes all of the components involved in the flow, mixing and reaction stages of the sample and reagents (sampling pump, titration reaction cell...). Numerous analysis configurations can be programmed, depending on accessories and of the number of valves mounted in the Liquid Section. The top section is the ELECTRICAL enclosure. It includes the main power supply, the controller PCB assembly and the touch screen interface.

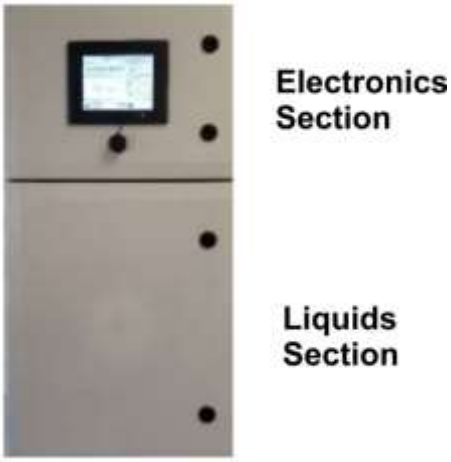

Figure 1-1: Model 6800T

1.2 Applications

The measurement is a titration analysis using a pH sensor to determine Total Alkalinity. Maintaining water quality with the proper balance of pH and alkalinity levels is essential in many different

processes—everything from drinking water to wastewater processes, as well as in irrigation water, water-based beverages and pharmaceuticals, electronics manufacturing and more. Alkalinity is a measure of the capacity of water to neutralize acids and affects pH levels in water. It occurs naturally in ground water and its levels are influenced by rocks and soils, salts, certain plant activities and in some cases by industrial wastewater discharges.

Teledyne's advanced 6800T Alkalinity Analyzer is easy to install and start up and a technician can do it in less than 15 minutes. All that is necessary is to perform simple connections of the sample, waste and reagent lines and then power up the factory pre-calibrated analyzer. Wall mounting hardware comes standard with each analyzer, but an optional bench top stand with reagent holder also is available.

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Theory of Operation

2.1 Titration Using pH Electrode

To determine and maintain water quality, accurately measuring the alkalinity of the water is critical to assess its relationship and impact on pH levels. Titration analysis with the Model 6800T Analyzer calculates alkalinity by dispensing known doses of a titrant fluid into a reaction cell while monitoring the pH level to two end points. The analyzer then uses the titrant concentration and amount dispensed to calculate the Carbonate and bi-carbonate alkalinity measurement.

Calculation of alkalinity(ANC) is a simple accounting of the amount of acid used to neutralize the sample to the bicarbonate equivalence point:

$(meq/L) = (mL) \times (meq/mL) \times CF / (mL) \times (1\ L / 1000\ mL) =$ (1000 x (B) x (Ca) x (CF)) / Vs

and

$(mg/L$ as $CaCO_3) = (meq/L) \times (1\ mmolCaCO_3 / 2\ meq) \times (100.087\ mgCaCO_3 / 1\ mmolCaCO_3) = (50044$ x (B) x (Ca) x $(CF))$ / Vs

where

Alk	is the alkalinity or ANC of the sample.
B	is the volume of acid titrant added from the initial pH to the bicarbonate equivalence point (near pH 4.5), in milliliters.
Ca	is the concentration of acid titrant, in milliequivalents (meq) per milliliter (same as equivalents per liter, or normality N).
CF	is a correction factor (see below).
Vs	is the volume of sample, in milliliters. mmol is millimoles, in this case for calcium carbonate.

2.2 Analysis Cycle

The Model 6800T Titration Analyzer typically performs a single alkalinity measurement per analysis cycle. Its standard program sequence consists of a cleaning cycle, sample acquisition, monitoring of pH, the addition of the titrant fluid, mixing the fluid, calculation of results and data storage. The desired frequency of analysis between cycles can be easily modified to the requirements of the user's process.

2.2.1 Typical RunSequence

Rinsing and sampling *Drain, rinse and sample functions*	First the reaction cell is drained and rinsed (these steps can also be programmed at the end of the run). The hydraulic lines and the reaction cell are rinsed prior to taking the actual sample. Then the sample is taken.
Addition of reagent(s)/Titrant(s) *Add reagent function/ Add Shots*	Depending on the method one or more reagents are added or titrated to a specified pH value. Titrants are administered by the amount of shots.
Mixing *Mix functions*	The mixing stir bar is activated once the titration sequence begins. The liquid is mixed after every shot administered to the solution.
Data log *Data logging*	Data logging is used to determine the Total alkalinity of the sample. It counts the number of Shots being titrated and the pH concentration of the sample while the titration.
Concentration calculation *Calculation*	The analyzer will record the number of shots titrated, then a calculation is performed

Drain, conditioning, rinsing, sampling *Drain, rinse and sample functions*	Drain and rinse of the hydraulic lines and the reaction cell.
Waiting time (analysis frequency) *Wait function*	The wait function allows the frequency of the analysis to set.

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Components

The Model 6800T Analyzer has two distinct sections as shown in Figure 3-1.:

1. The **Liquids Section** which includes all of the liquid handling equipment. This is located in the Lower Compartment, (pictured right, with Dilution Module).
2. The **Electrical Section** including power supply, microprocessor controller, I/O and touch screen interface are located in the Upper Compartment.

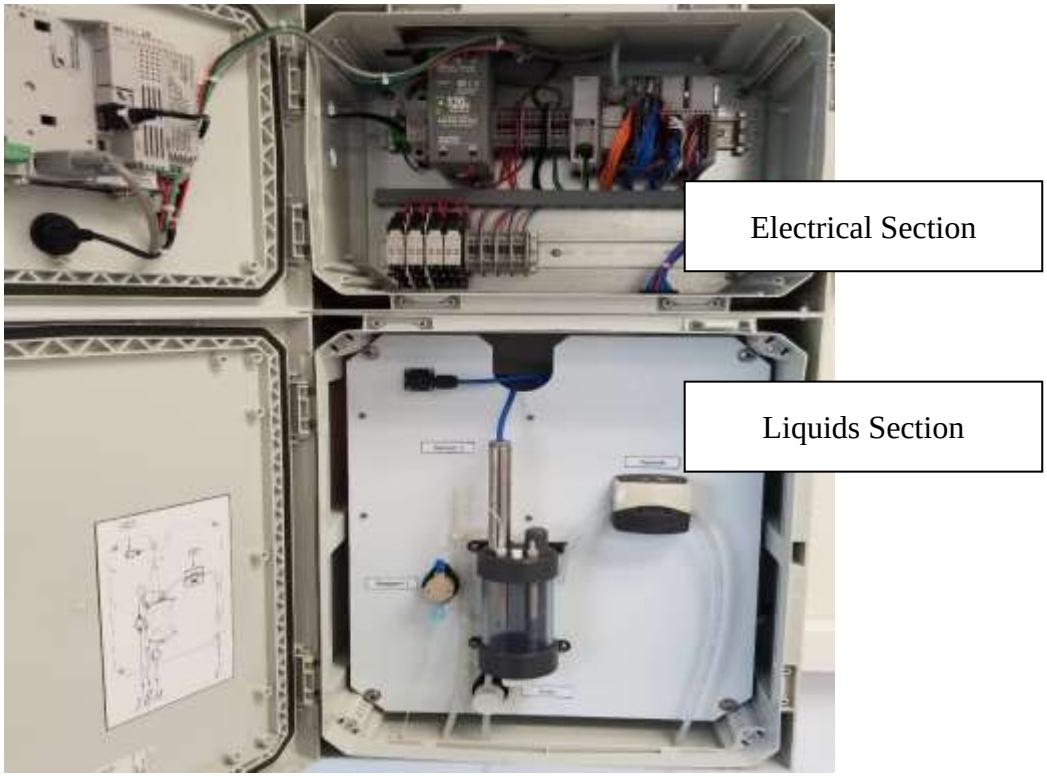

Figure 3-1: Analyzer Sections

3.1 Liquids Section Components

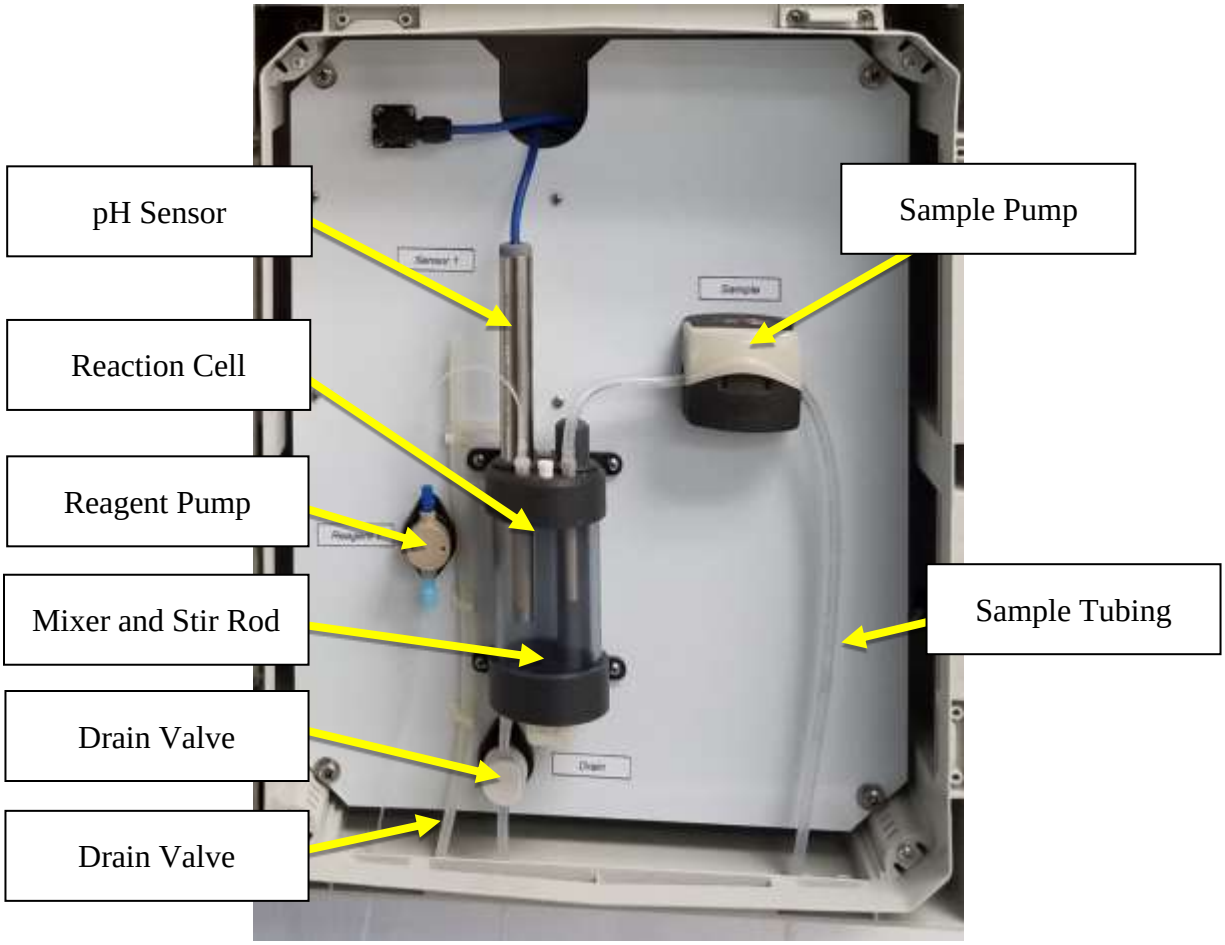

Figure 3-2: Liquids Section Components

3.1.1 Sample Pump

Model 6800T uses a Watson Marlow peristaltic pump for sampling Proper diameter and material of the tubing must be used for proper functioning of the Model 6800T Analyzer, use only Teledyne specified replacement tubing and parts. The pump is located in the liquid enclosure.

3.1.2 Drain Valve

The normally-closed pinch valve is used to control the draining or rinsing of the rinsing cell. When the valve is actuated it opens and drains the cell. The pinching jaws are sized for 1/8" I.D. Silicon or Viton tubing. The size and material of the tubing is VERY IMPORTANT, use only Teledyne spares. The pinch valve is located in the liquid enclosure. This tubing should be checked regularly for proper sealing.

3.1.3 Reaction Cell

The reaction cell is the vessel where the sample and titrant are added and mixed. The pH sensor is inserted through an opening on the top of the reaction cell where the sensor electrode is submerged in the sample/titrant mixture and reads the solution pH. Inside the reaction cell is a magnetic rod that is spun on its center axis by the stirring motor immediately below the reaction cell. The assembly is like a laboratory stirring plate.

3.1.4 pH Sensor

The pH sensor has two parts:

1. The sensor body with electronics in a 10-inch stainless steel tube.
2. The pH sensor electrode (screwed in to the open end of the sensor body).

The sensor uses the pH electrode to monitor the change in pH when the titrant is added. When not in use, the electrode (can be still attached to the sensor) should be kept wet with the 4 buffer (best) or at a minimum tap water.

CAUTION: DO NOT USE DE-IODIZED WATER TO STORE THE SENSOR ELECTRODE.

De-ionized water will cause damage to the sensor electrode and will require replacement. The sensor's pH electrode is shipped with a black boot on the end and will require replacement. The sensor's pH electrode is shipped with a black boot on the end containing 4 buffer solution, this boot can be refilled with 4 buffer and used again.

3.1.5 Reagent pump

The Titrant or reagent pump is a pump that dispenses an accurate volume of liquid into the reaction cell. It is located in the liquids enclosure section.

3.1.6 Mixer and Stir Rod

The mixer is located on the bottom of the reaction cell. It is a magnetic stirrer and used with the Stir rod to mix the Reaction Cell contents. These are located in the liquids enclosure section.

3.1.7 Sample Tubing

The sample should be connected to the far right tubing line. The Tubing is sized for 1/8" I.D. Silicon or Viton tubing.

3.2 Electronics Section Components

The microprocessor based controller and its PCB assembly are located in the electronic section. The cover and touch screen interface have been removed to show the internal construction. The controller handles all analyzer operations. It collects all the information and data coming from the different analyzer devices and controls all I/O dialogue with the user touch screen interface and data transfer equipment.

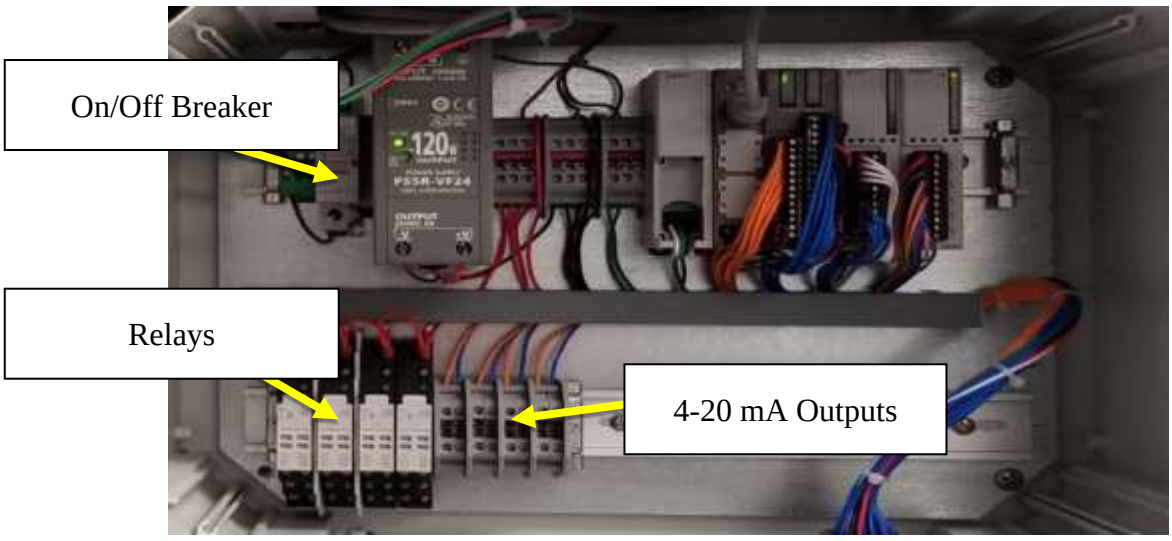

Figure 3-3: Electronics Section Components

3.2.1 On/Off Breaker

The On/Off breaker is located in the Electrical Compartment on the

top left corner. To turn ON the unit on you must flip the breaker up. To turn the unit OFF you must flip the breaker down. See Figure 3-4.

Figure 3-4: ON/OFF Circuit Breaker

3.2.2 Relays

The Model 6800T is equipped with 4 relays. Each relay is SPDT 15A 250VAC.

Figure 3-5: Model 6800T Circuit Breakers

3.2.3 4-20 mA Output

There are four 4-20 mA outputs.

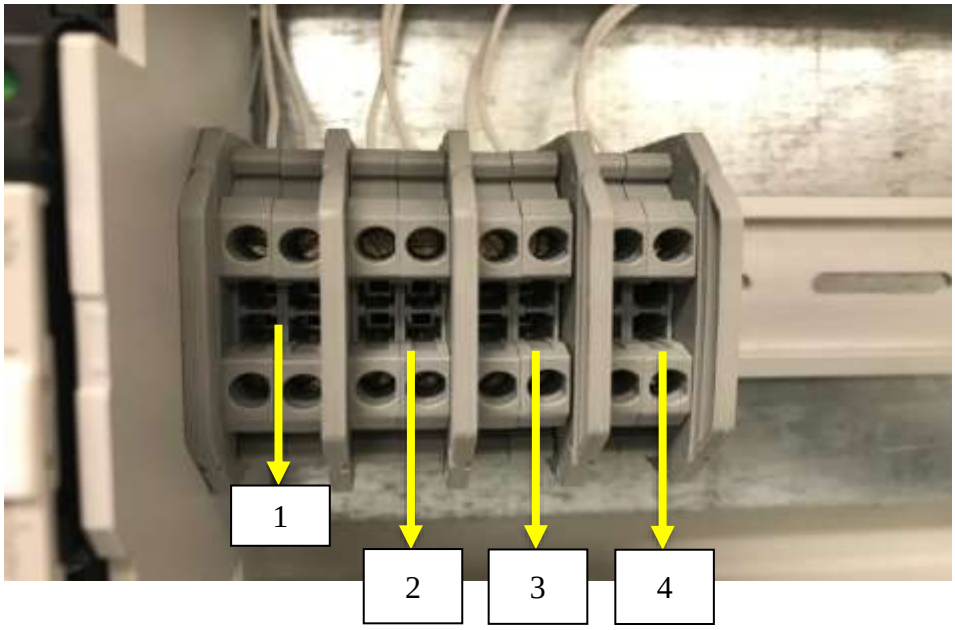

Figure 3-6: Analog Output Connection

Installation

4.1 Unpacking the Instrument

Your Model 6800T has been carefully packaged to protect it from damage during shipment and dry storage. Upon receipt please follow the procedure outlined below.

1. Before unpacking, inspect the condition of the shipping container to verify proper handling by the carrier. If damage is noted, save the shipping container as proof of mishandling for the carrier.
2. Check the contents of the shipping container with the items and quantities shown on the packing list. Immediately report any discrepancies to Teledyne.
3. Save the original packing material until you are satisfied with the contents. In the event the product(s) must be returned to the factory, the packing material will allow you to properly ship it to Teledyne.
4. Familiarize yourself with the instrument before installation, and follow proper installation and wiring procedures.

4.2 Contents

Verify that your shipment contains the following items:

1. Model 6800T Alkalinity Analyzer
2. Tubing Kit, Door Key
3. 1 Reagent Bottle
4. Model 6800T Alkalinity Analyzer Instruction Manual

4.3 Unpacking and Inspecting

The Model 6800T Analyzer is fully assembled and was tested for proper performance at the factory before packaging and shipping. Before proceeding with installation of the analyzer, it is recommended that you carefully inspect the box and analyzer for damage that may have occurred during shipping.

Use care when unpacking and moving the analyzer. Refer to the Packing List when unpacking the Model 6800T Analyzer and be careful not to misplace any of the accessories.

4.4 Analyzer Handling

Use extreme care when lifting or moving the analyzer. If the analyzer has been in service, empty all liquids from the hydraulic parts before moving the analyzer.

4.5 Location and Mounting Instructions

Install the Model 6800T Analyzer in a clean, dry and dust free environment or in an enclosure with good ventilation.

Environmental Operating conditions are:

Temperature: 5°to 50°C (41° - 121°F)

Relative humidity: 80% maximum

If the temperature is below 5°C (41°F), the analyzer should be installed in a heated cabinet.

Due to the possible generation of chemical or waste gases, choose a well ventilated location for the analyzer.

The Model 6800Tanalyzer is supplied with four mounting brackets for wall mounting or stainless steel support rack installation. To wall or rack mount the Model 6800T analyzer use four 1/4-20 screws or larger.

The reagent bottles are supplied with the analyzer. The relative position of the reagent bottle(s) to the reagent pump(s) is very important. The maximum distance between the bottom of the reagent bottle(s) and the lowest edge of the analyzer panel shall be no more than 40 cm (15.75”).

4.6 Pre-Installation

Considerations for the proper Location of the Model 6800T Analyzer:

- Place the analyzer close to the sample point in order to minimize the response time.
- The sample point should provide a homogenous and representative sample to the Model 6800T.
- Plumb sample line to analyzer. If the sample line is under pressure use an adjustable shut-off valve (needle or ball valve) to feed the Fast Flow Reservoir. If drawing from a tank or pond then minimize the tubing length. If longer than 10 feet add time to the initial Rinse times in the Analysis Cycle and the Extra Cycle. (+5 seconds per 10 ft section)
- Position the Model 6800T Analyzer near a suitable drain, with sufficient capacity to handle the gravity fed waste discharge and the bypass overflow from the Fast Loop Reservoir (if used).

CAUTION: THE SAMPLE DRAIN FROM THE ANALYZER MUST DRAIN AT AMBIENT PRESSURE WITH NO RESTRICTIONS OR COUNTER PRESSURE.

- Clearance requirements for the analyzer should be 8 inches (20 cm) on either side of the analyzer and 40 inches (100 cm) on the front.
- Sufficient space for the reagent containers should be provided beside or beneath the analyzer.
- The reagent containers should be placed in a suitable collection basin in case of spills.

Note: 2" maximum height between the reagent's bottle(s) and the reagent's pump(s).

4.7 Electrical Connections

4.7.1 General information

The electrical installation should be carried out by qualified personnel in accordance with all national and local regulations.

Qualified Personnel refers to a person who has the professional training and experience to avoid electrical hazards and dangers.

Only qualified personnel should have access to the key that opens the analyzer enclosure.

Power to the Model 6800T Analyzer should be routed through an ON/OFF switch.

Turn off the power before beginning any service on the Model 6800T Analyzer.

The Model 6800T must be properly grounded to prevent the possibility of electrical shock. All metal surfaces are connected to the Ground terminal. The Grounding Terminal/Screw is located inside the electrical enclosure in the upper left position.

CAUTION: IT IS THE USER'S RESPONSIBILITY TO PERIODICALLY CHECK THE EFFICACY OF ANALYZER'S ELECTRICAL GROUND.

CAUTION: THE ANALYZER STOPS WHEN POWER IS LOST OR DISRUPTED AND AUTOMATICALLY RESTARTS WHEN THE POWER IS RESTORED.

Users and qualified maintenance personnel must proceed as follows:

- Always turn off the power before servicing the analyzer.
- Take notice of all Electrical Shock and/or Electrocutions labels placed on the analyzer.

WARNING: DANGER: NO SERVICE SHOULD BE CARRIED OUT ON THE INSTRUMENT WITHOUT FIRST SWITCHING OFF THE POWER.

4.7.2 AC Power Connections

The Model 6800T Analyzer is designed for operation with 110-220Vac, 50-60 Hz power. The supplied AC power cord exits through a port on the left side of the electrical compartment. All the connections must be made in accordance with national or local regulations. The analyzer is equipped with a Breaker (main power switch). It is recommended that the Model 6800T Analyzer is connected to power via a circuit breaker or an ON/OFF switch installed near the unit.

4.7.3 SignalOutputConnections– (4-20 mA, Relays)

Model 6800T Analyzer provides various output signals all from the TB terminal pictured below.

- Digital Input (- Input; + Input) for an external device (start extra cycle)
- (4) 4-20 mA output
- (4) configurable relays

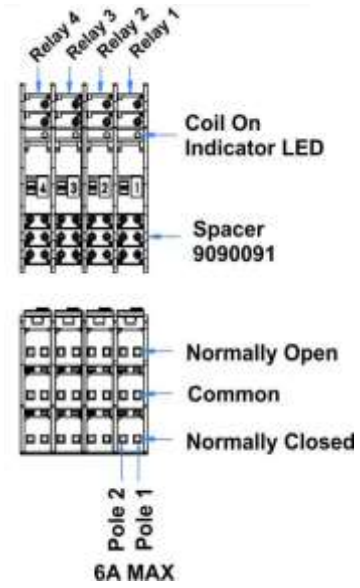

Figure 4-1: Relays

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Reagents and Buffers

Teledyne recommends that 0.16N sulfuric acid is used as the titrant reagent for 0-200 ppm alkalinity. Other normality concentrations can be used for different alkalinity concentrations outside the 0-200 ppm range.

pH 7 and pH 4 Buffer is needed to calibrate the pH sensor. You can purchase these buffers directly from Teledyne or you can purchase them from other venders.

Read all MSDS data sheets before preparing the reagents.

Use good laboratory technique. Wear safety goggles, gloves and protective clothing when preparing the reagents, calibration solutions or cleaning solutions.

Pay close attention to all Hazard and Poison labels.

Pre-made reagents and solutions are available from Teledyne. The part numbers for the reagents can be found in the recipe next to the reagent name and in the Appendix in the Accessories and Spare Parts section. Several of the reagents are listed as Hazardous Shipping Materials; these materials are only available for shipment domestically inside the USA.

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User Interface

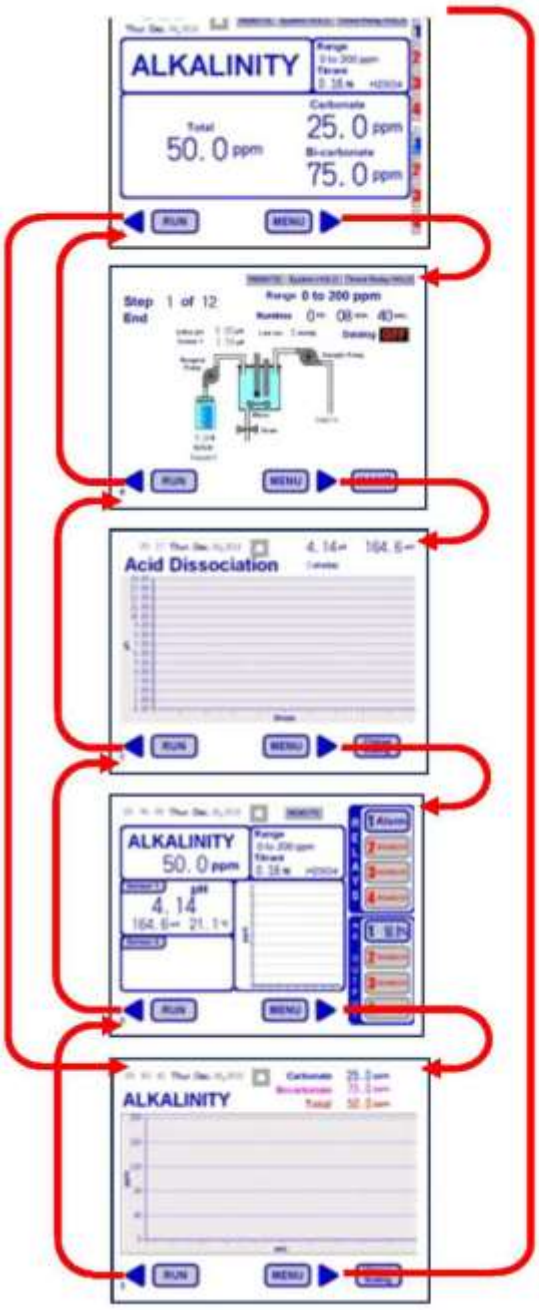
6.1 Touch Screen Display

The user interface consists of the Touch Screen Display located on the front panel of the analyzer enclosure. All input/output data, information, alarms and fault conditions are shown on the display while all commands and settings may be transferred to the analyzer simply pressing the touch screen.

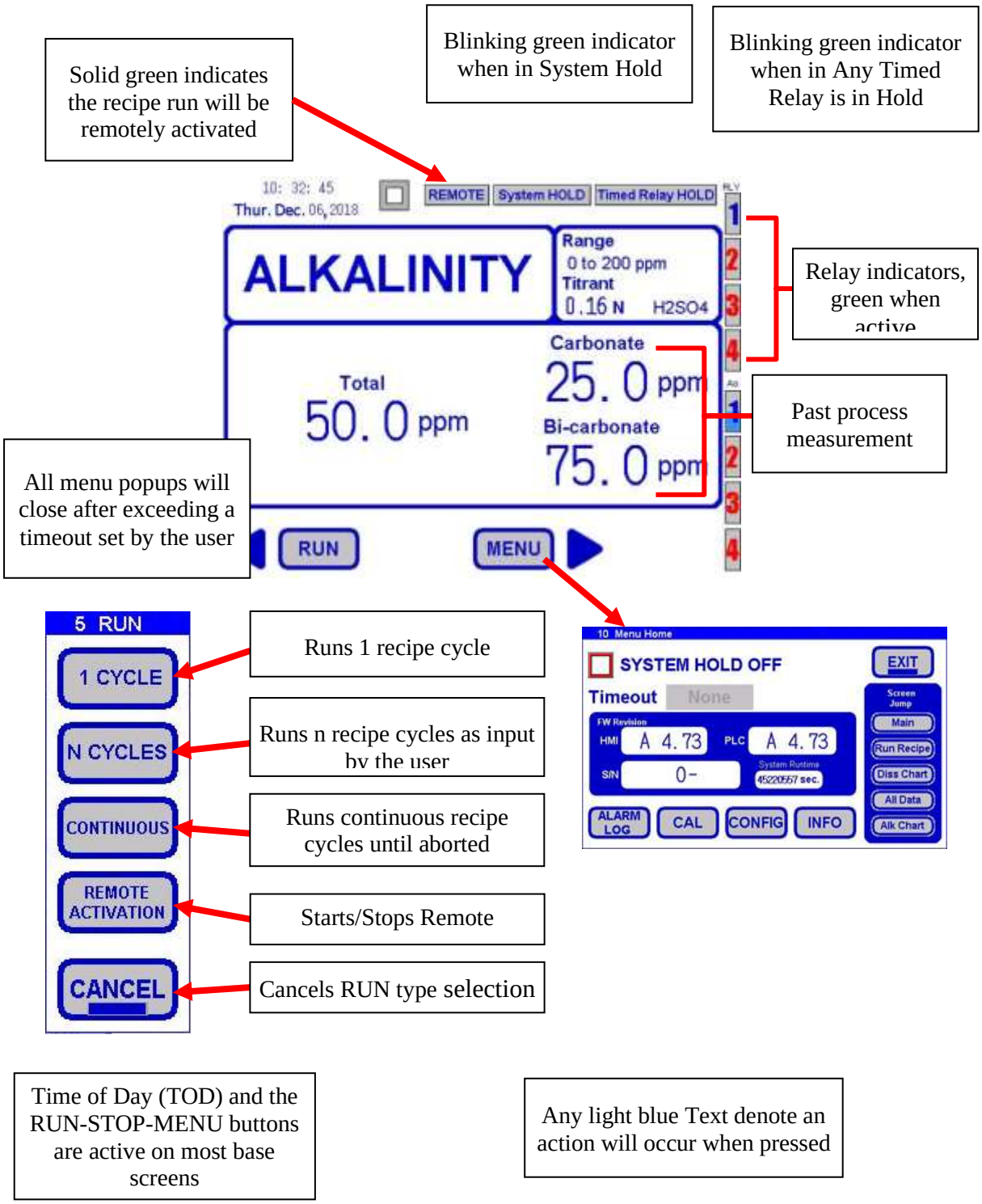
6.2 Base Screens

The display screen is a 5 inch, 640 x 480 pixel screen. Base Screen letter designations are located at the left bottom of the screen.

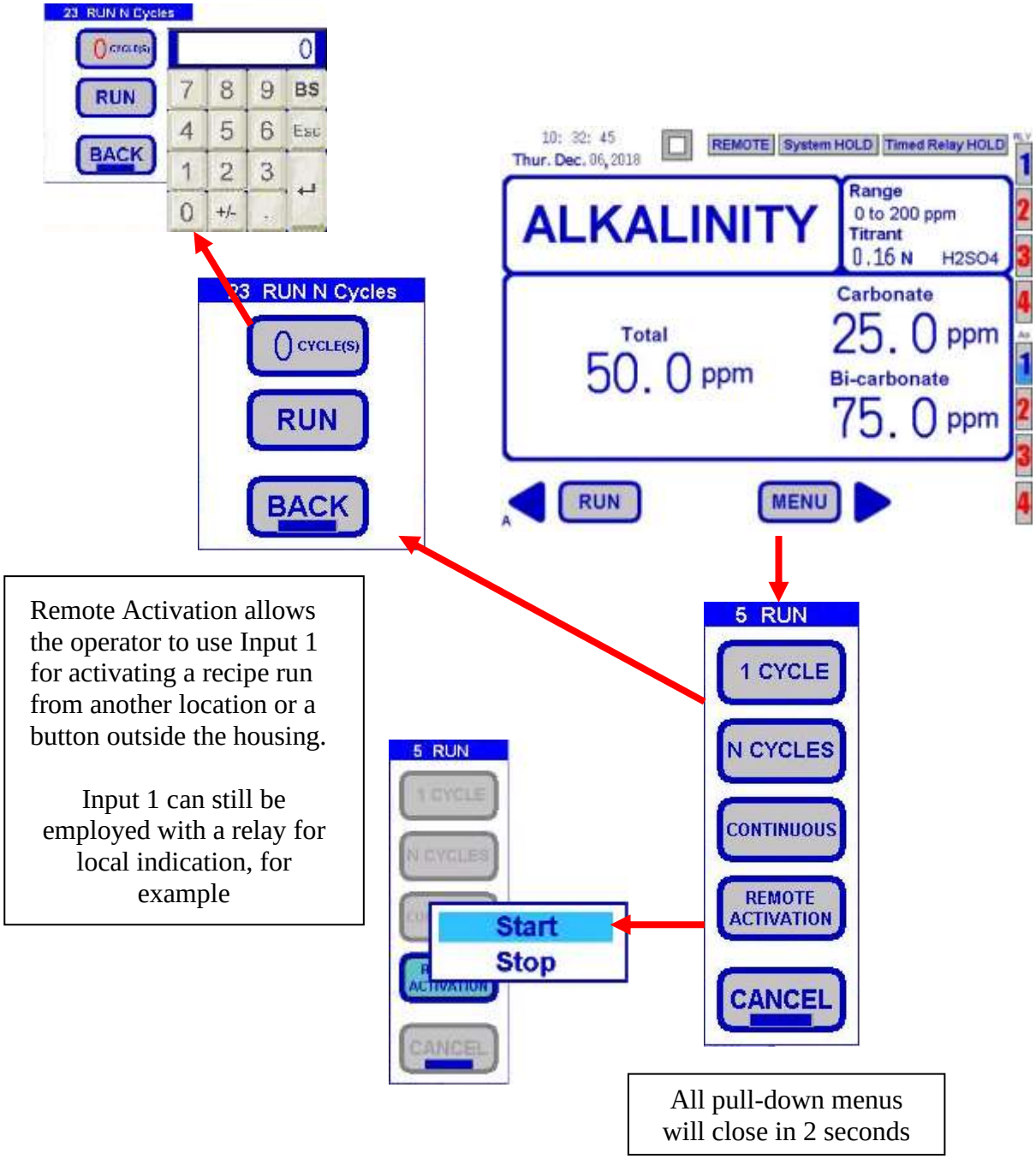
Basic Screens



6.3 Main Screen



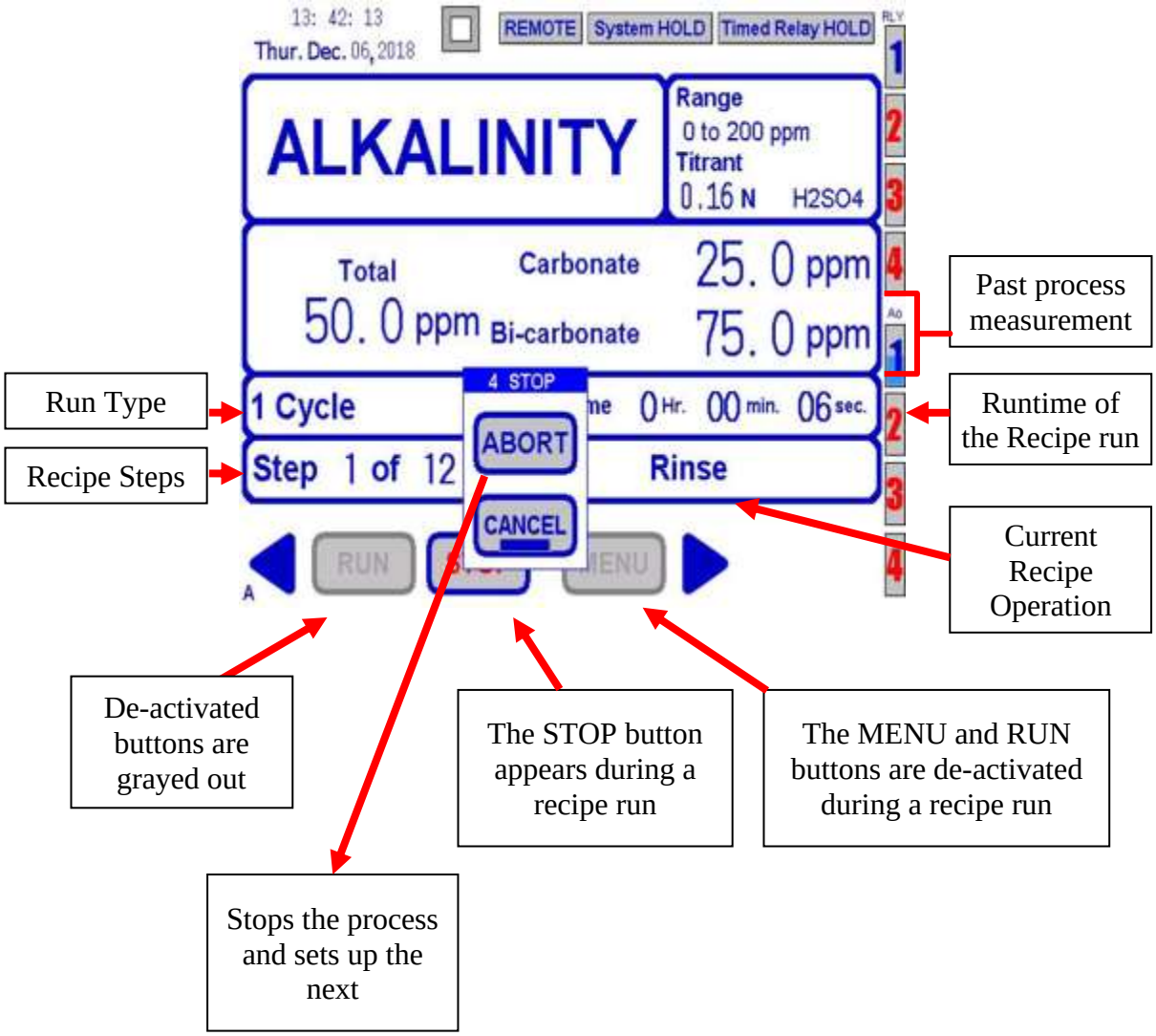
6.3.1 Run Command



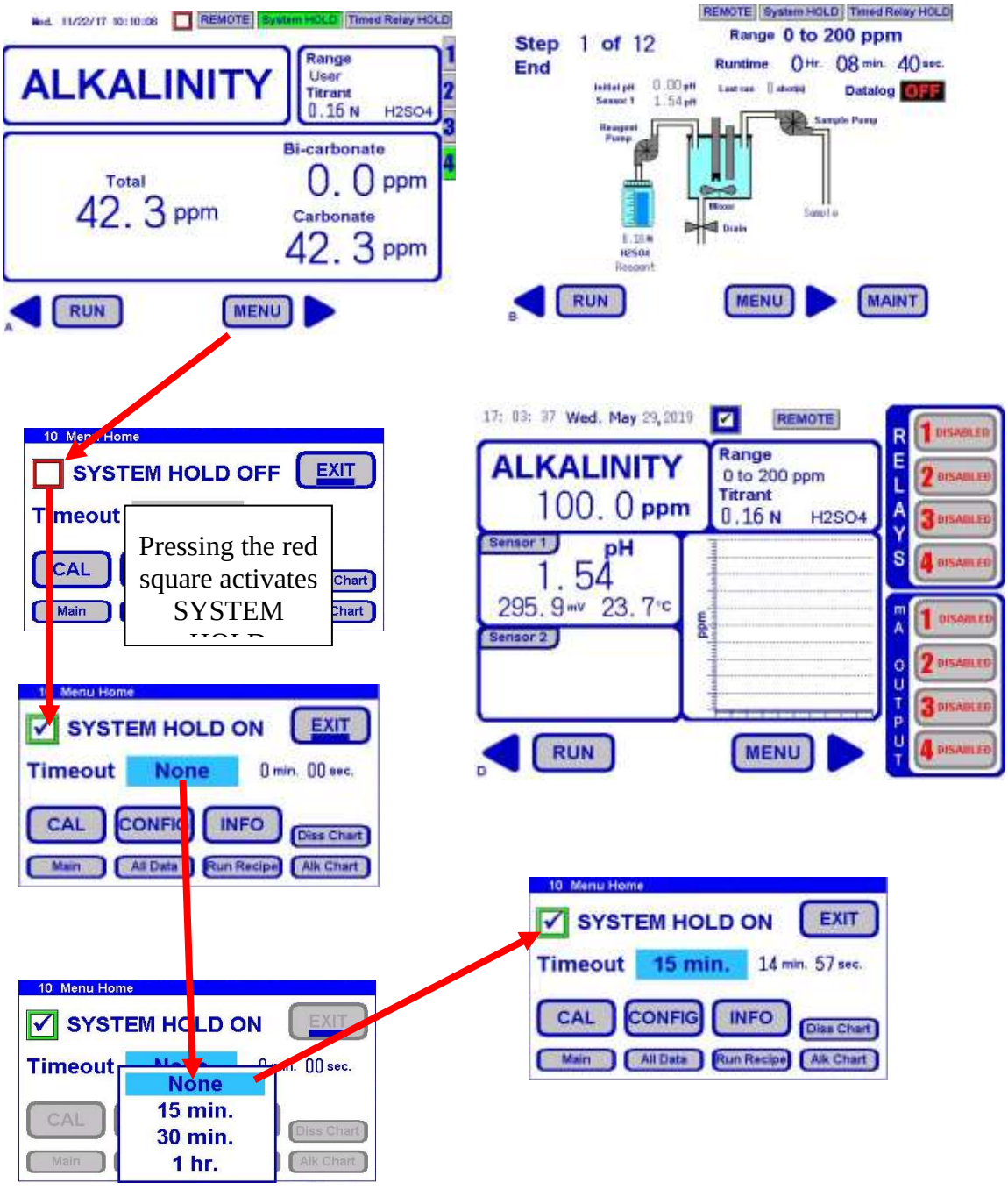
Remote Activation allows the operator to use Input 1 for activating a recipe run from another location or a button outside the housing.

Input 1 can still be employed with a relay for local indication, for example

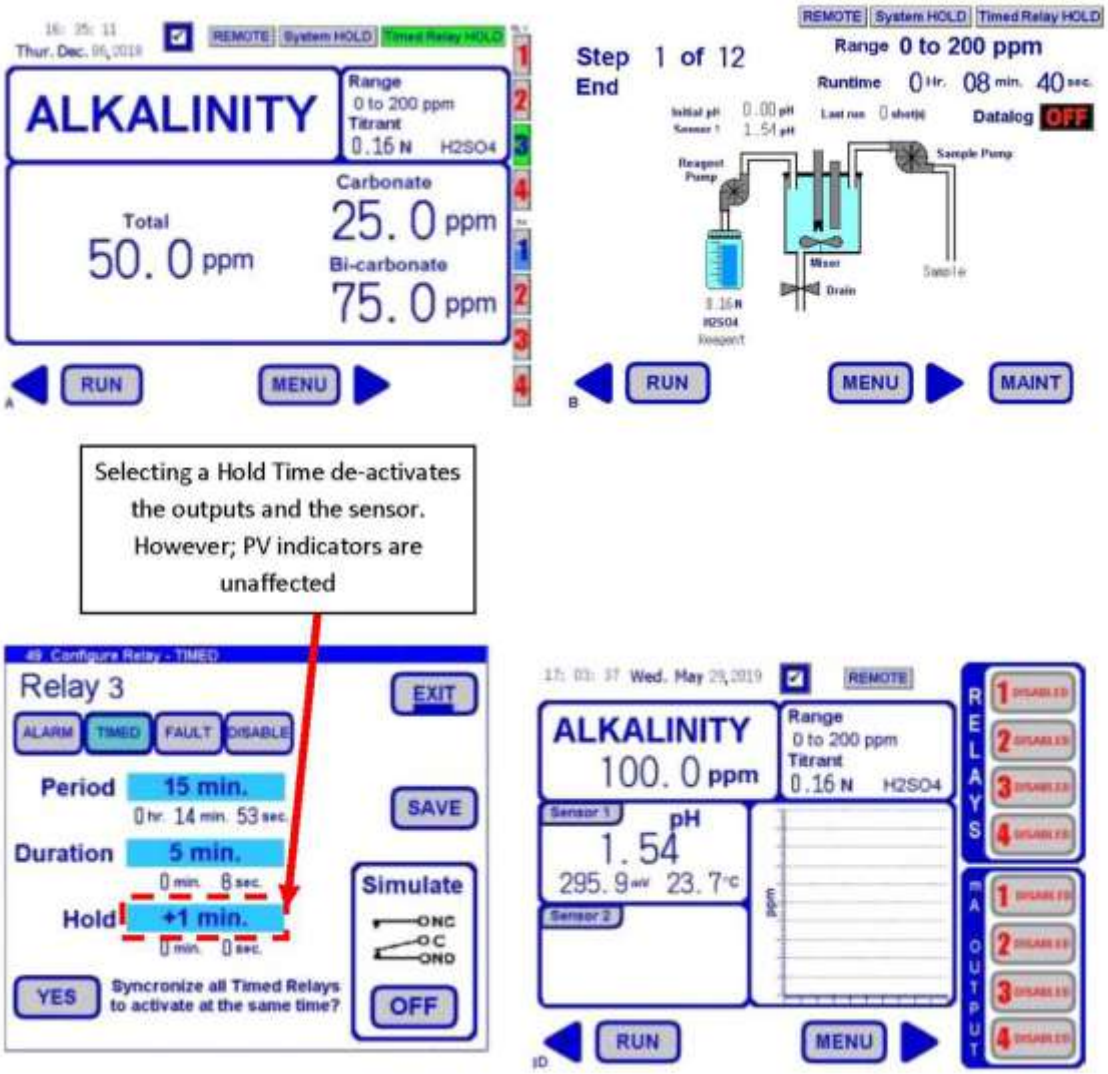
All pull-down menus will close in 2 seconds


13: 42: 13
Thur. Dec. 06, 2018
REMOTE
System HOLD
Timed Relay HOLD
ALKALINITY
Range
0 to 200 ppm
Titrant
0.16 N H2SO4
Total
50. 0 ppm
Carbonate
25. 0 ppm
Bi-carbonate
75. 0 ppm
1 Cycle
0 Hr. 00 min. 06 sec.
Step 1 of 12
Rinse
4 STOP
ABORT
CANCEL
RUN
MENU
Run Type
Recipe Steps
Past process measurement
Runtime of the Recipe run
Current Recipe Operation
De-activated buttons are grayed out
The STOP button appears during a recipe run
The MENU and RUN buttons are de-activated during a recipe run
Stops the process and sets up the next

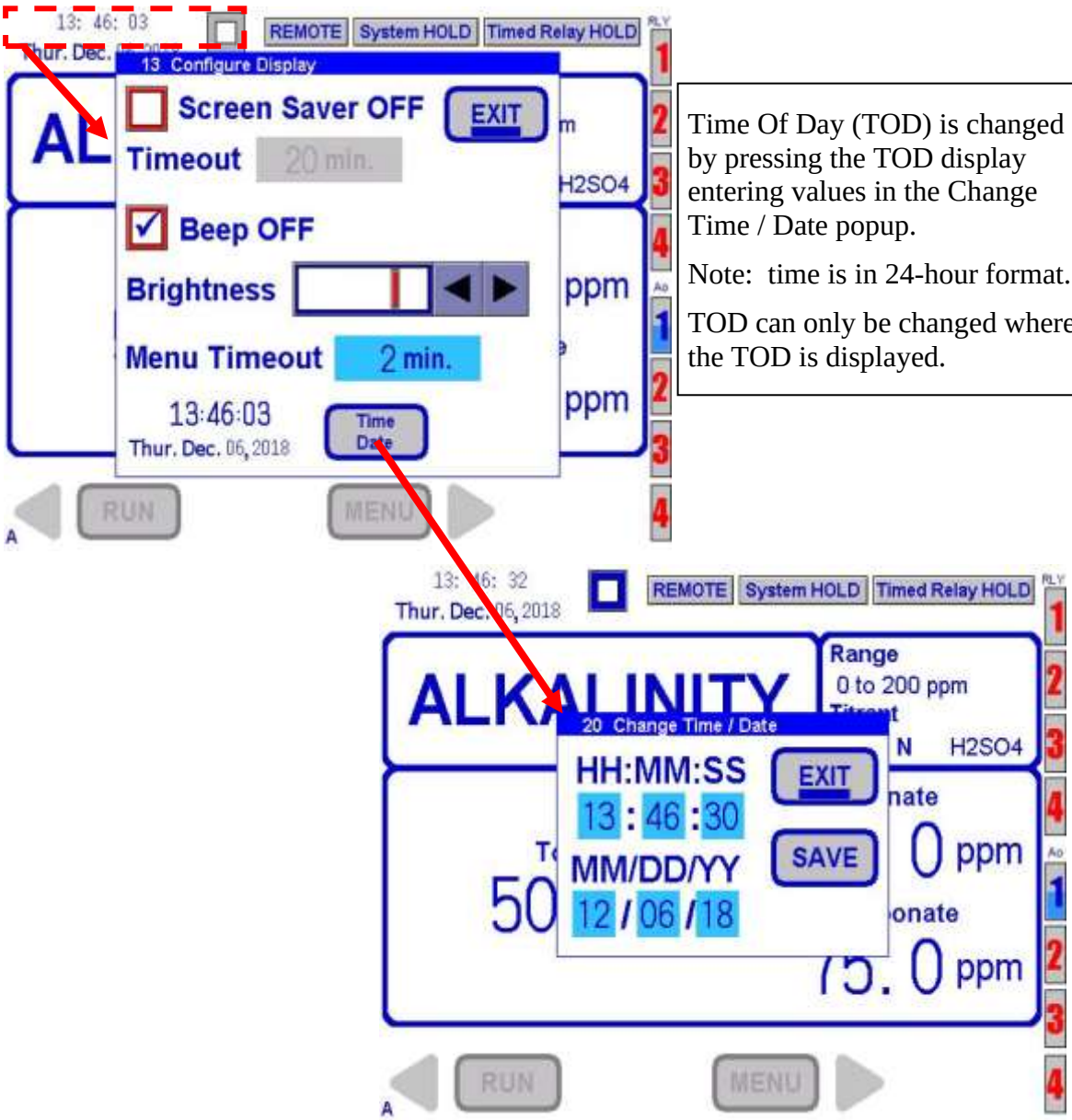
6.3.2 System Hold Indications



6.3.3 Timed Relay Hold Indications



6.3.4 Time of Day

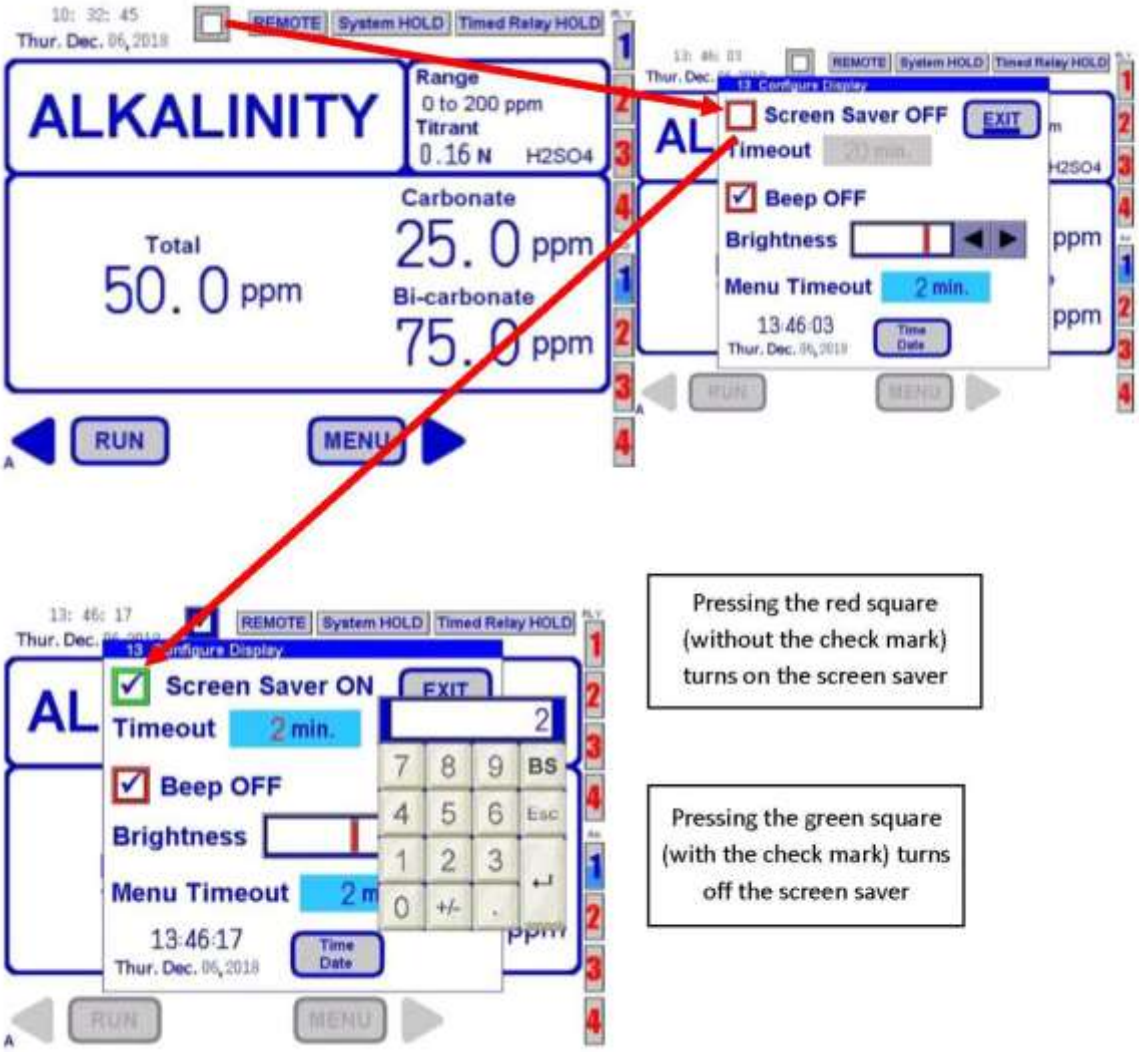


Time Of Day (TOD) is changed by pressing the TOD display entering values in the Change Time / Date popup.

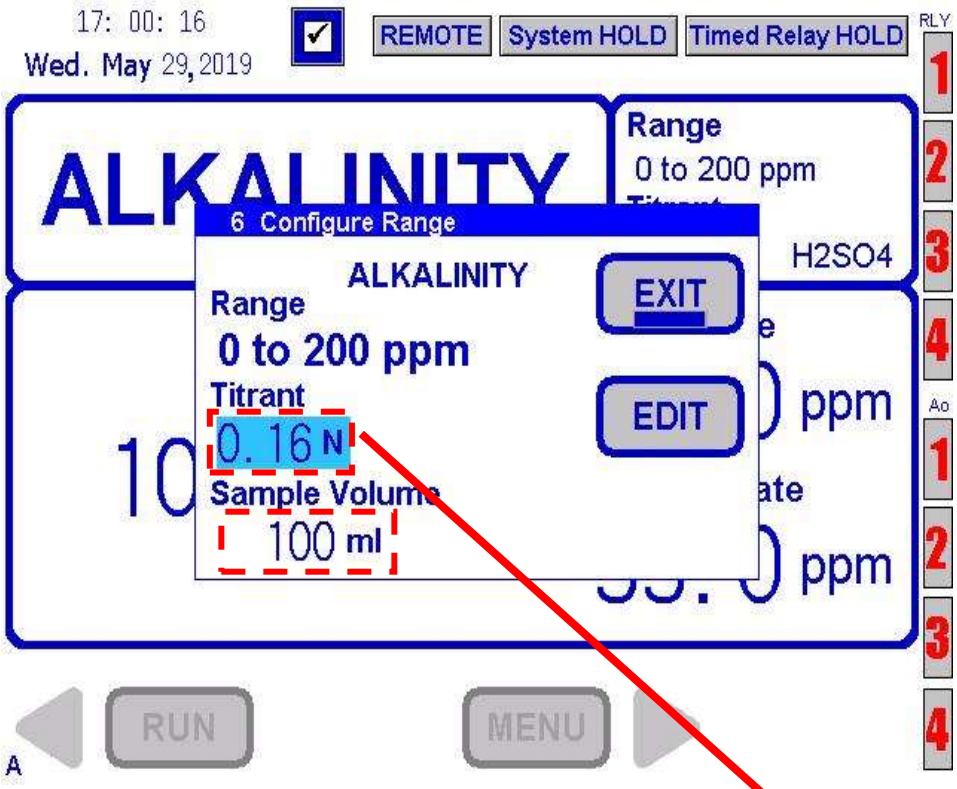
Note: time is in 24-hour format.

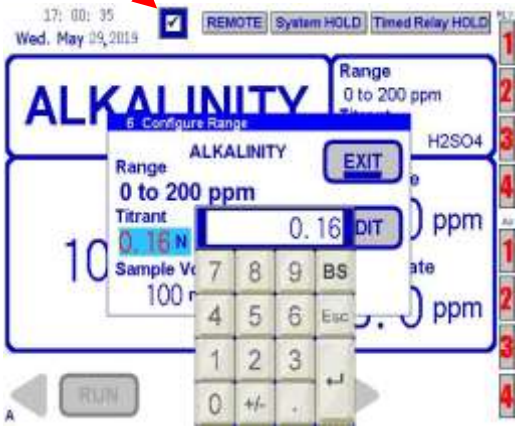
TOD can only be changed where the TOD is displayed.

6.3.5 Screen Saver



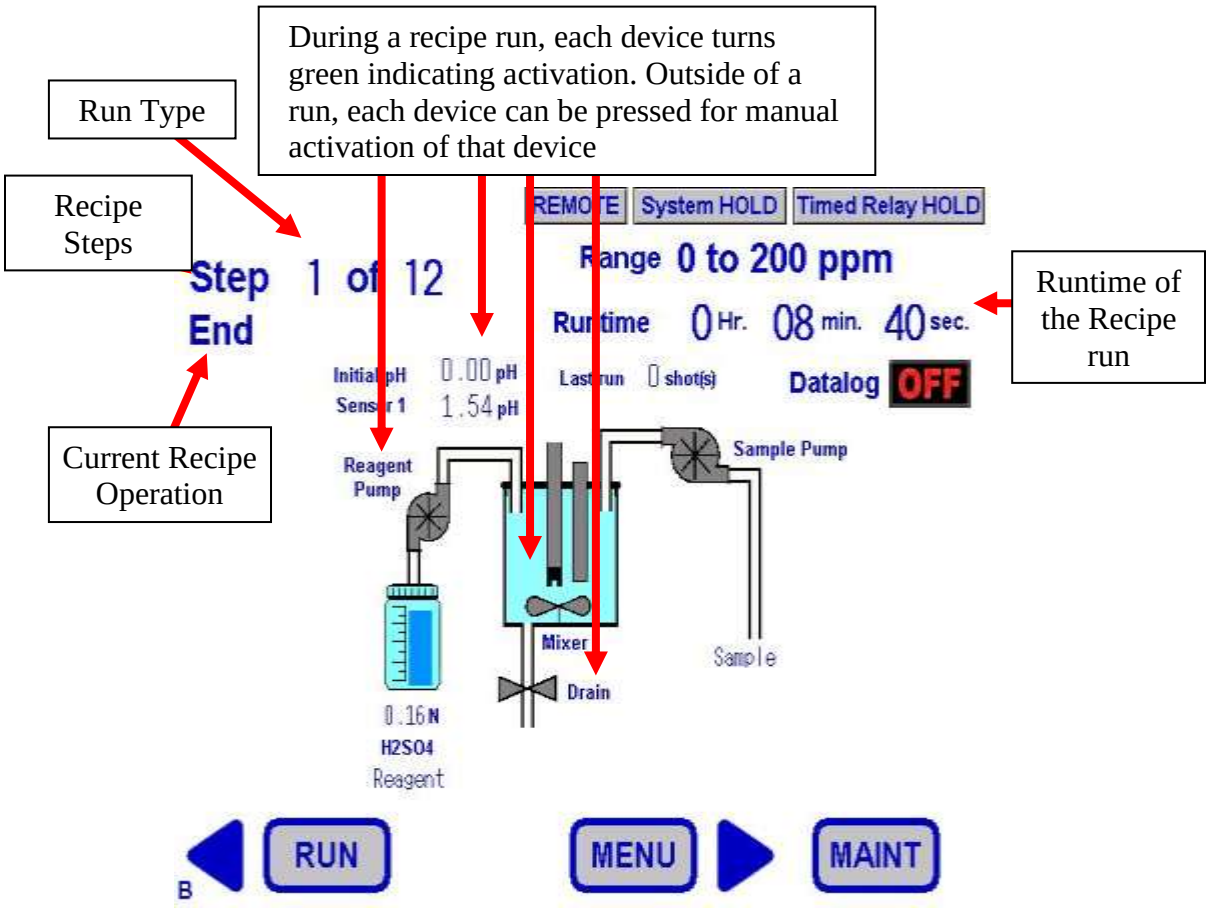
6.3.6 Range



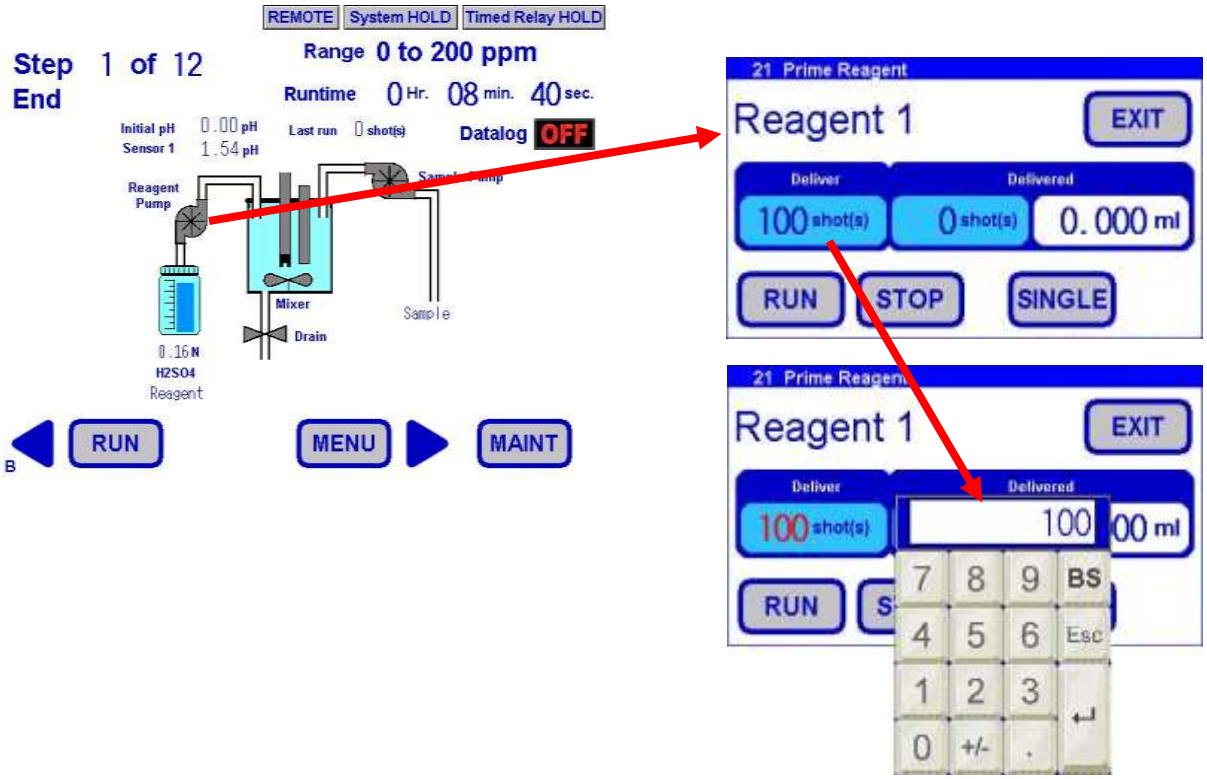


The Titrant and Sample Volume can be changed by pressing the range display on either the Main or All Data Screens

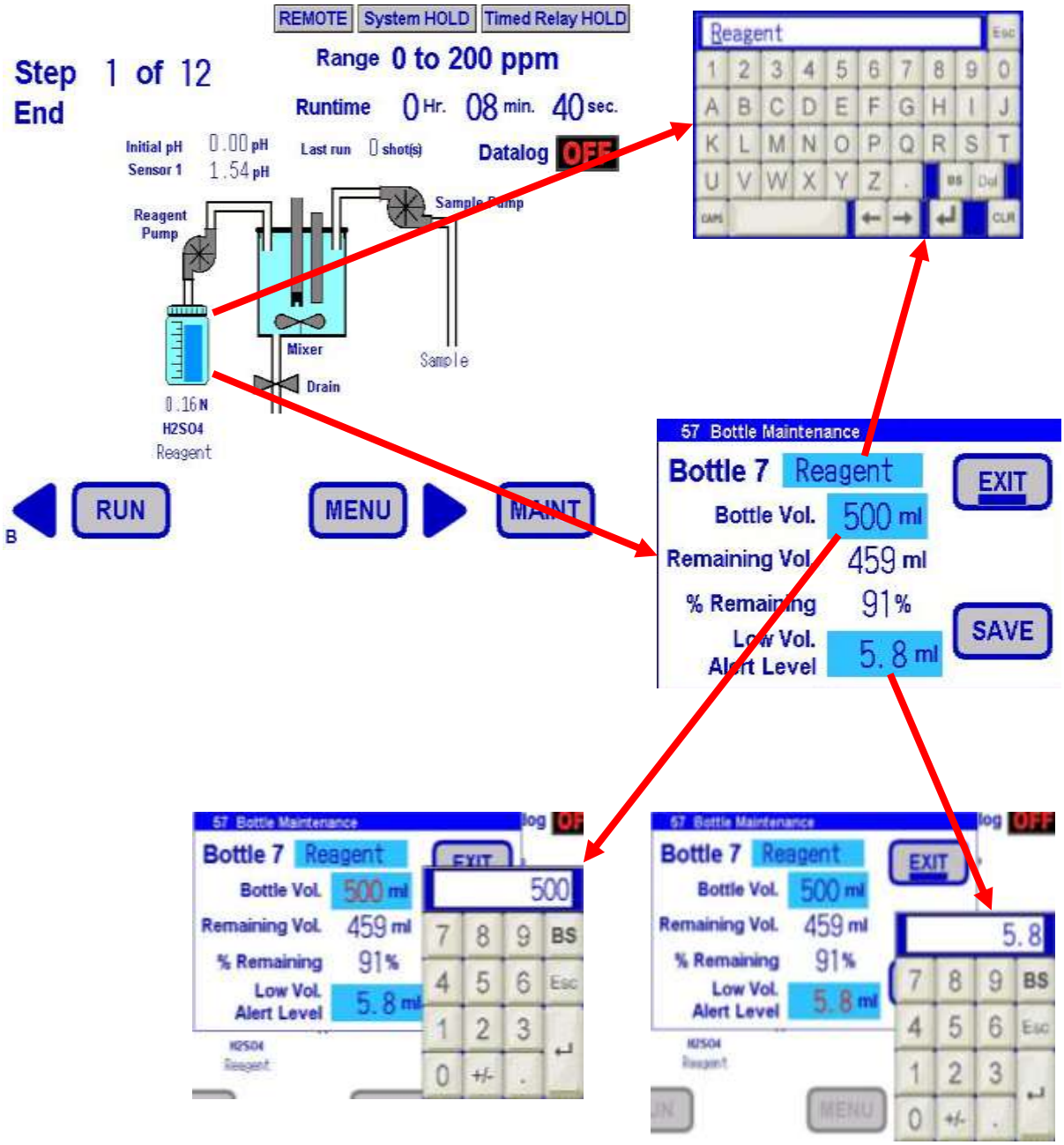
6.3.7 Run Recipe



6.3.8 Prime Reagent/Titrant

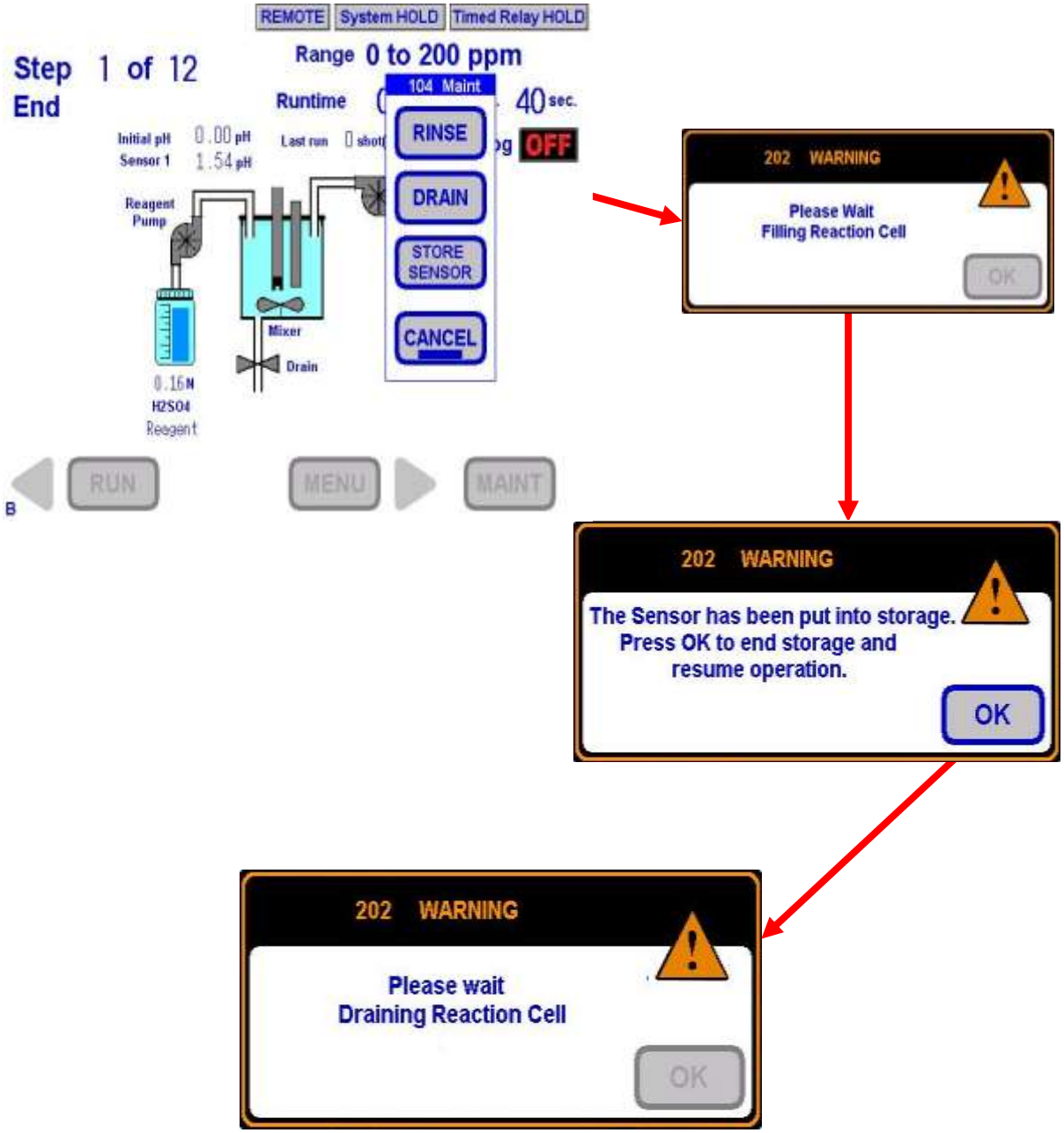


6.3.9 Bottle Maintenance



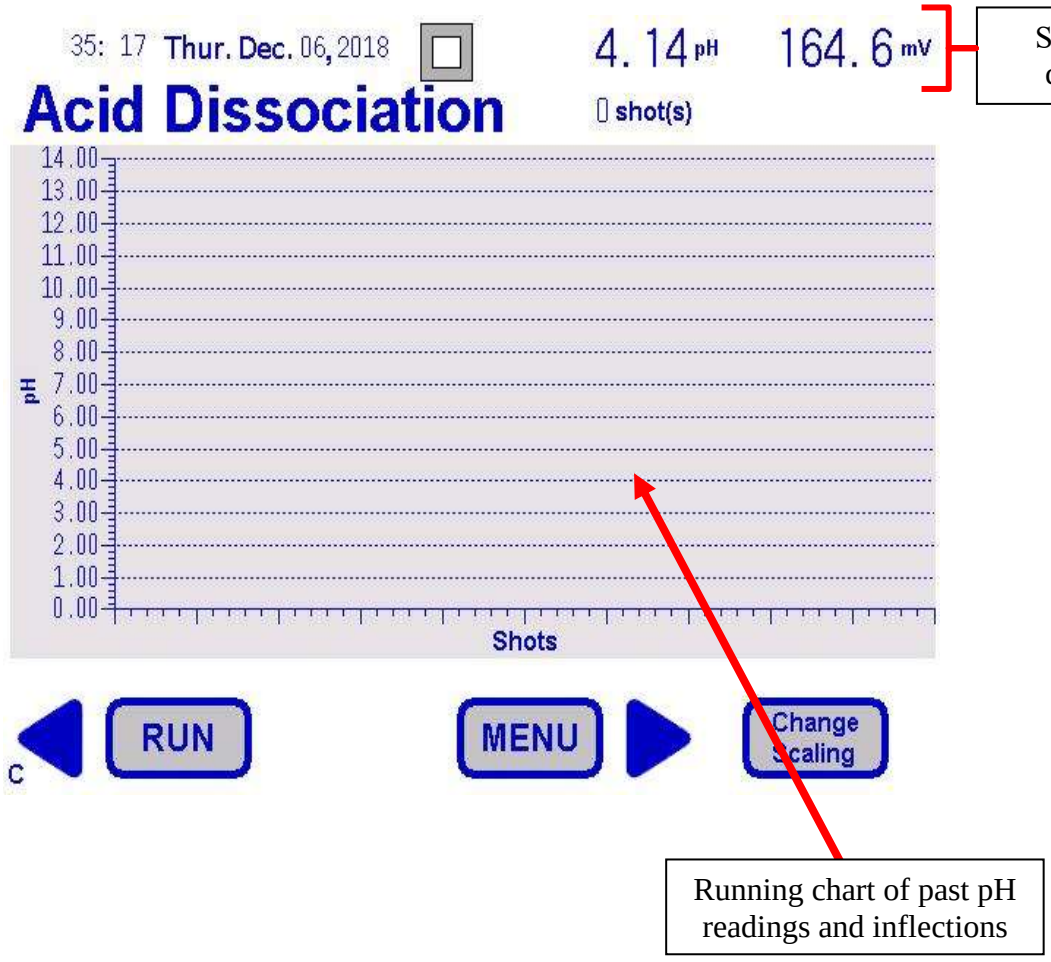
6.3.10 Store Sensor

When the Analyzer is not running an analysis, it is recommended that the sensor be stored in pH 4 Buffer. The reaction cell will automatically fill up with the correct buffer. Follow the sequence below to store sensor.

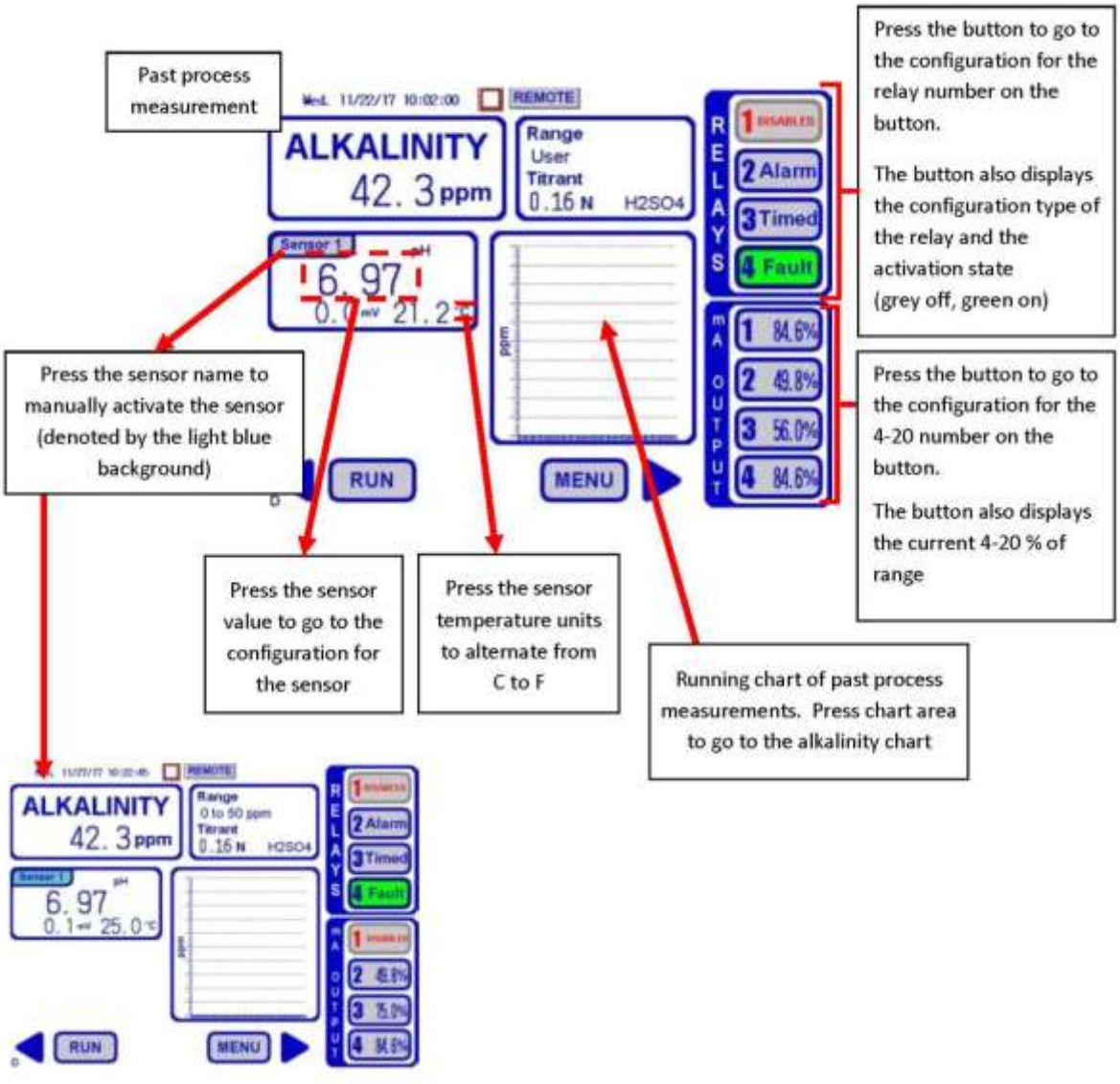


6.3.11 Acid Dissociation Chart

This chart allows you to visualize the pH concentration as the acid is titrated into the sample.



6.3.12 All Data Screen

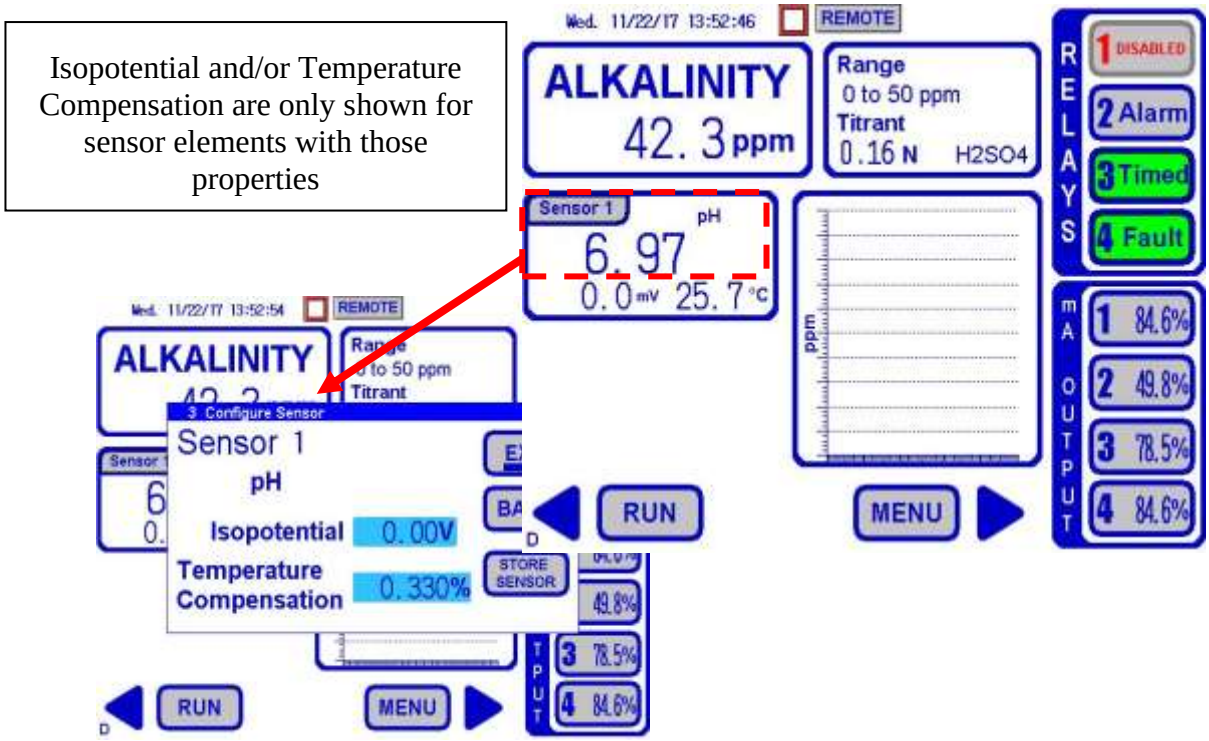


6.3.13 Range

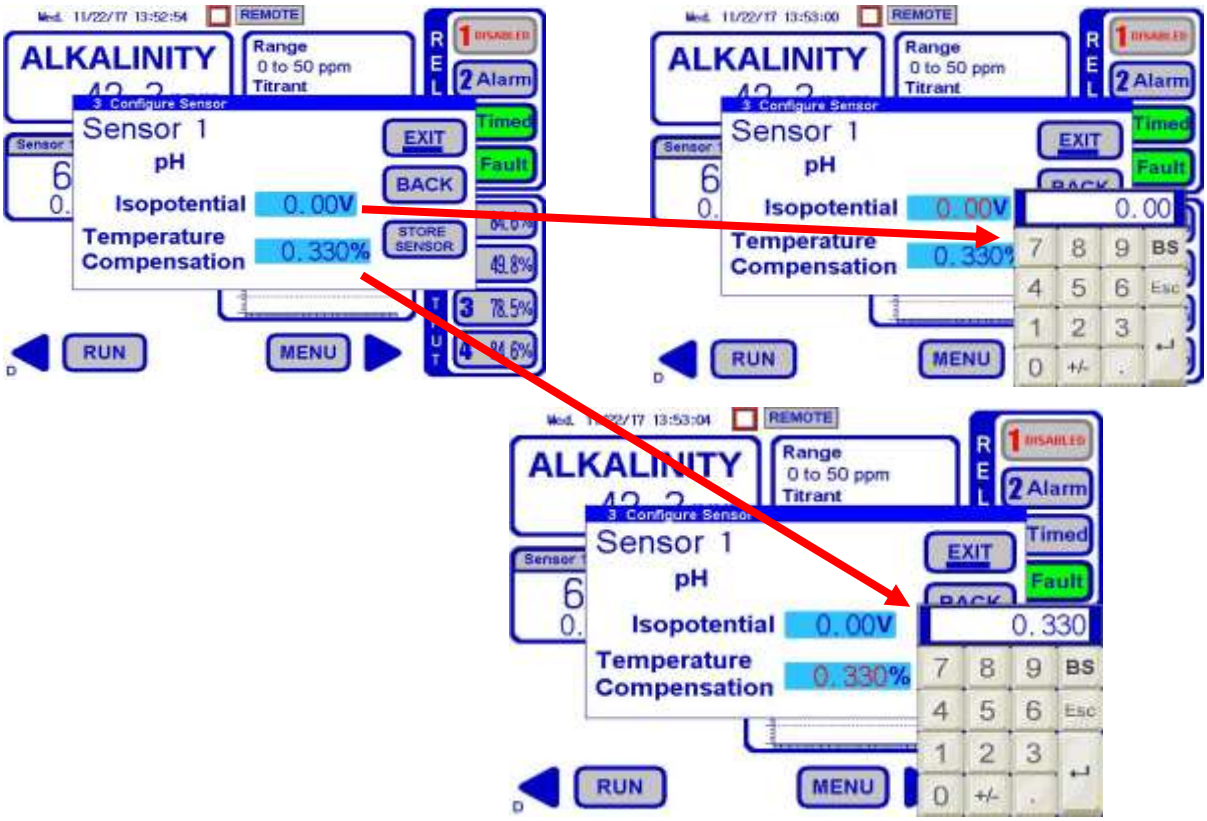
The Range setup is the same as shown for the Main screen

6.3.14 Range

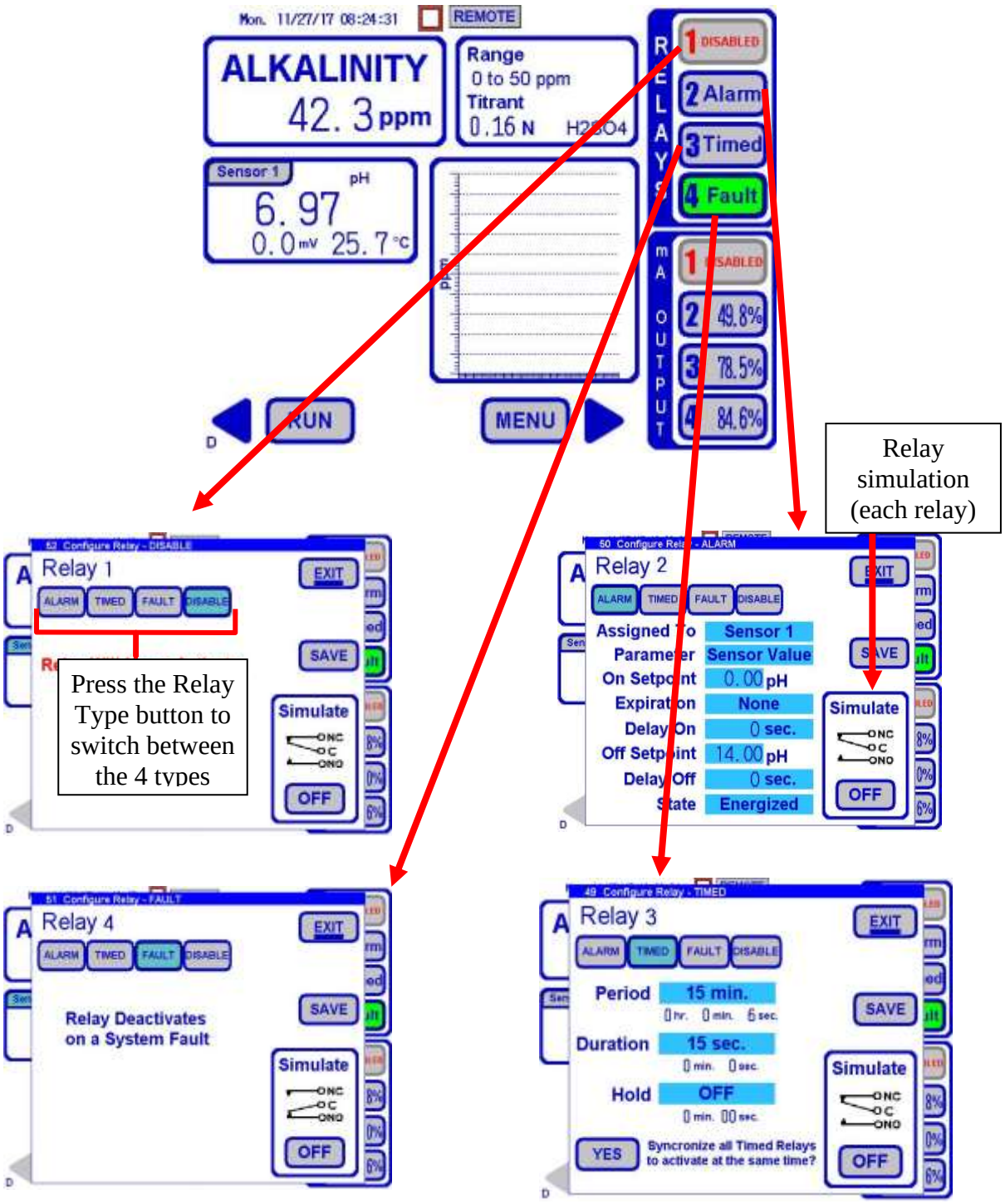
Isopotential and/or Temperature Compensation are only shown for sensor elements with those properties



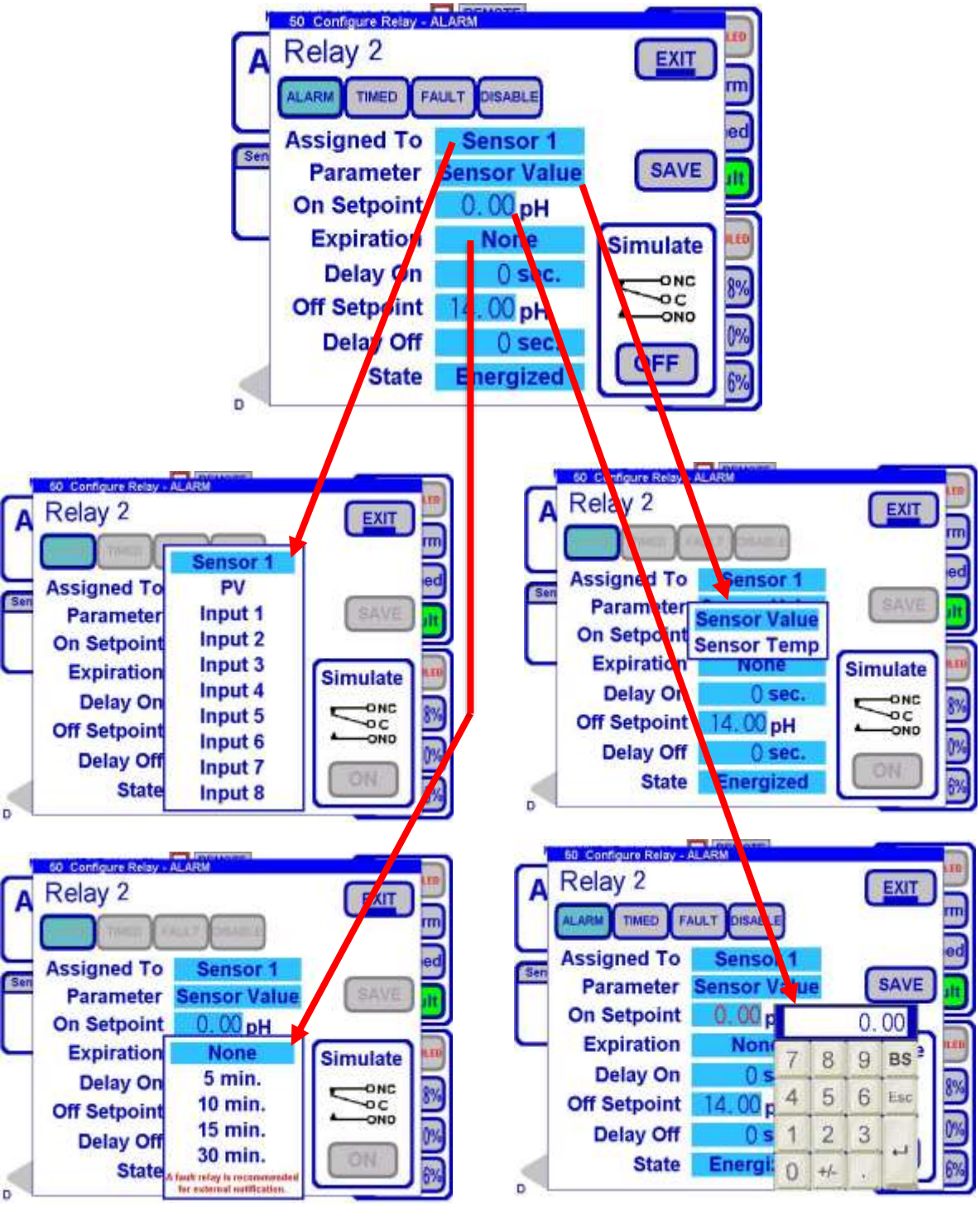
6.3.15 Sensor Configuration



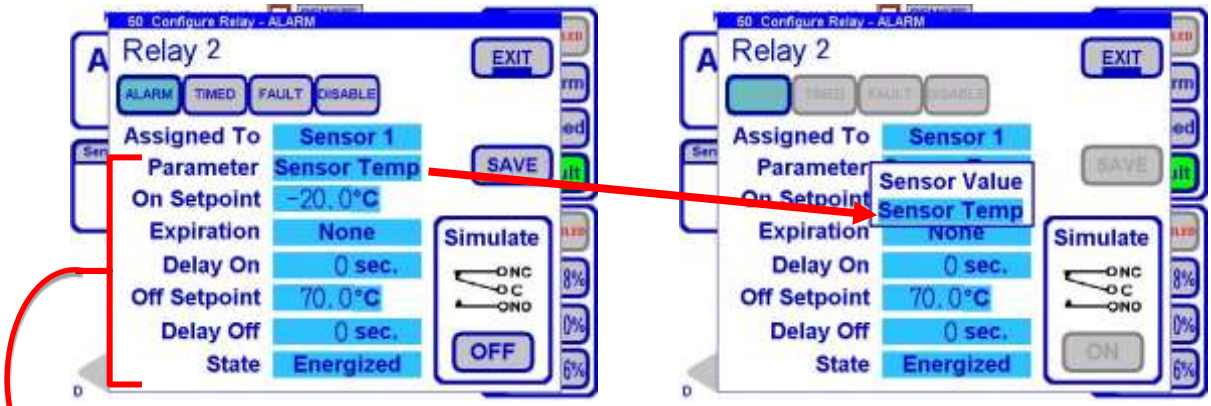
6.3.16 Relay Configuration



6.3.17 Relay Configuration- Alarm- Sensor Value

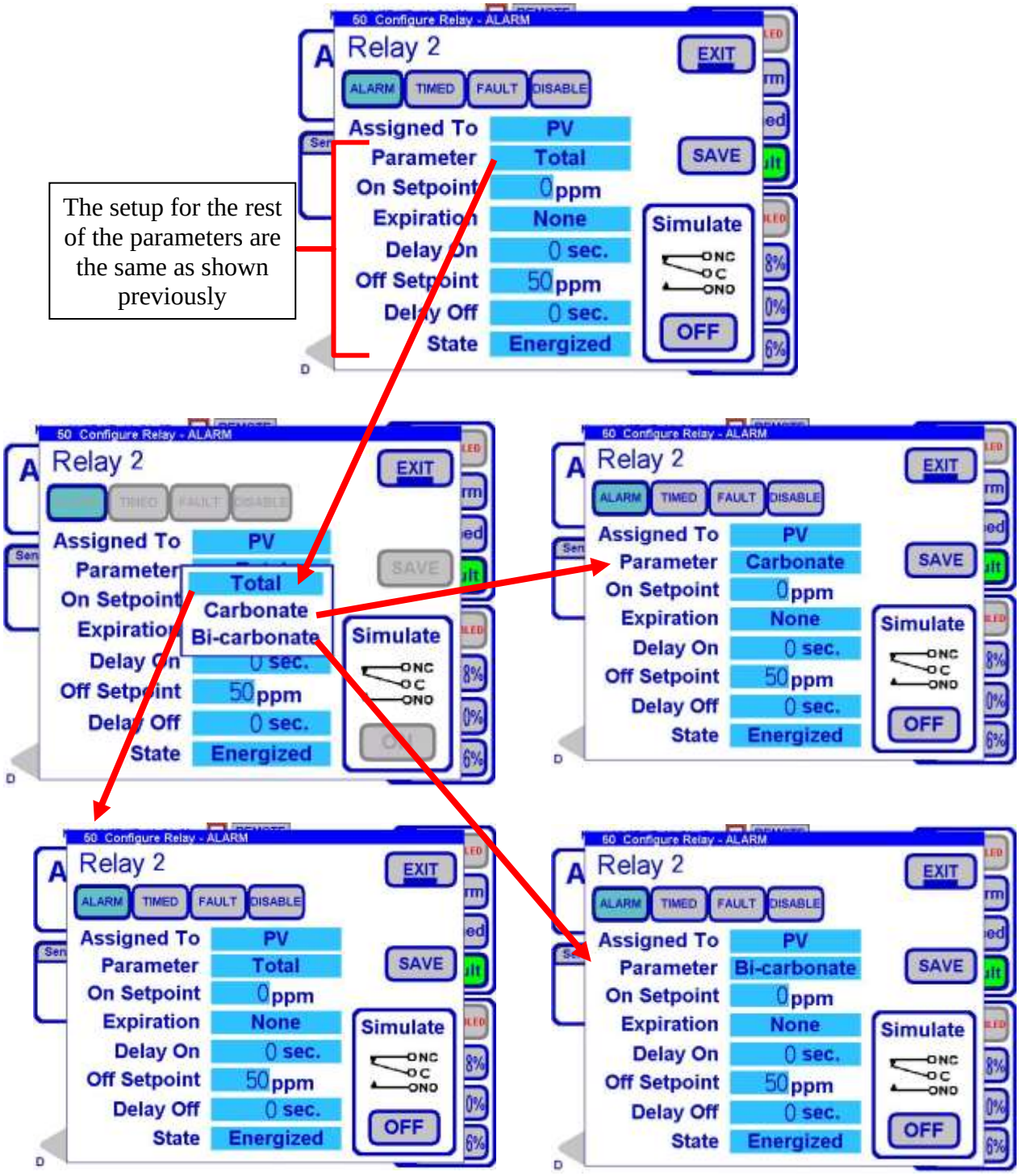

50 Configure Relay - ALARM
Relay 2
EXIT
ALARM
TIMED
FAULT
DISABLE
Assigned To
Sensor 1
Parameter
Sensor Value
On Setpoint
0.00 pH
Expiration
None
Delay On
0 sec.
Off Setpoint
14.00 pH
Delay Off
0 sec.
State
Energized
SAVE
Simulate
NC
C
NO
OFF
PV
Input 1
Input 2
Input 3
Input 4
Input 5
Input 6
Input 7
Input 8
ON
Sensor Temp
5 min.
10 min.
15 min.
30 min.
A fault relay is recommended for external notification.
7 8 9 BS
4 5 6 Esc
1 2 3
0 +/- .

6.3.18 Relay Configuration- Alarm- Sensor Temperature

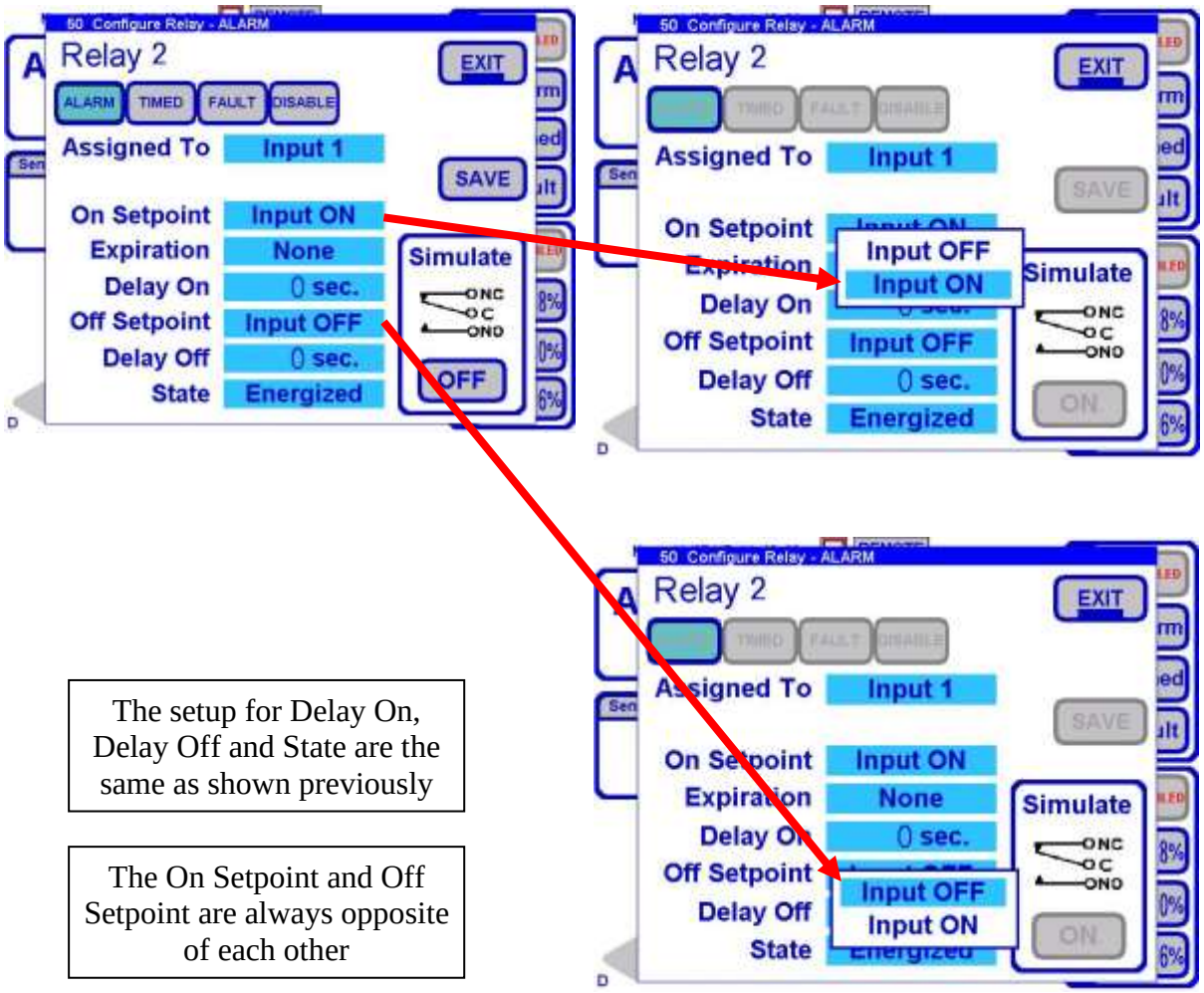


The setup for the rest of the parameters are the same as shown previously

6.3.19 Relay Configuration- Alarm- Process



6.3.20 Relay Configuration- Alarm- Inputs



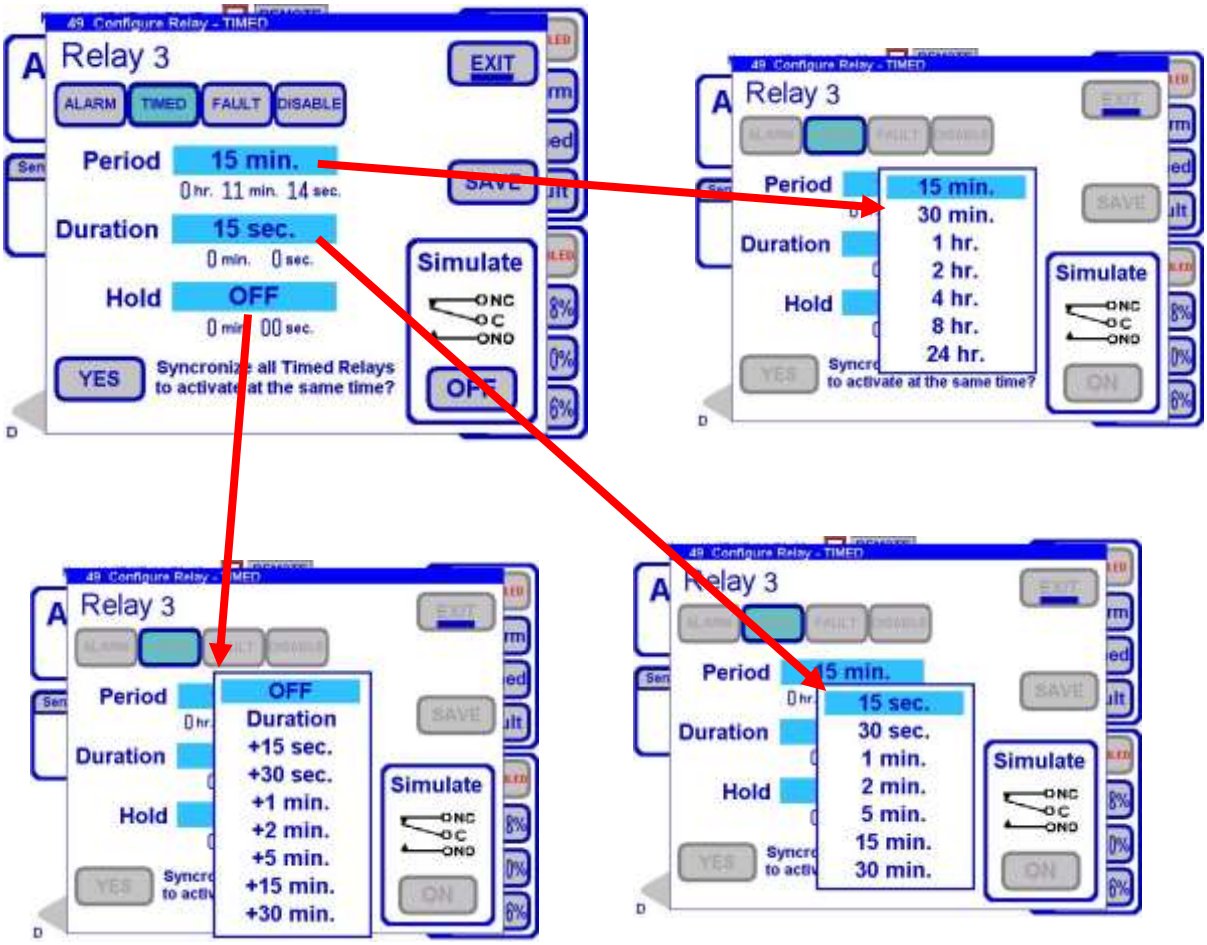
The setup for Delay On, Delay Off and State are the same as shown previously

The On Setpoint and Off Setpoint are always opposite of each other

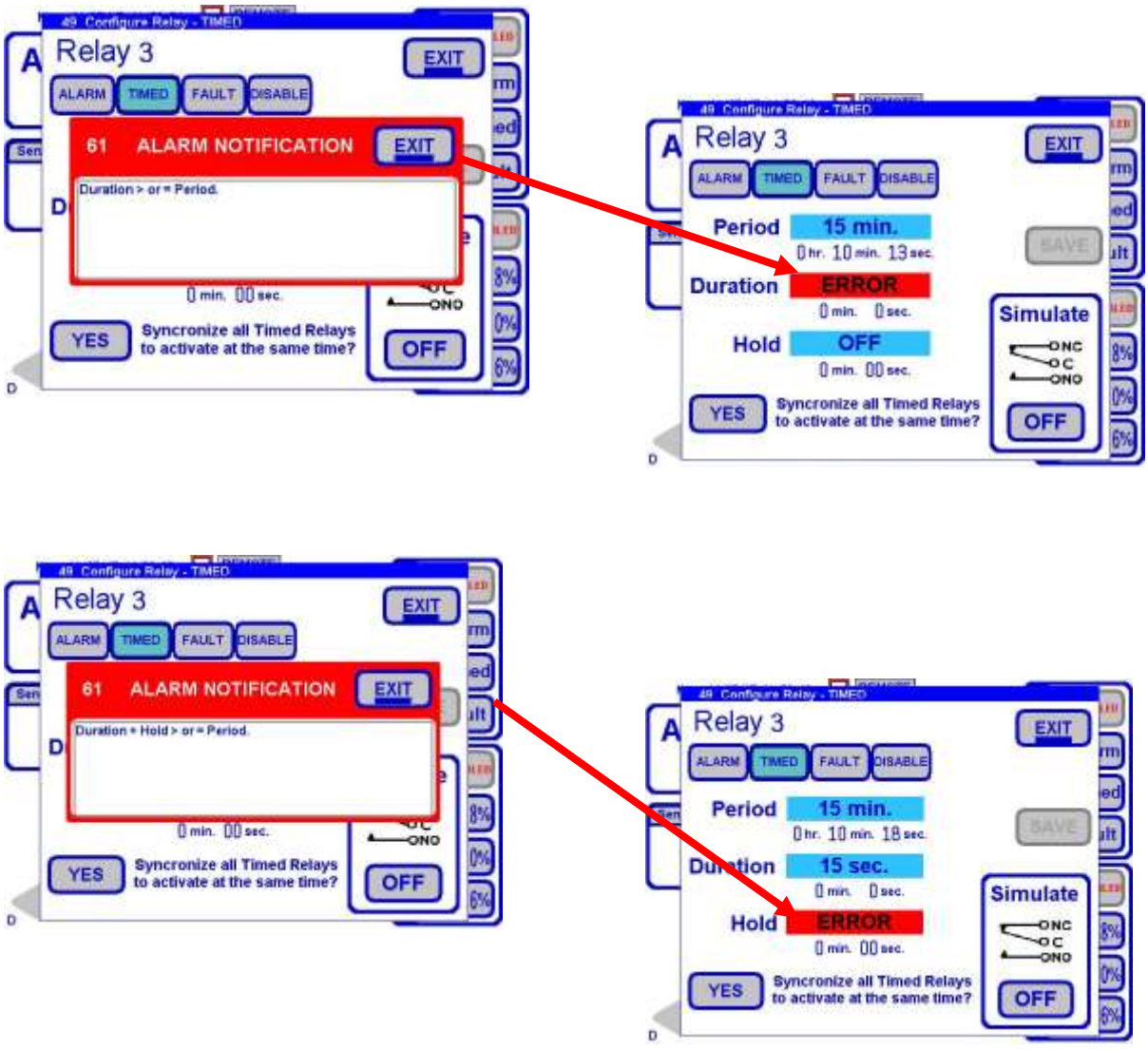
Run recipe configured as Remote Activation uses Input 1 for activating a recipe run from another location or a button outside the housing.

Input 1 can still be employed with a relay for local indication, for example

6.3.21 Relay Configuration - Alarm - Timed

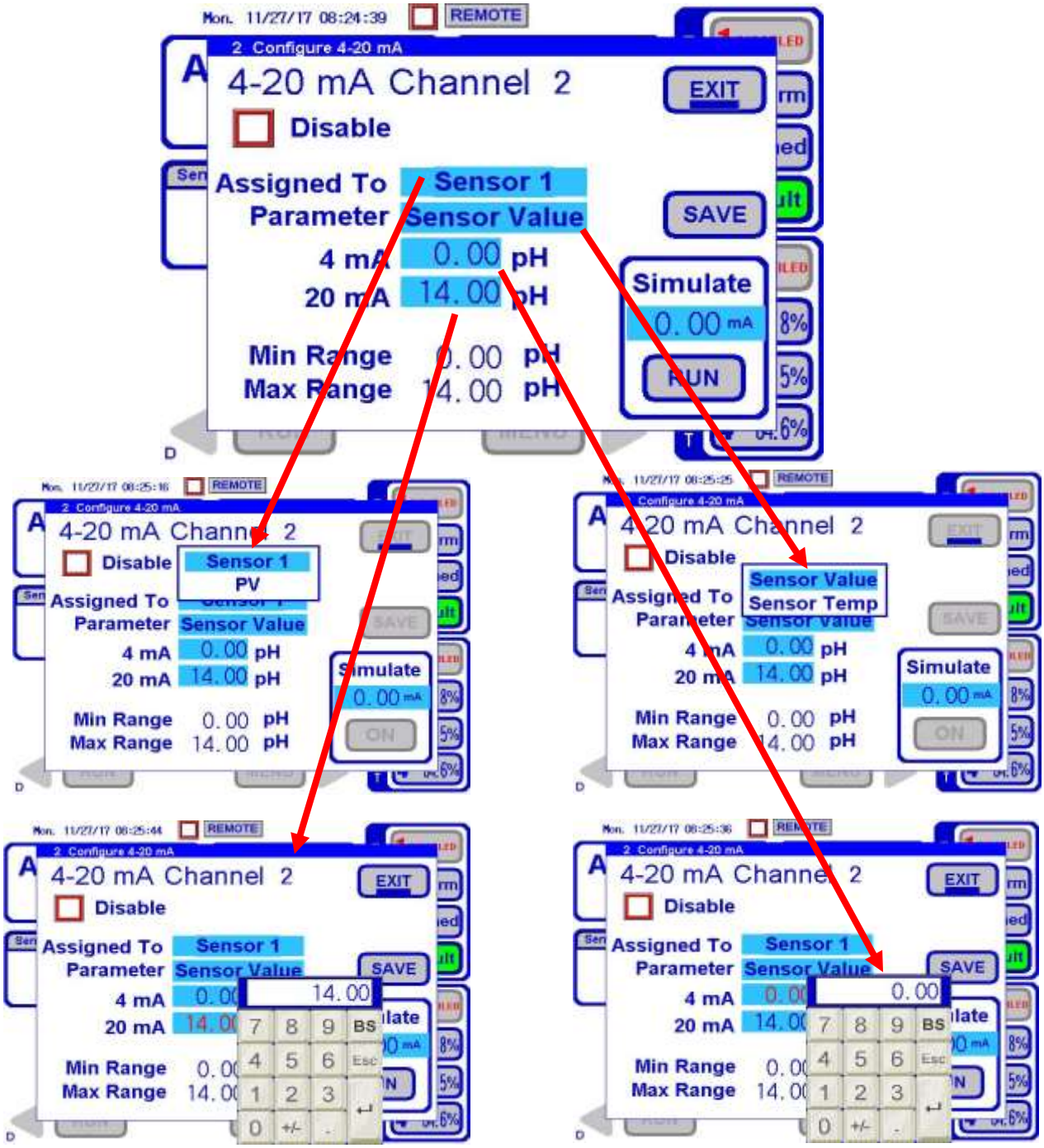


A Fault is generated if the duration >= period or the duration + hold time >= period. The Fault condition will persist until corrected.

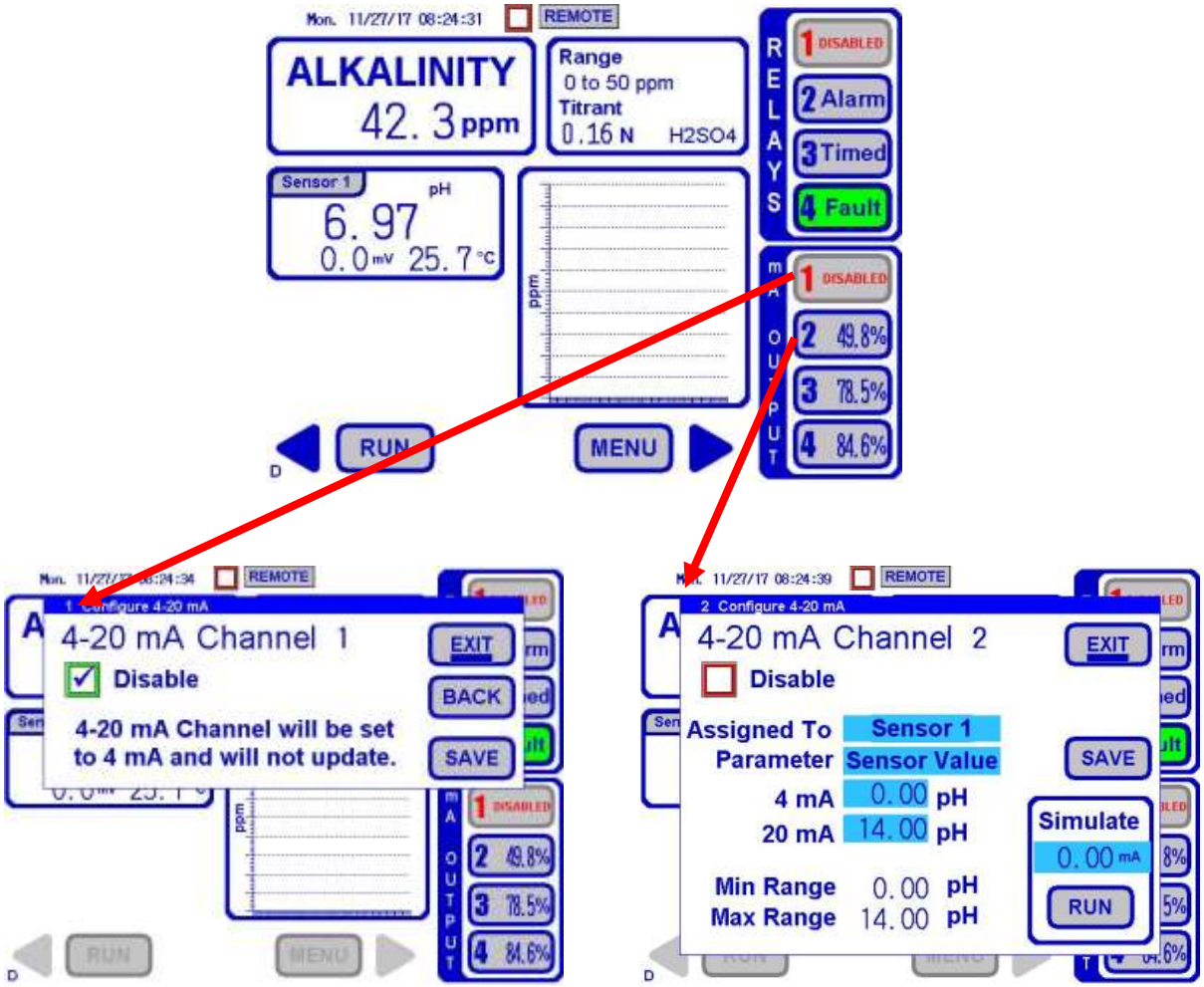


6.4 4-20 mA

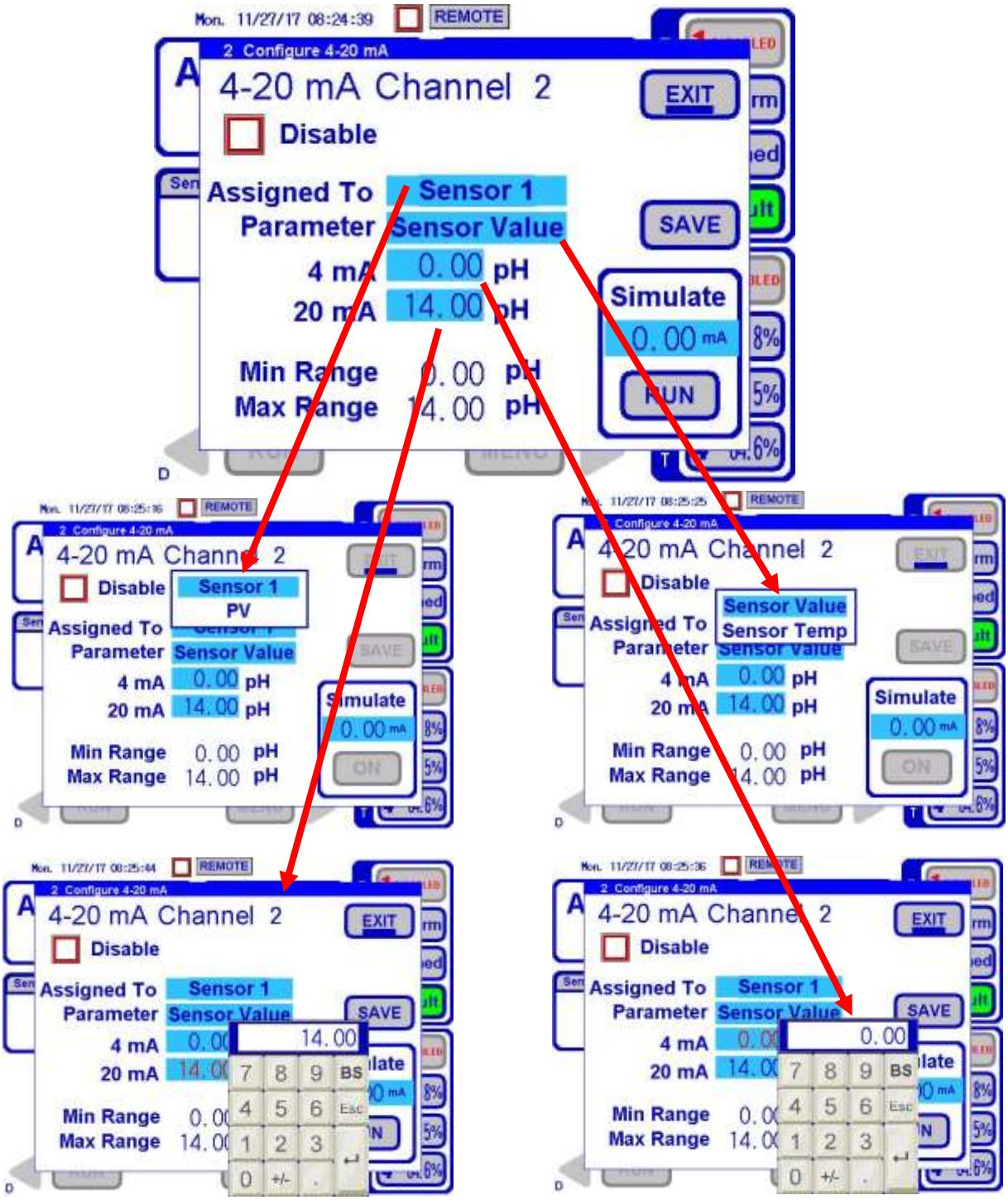
The Model 6800T has four 4-20 mA outputs.



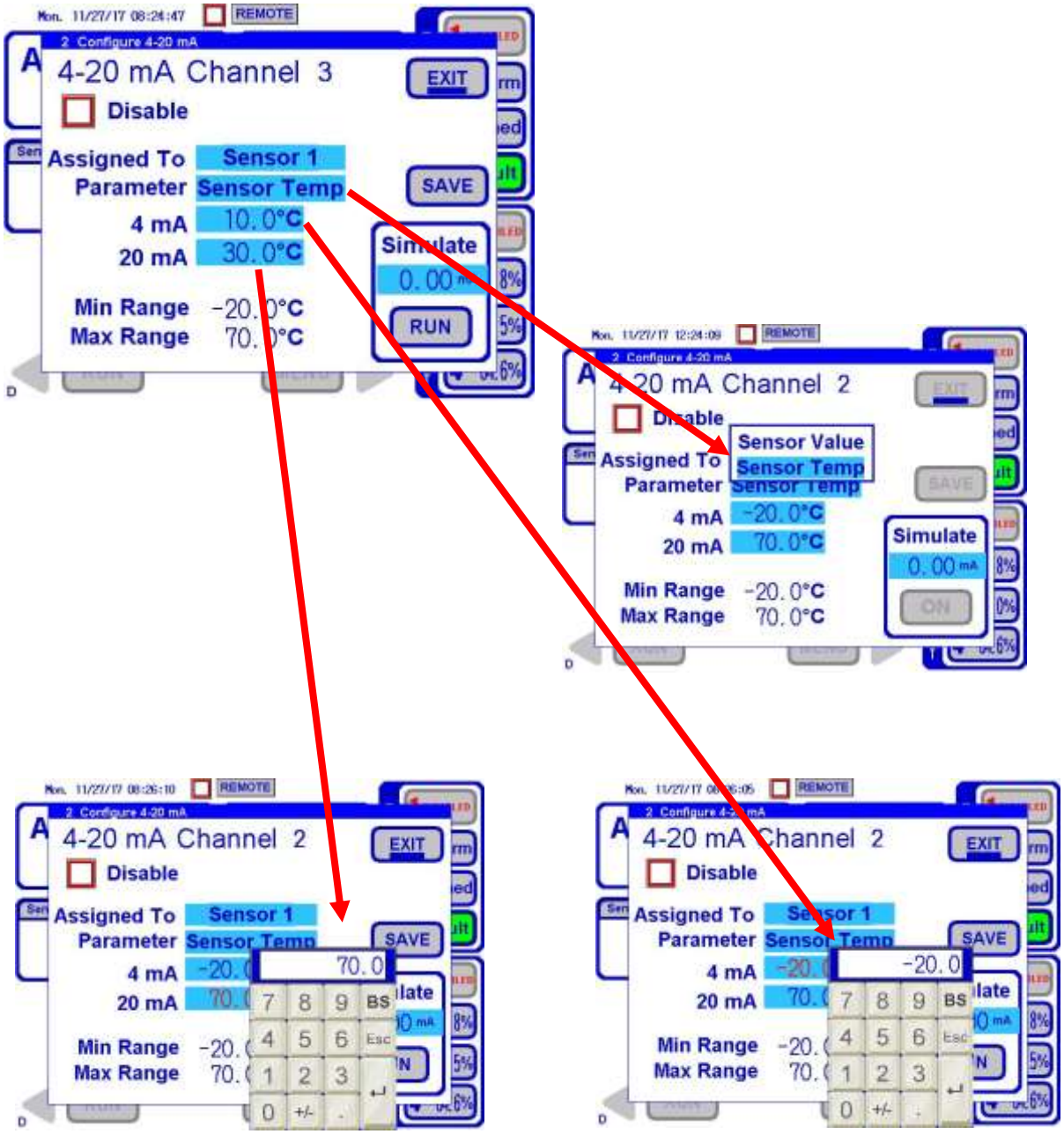
6.4.1 4-20 mA Configuration



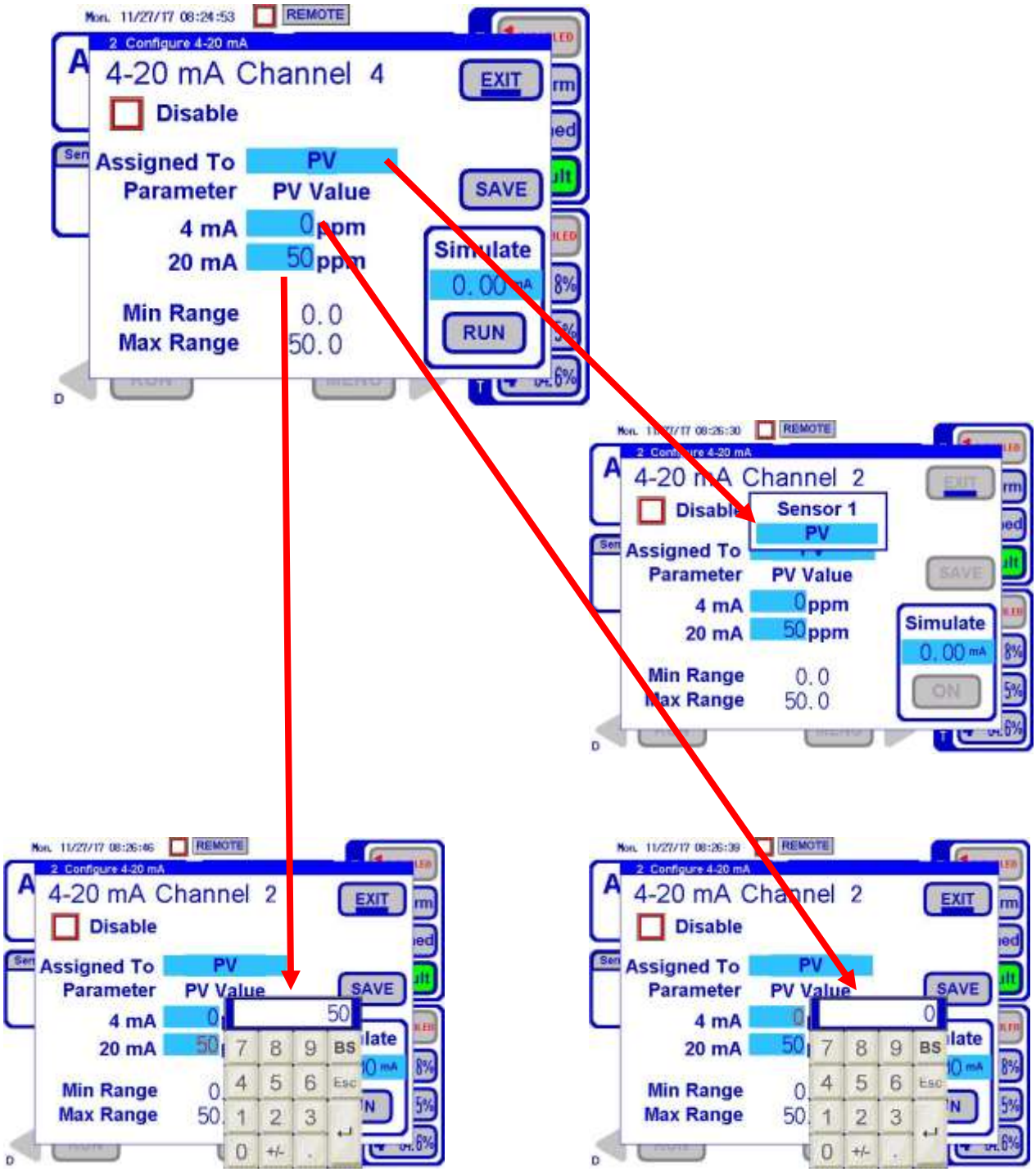
6.4.2 4-20 mA Configuration – Sensor Value



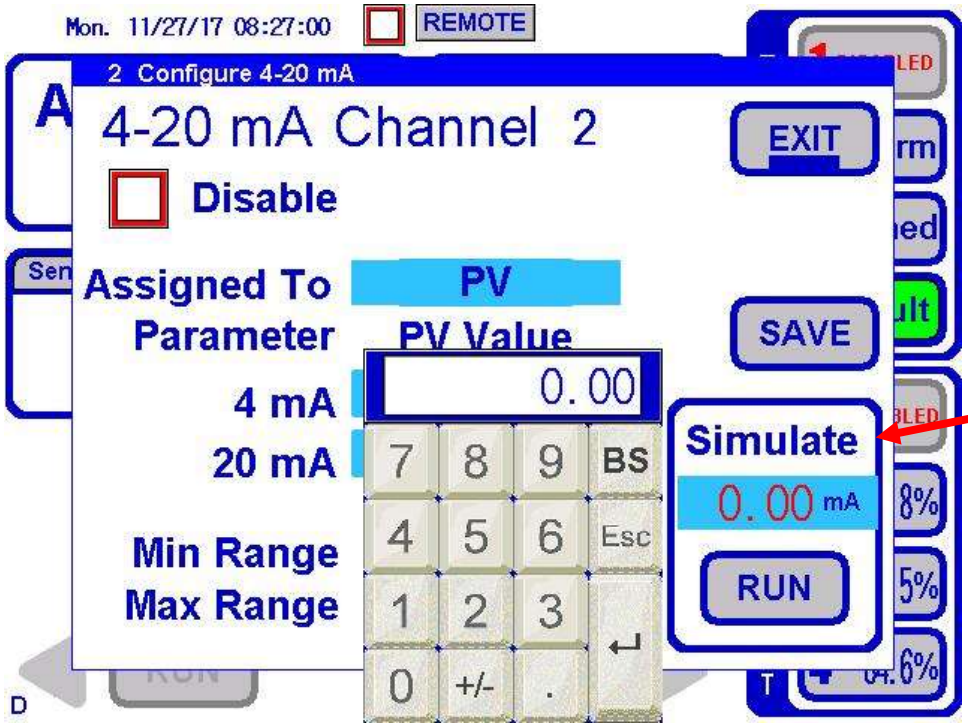
6.4.3 4-20 mA Configuration – Sensor Temp



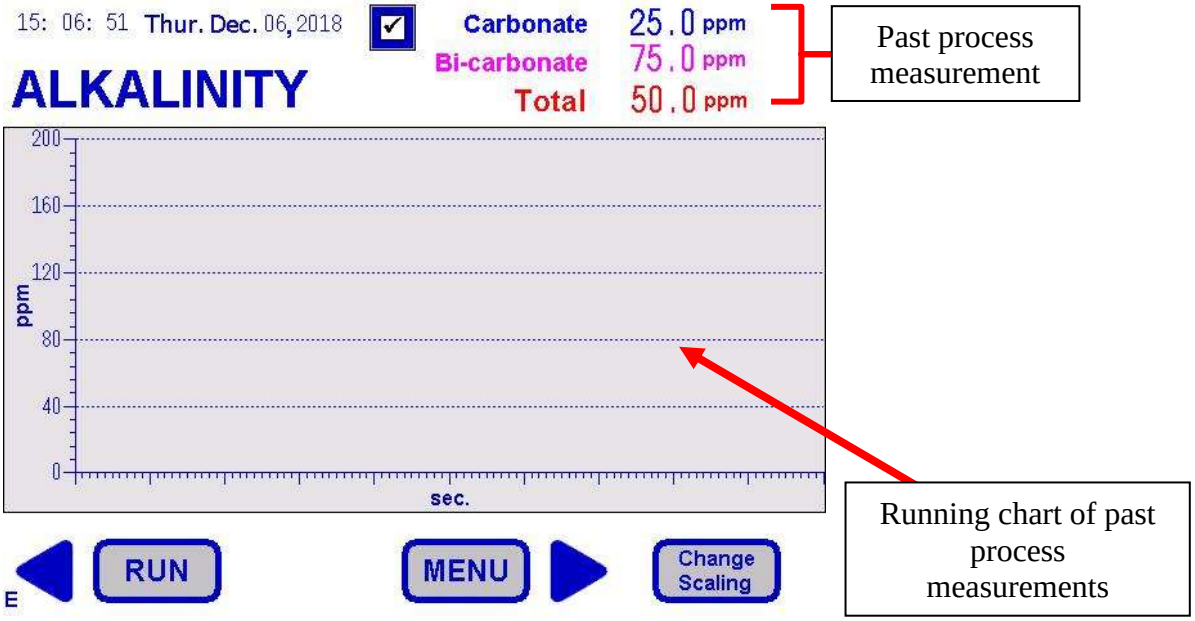
6.4.4 4-20 mA Configuration – Process Variable



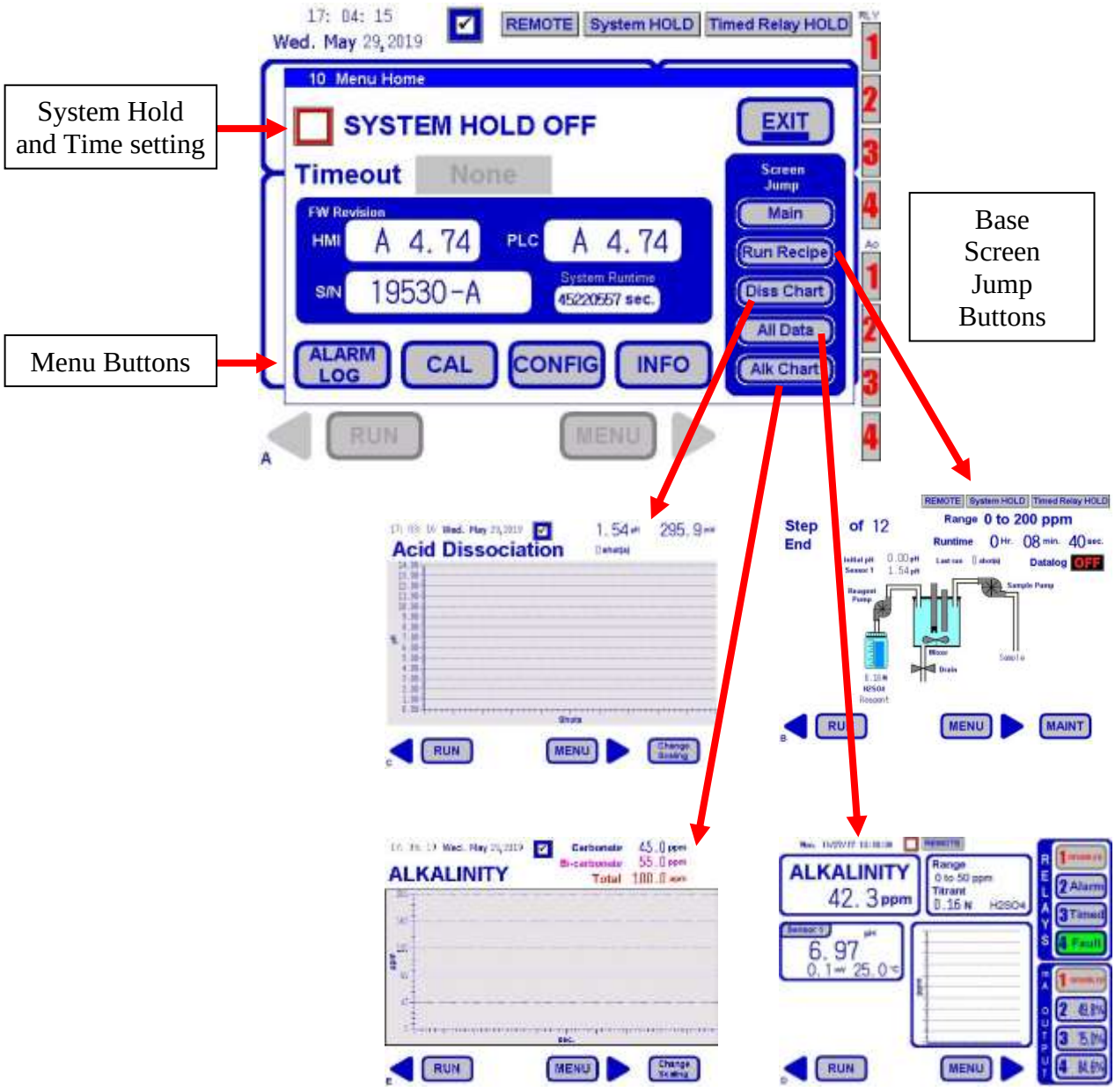
6.4.5 4-20 mA Configuration – Simulate



6.5 Alkalinity Concentration Chart

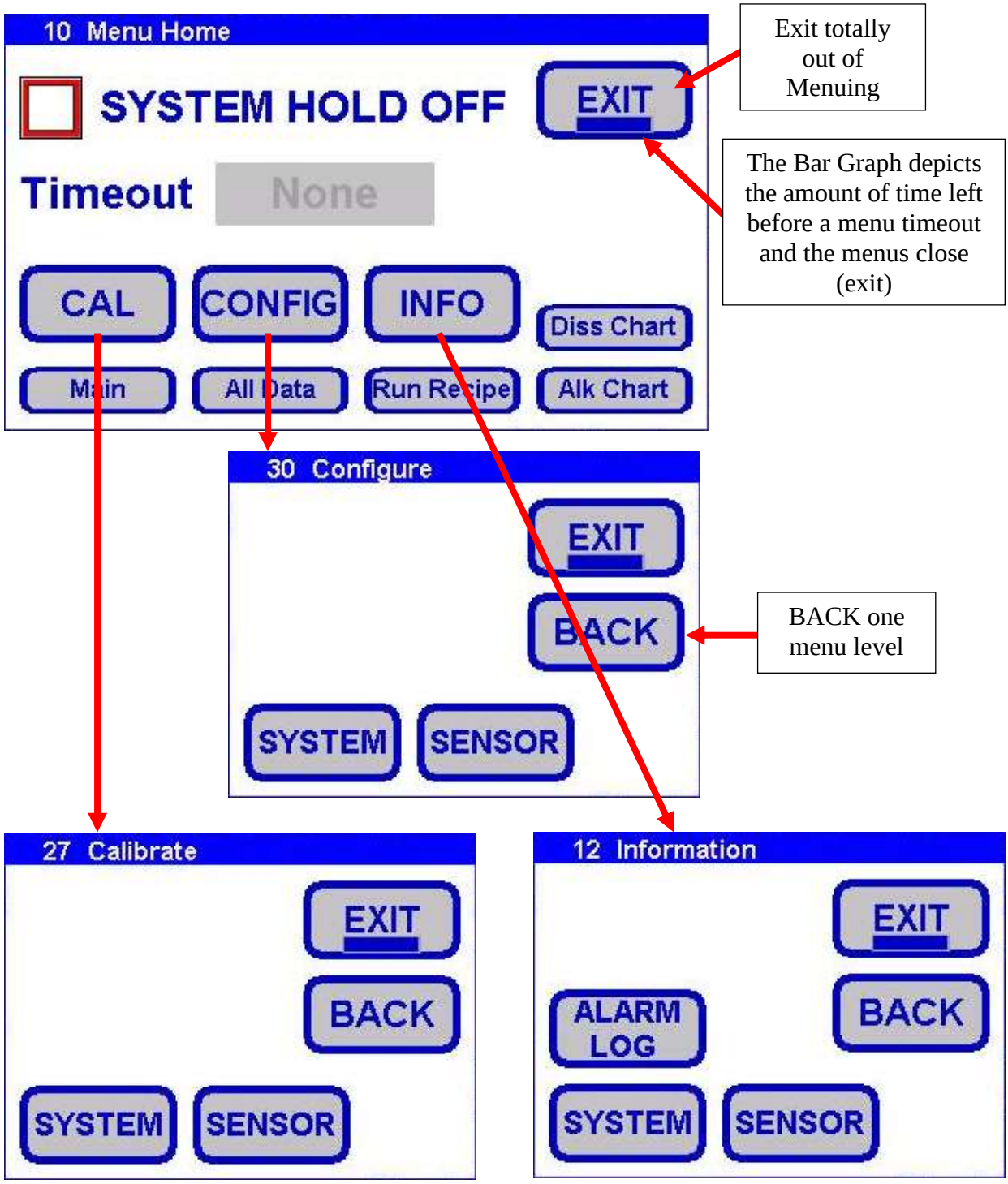


6.6 Menu Home Screen



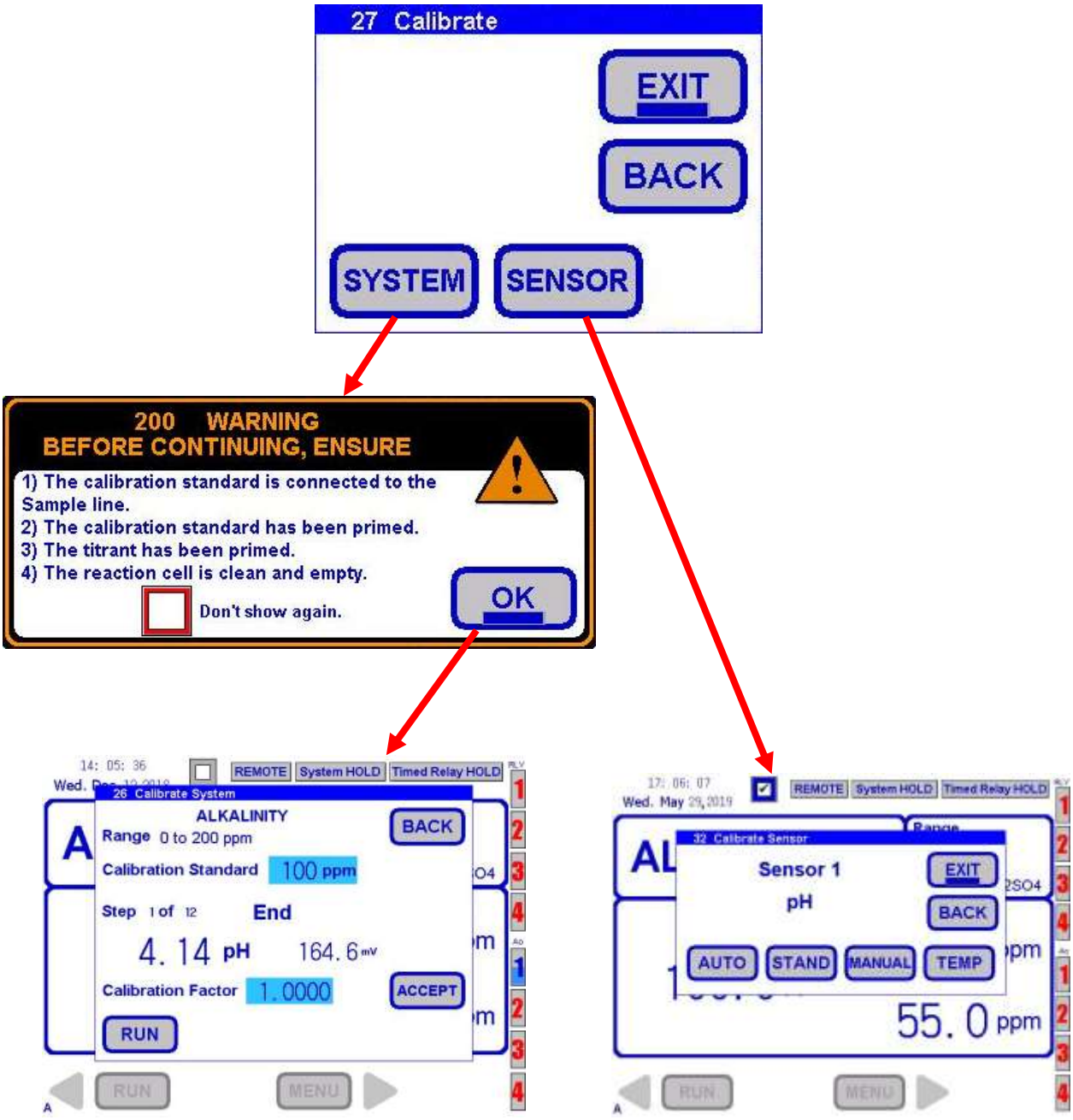
6.6.1 Menu Home – System Hold

6.6.2 Menu Buttons



6.7 Calibration

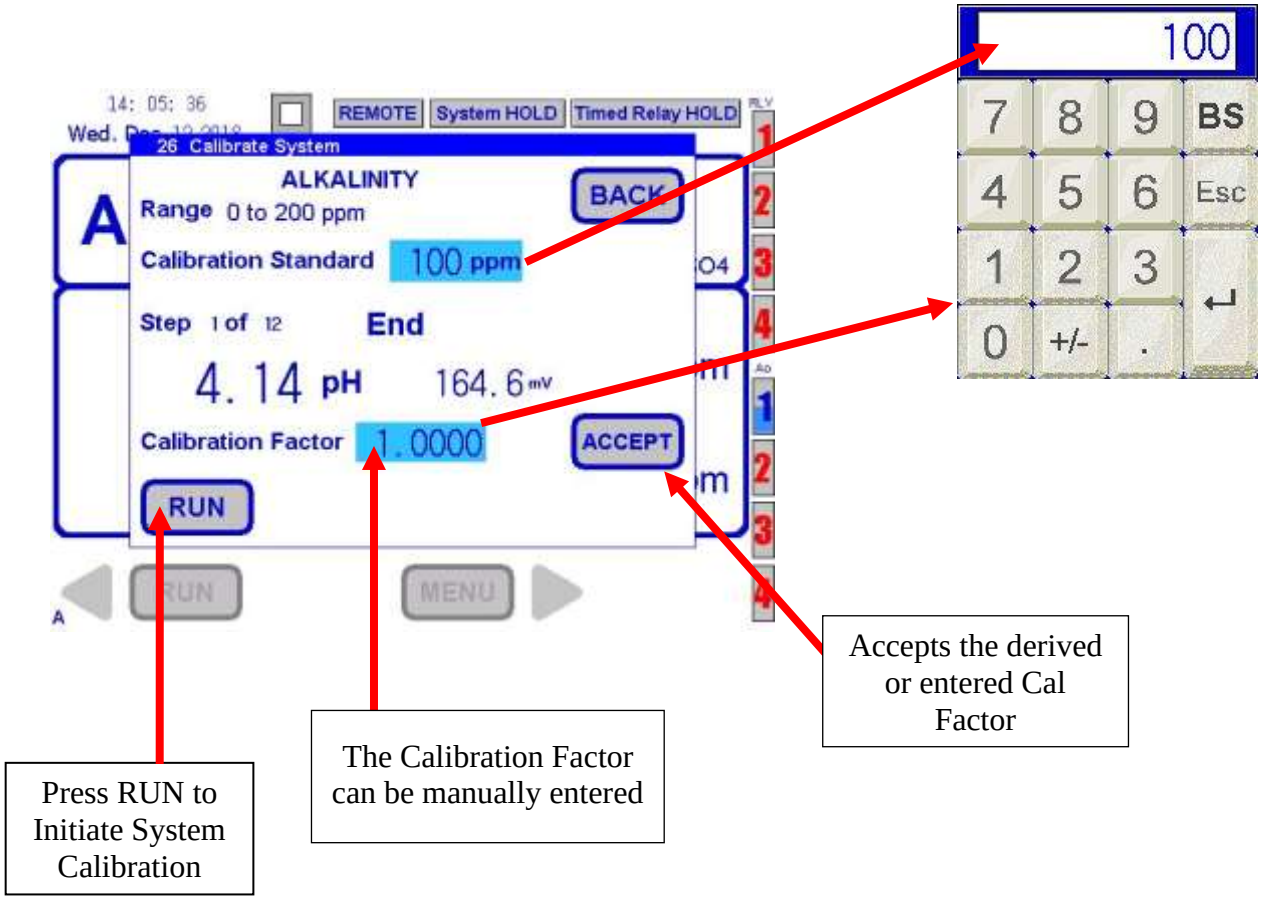
When Calibrating the analyzer you are given two tabs: System and Sensor. Alkalinity should be Calibrated using the System Tab, and the pH sensor should be calibrated using the Sensor Tab.



6.7.1 Calibrate System

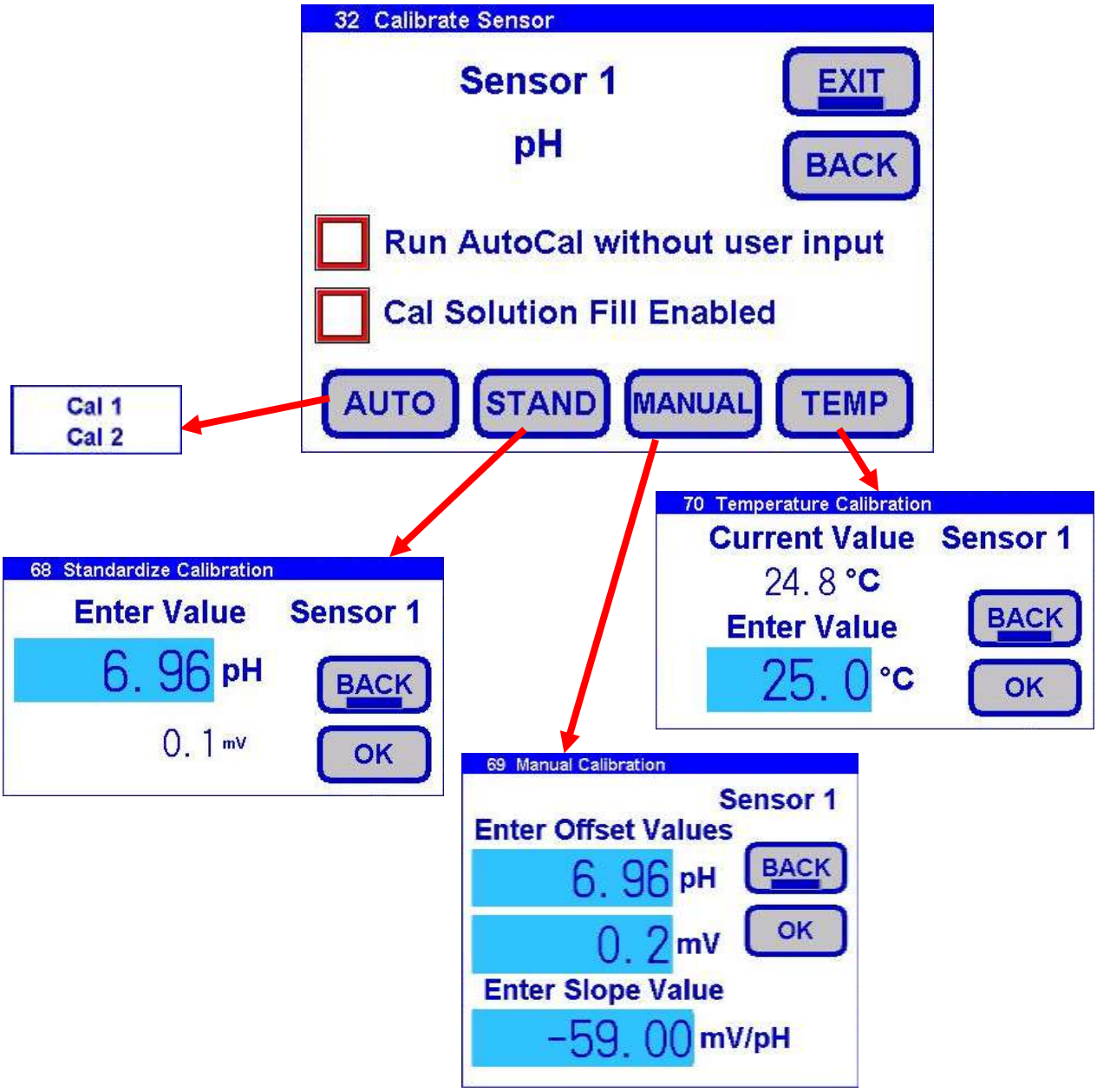
Calibrate System is the Primary Calibration for Alkalinity. When you press the Systems key on the Calibrate Screen, the Calibrate Systems screen will appear. A standard or known sample should be used. When calibrating, the sample line should be connected to the appropriate standard solution or known process sample.

You must select the value of the Calibration Standard when doing this function. Press Run on the bottom of the screen to initiate Calibration. When the Calibration System Run is finished, the Calibration Factor will update, press Accept to Finish then press EXIT to return to the home screen



6.7.2 Calibrate Sensor

To calibrate the pH Sensor you must press the Sensor Key on the Calibrate Screen. Calibration of the pH sensor is very important as it contributes to the calculation of Alkalinity. There are 4 tabs that can be used to Calibrate: AUTO, STAND, Manual, and Temp.

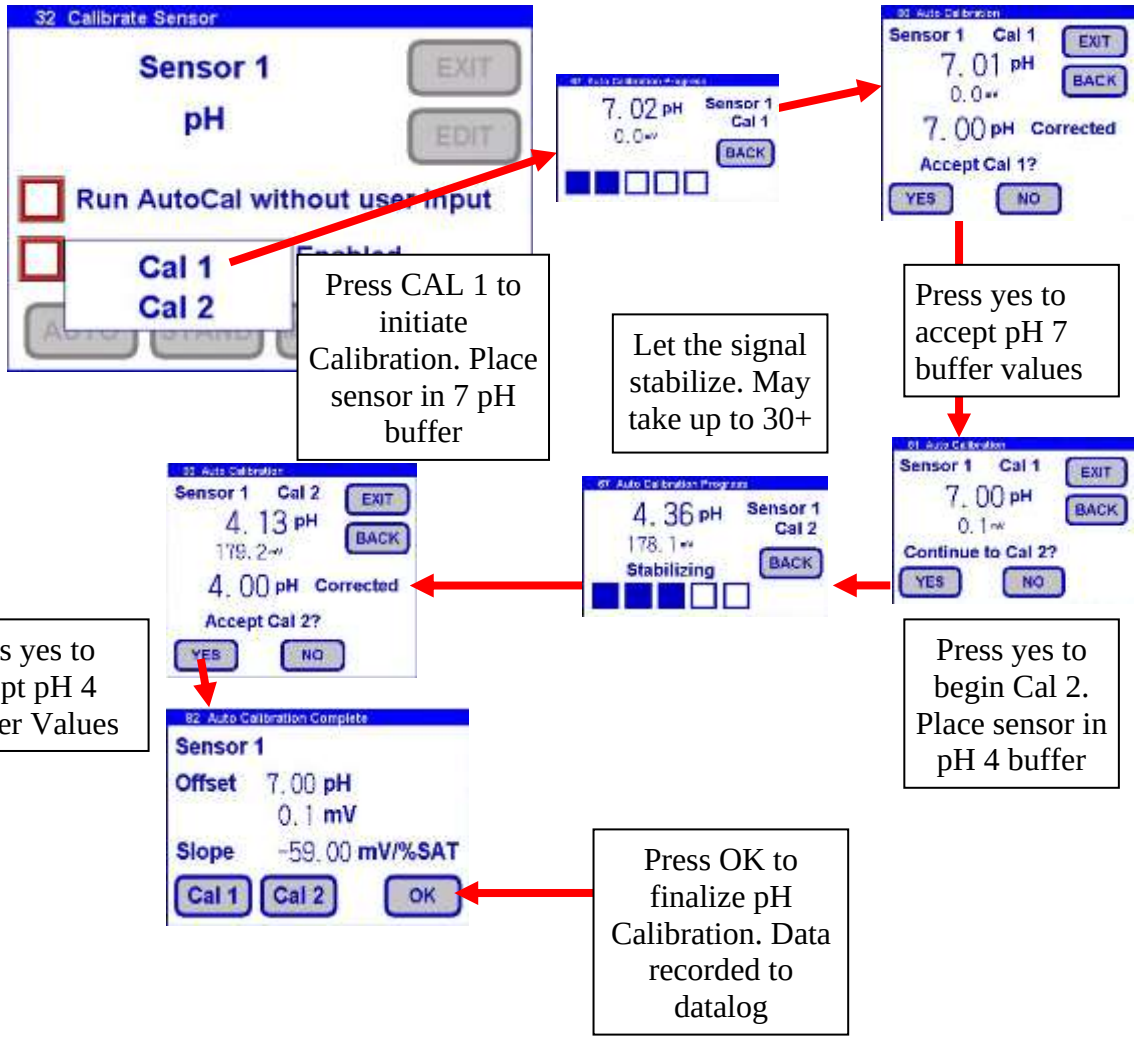


6.7.3 Calibrate Sensor – Auto Calibration

Auto calibration is the primary calibration method for pH. AUTO calibration automatically recognizes the calibration solution the sensor is in and proposes the actual temperature compensated value for acceptance. AUTO calibration can be a single point or two point calibration. A single point calibration sets the zero point or offset value of the sensor. The second calibration sets the slope or span of the sensor.

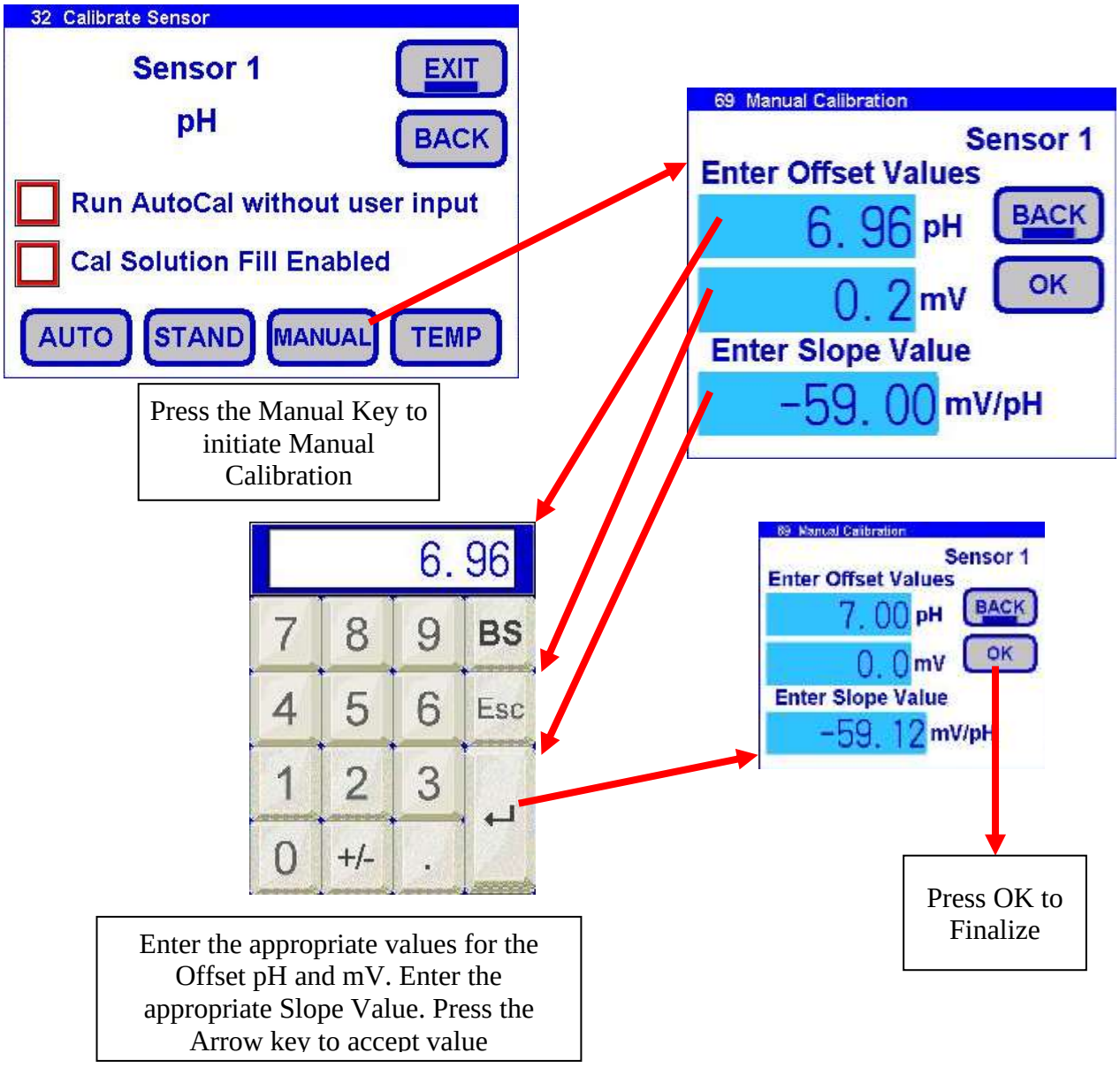
When the AUTO key is pressed the transmitter displays the pH and the associated mV signal from the sensor. When the reading has stabilized a calibration value is automatically proposed, i.e. 7.00 pH. The user is prompted to accept the proposed calibration value or enter and accept another value. Once Cal 1 is accepted the user is ask to continue to Cal 2, **yes/no**. If **yes**, then a second calibration value is proposed when the sensor has stabilized in the second calibration solution. Accept the value and the calibration is complete.

At the end of each calibration the Offset and Slope are displayed in pH.


32 Calibrate Sensor
Sensor 1
pH
EXIT
EDIT
Run AutoCal without user input
Cal 1
Cal 2
Press CAL 1 to initiate Calibration. Place sensor in 7 pH buffer
7.02 pH
Sensor 1
Cal 1
BACK
Let the signal stabilize. May take up to 30+
Sensor 1 Cal 1
7.01 pH
BACK
7.00 pH Corrected
Accept Cal 1?
YES
NO
Press yes to accept pH 7 buffer values
Sensor 1 Cal 1
7.00 pH
Continue to Cal 2?
Press yes to begin Cal 2. Place sensor in pH 4 buffer
4.36 pH
Sensor 1
Cal 2
Stabilizing
Sensor 1 Cal 2
4.13 pH
4.00 pH Corrected
Accept Cal 2?
Press yes to accept pH 4 buffer Values
82 Auto Calibration Complete
Sensor 1
Offset 7.00 pH
0.1 mV
Slope -59.00 mV/%SAT
Cal 1
Cal 2
OK
Press OK to finalize pH Calibration. Data recorded to datalog

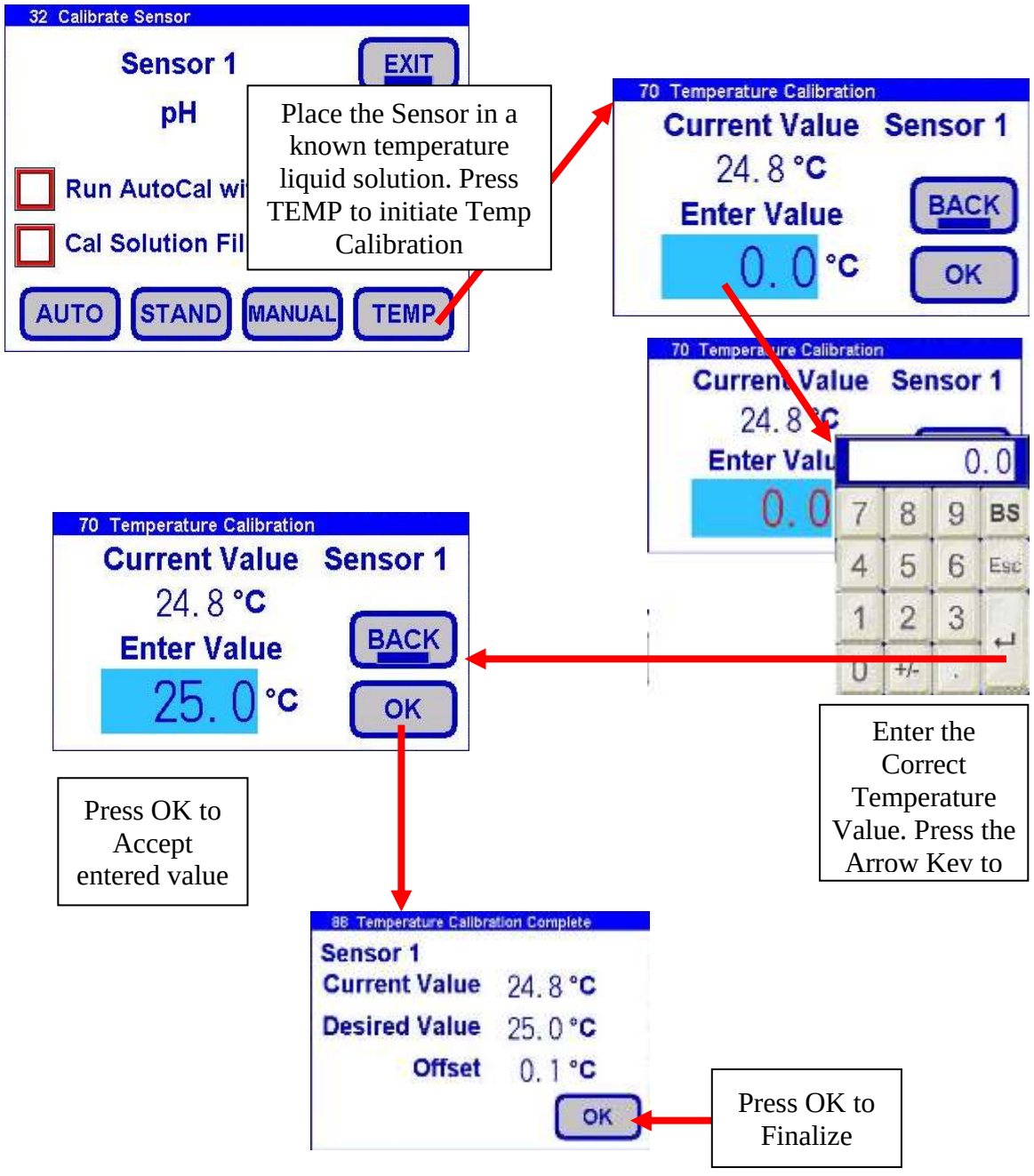
6.7.5 Calibrate Sensor – Manual Calibration

Manual calibration allows the user to enter calibration data for an electrode into the transmitter without performing a calibration. A MANUAL Calibration requires the entry of three pieces of data: (1) A concentration with the (2) corresponding mV value and (3) a slope for the electrode. This allows laboratory generated calibration data for an electrode to be entered in a remote analyzer where calibration is difficult or impractical.



6.7.6 Calibrate Sensor – Temperature Calibration

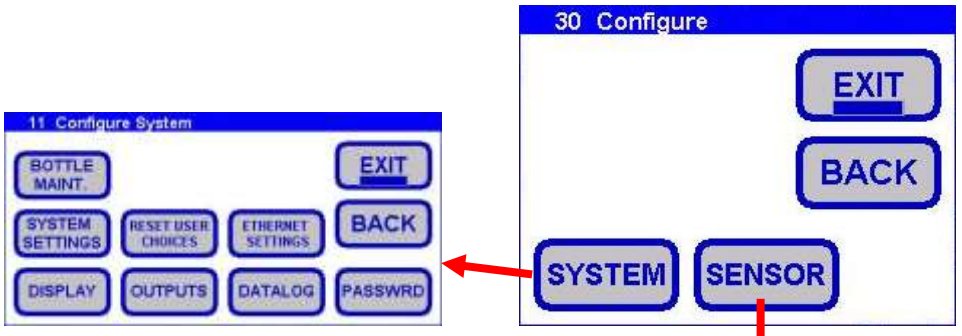
TEMP Key allows the displayed temperature to be trimmed to agree with actual process temperature.



6.8 Configure

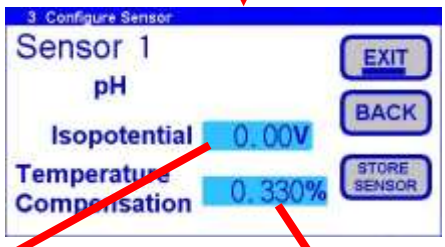
Two options are available under the CONFIG key: System and Sensor. By pressing the SYSTEM key, you are able to Configure:

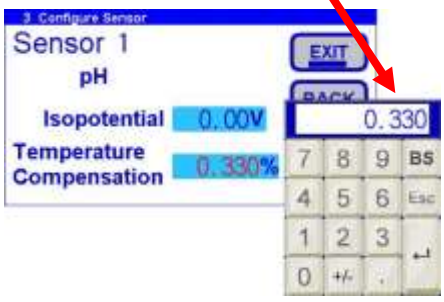
1. Bottle Maintenance
2. System Settings
3. Display
4. Reset User choices
5. Outputs
6. Ethernet Settings
7. Catalog
8. Password



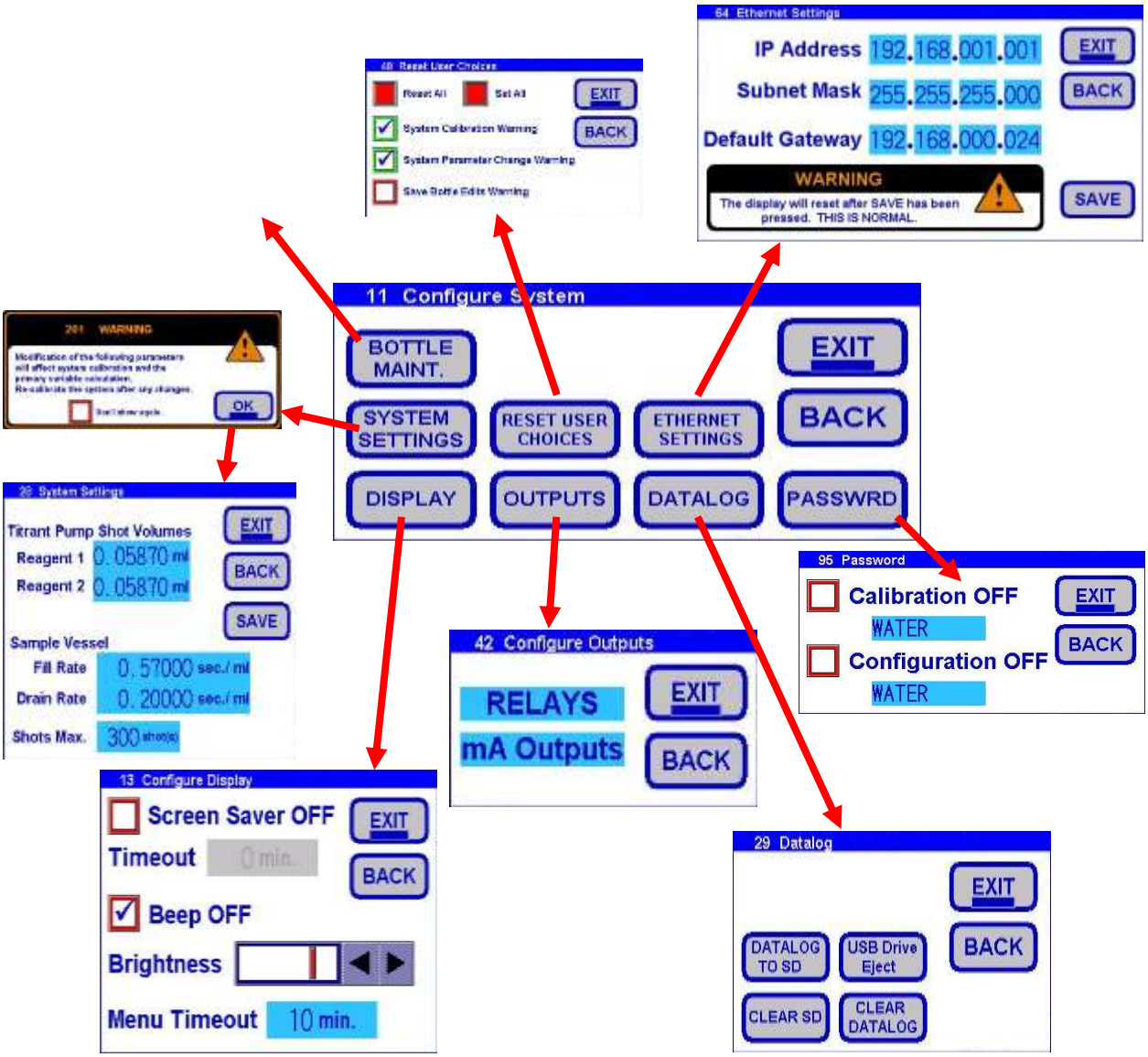
By pressing the SENSOR key, you are able to configure:

1. Isopotential Value
2. Temperature Compensation



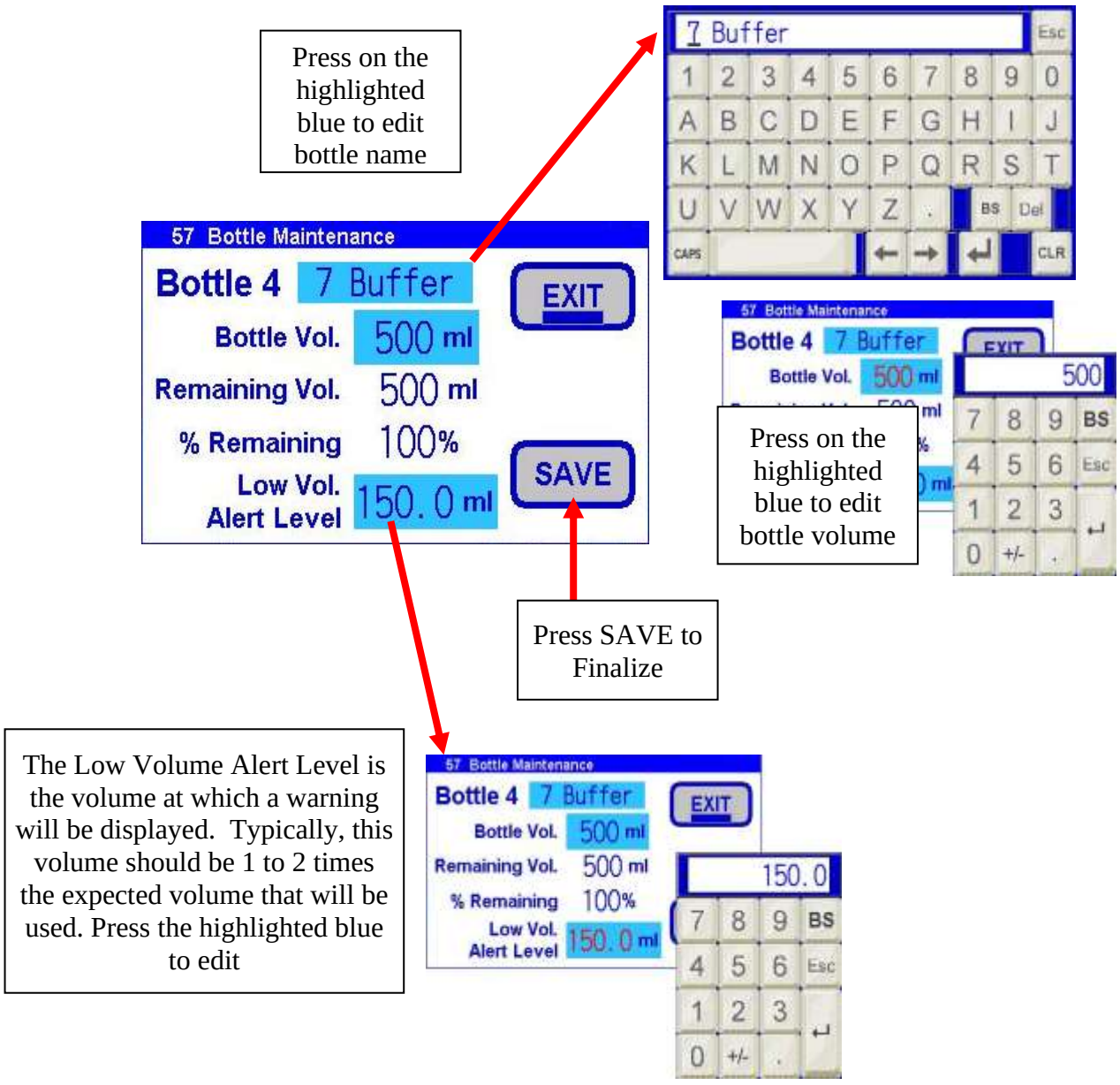


6.8.1 Configure – System Screens



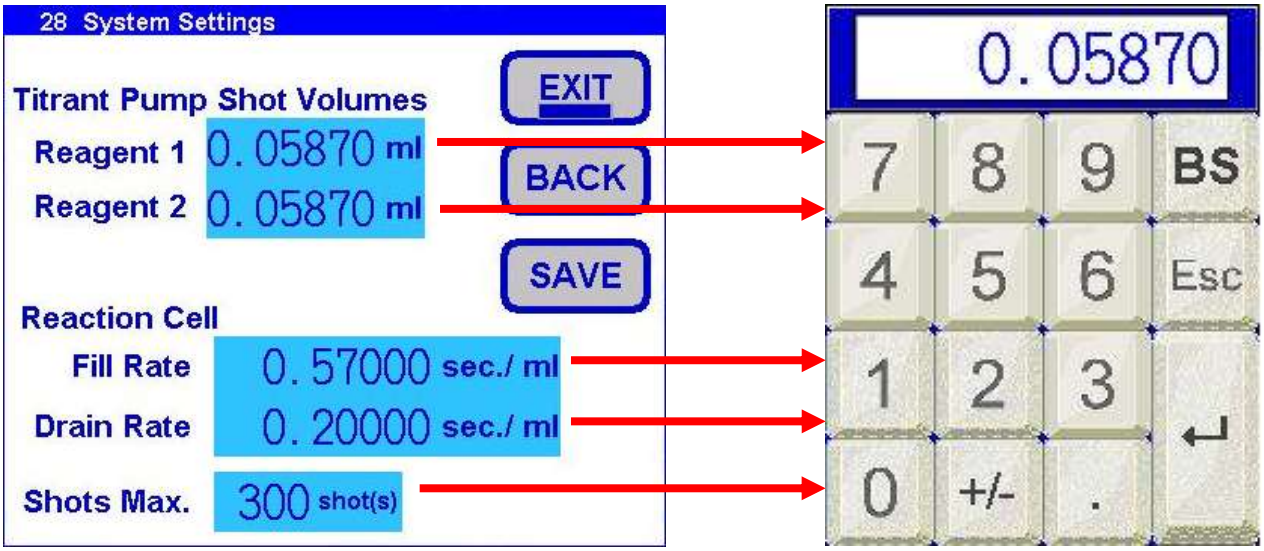
6.8.1.1 CONFIGURE – SYSTEM – BOTTLE MAINTENANCE

Bottle Maintenance key lets you name the bottles, input the bottle volume, and provide a low volume alert level.



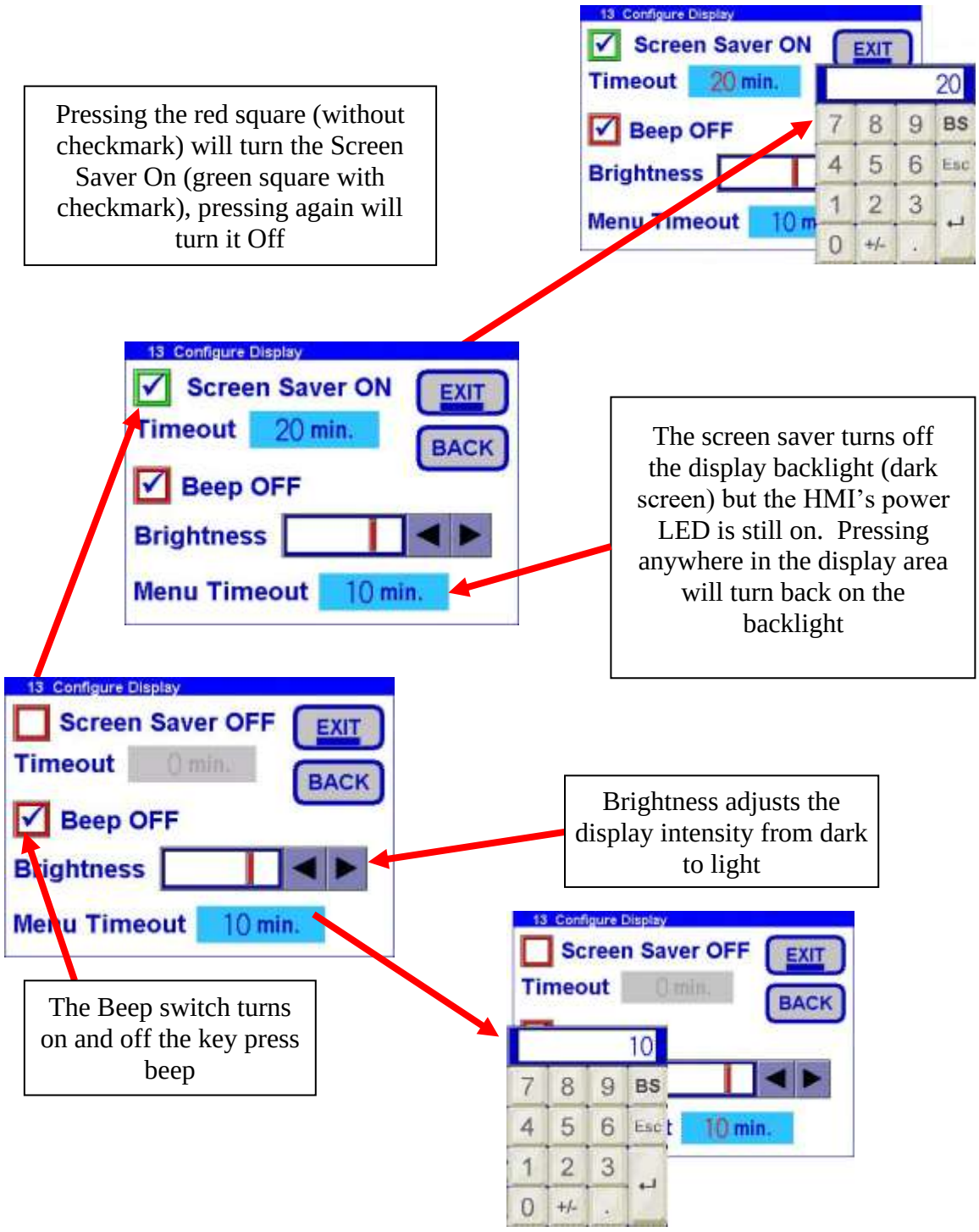
6.8.1.2 CONFIGURE – SYSTEM – SYSTEM SETTINGS

System Settings Key lets the user input the titrant pump shot volumes, reaction cells fill and drain rates, and shot max. These settings are configured at the factory. These settings should only be changed by qualified personnel.



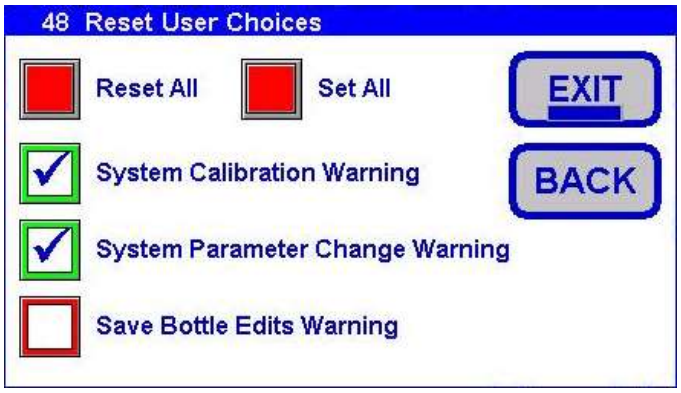
Enter correct amount for each entry. Press save to finalize

6.8.1.3 CONFIGURE – SYSTEM – DISPLAY



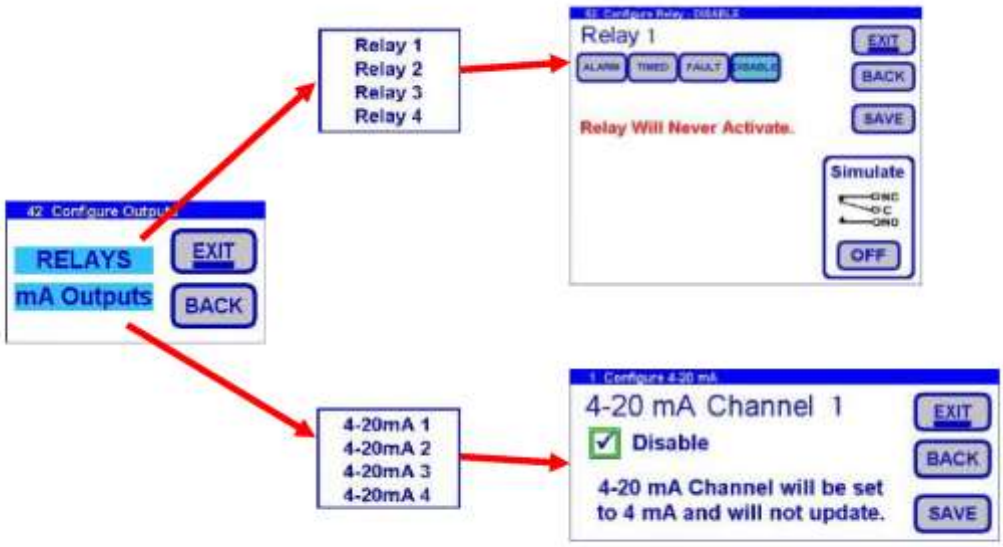
6.8.1.4 CONFIGURE – SYSTEM – RESET USER CHOICES

The reset user choices screen allows the user to set or reset previous choices made about viewing the warning screens again. The red square without check mark means the warning will be displayed, whereas, the green square with check mark means the warning will not be displayed.



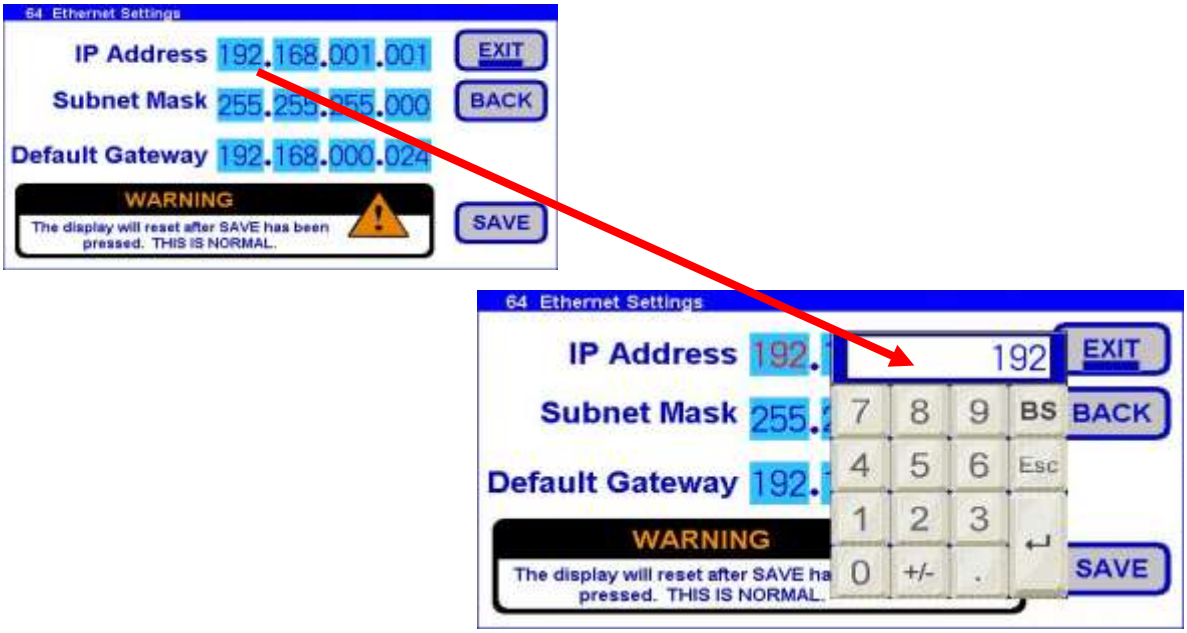
6.8.1.5 CONFIGURE – SYSTEM – OUTPUTS

Pressing the Outputs key in configuration you can set the 4 relays and 4 4-20 outputs.

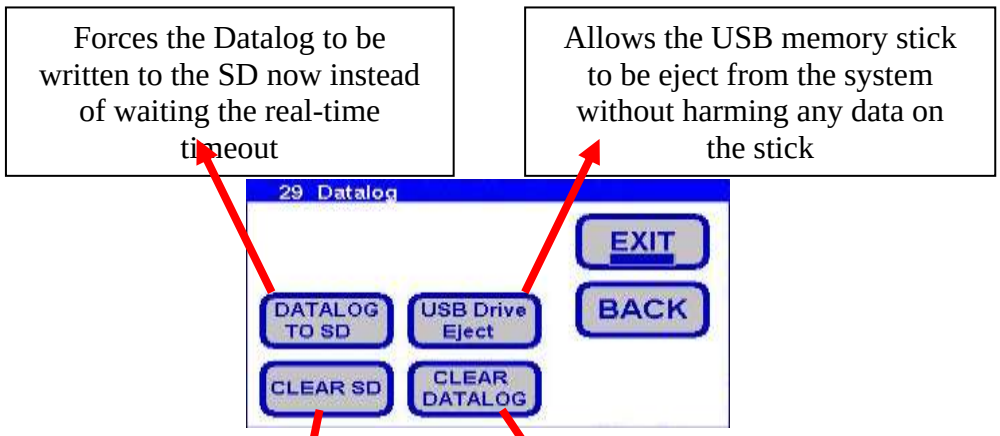


6.8.1.6 CONFIGURE – SYSTEM – ETHERNET SETTINGS

Pressing the Ethernet Settings allows changes to the external web page Ethernet web page addressing.



6.8.1.7 CONFIGURE - SYSTEM - DATA LOG



6.8.1.7 CONFIGURE – SYSTEM – PASSWORD

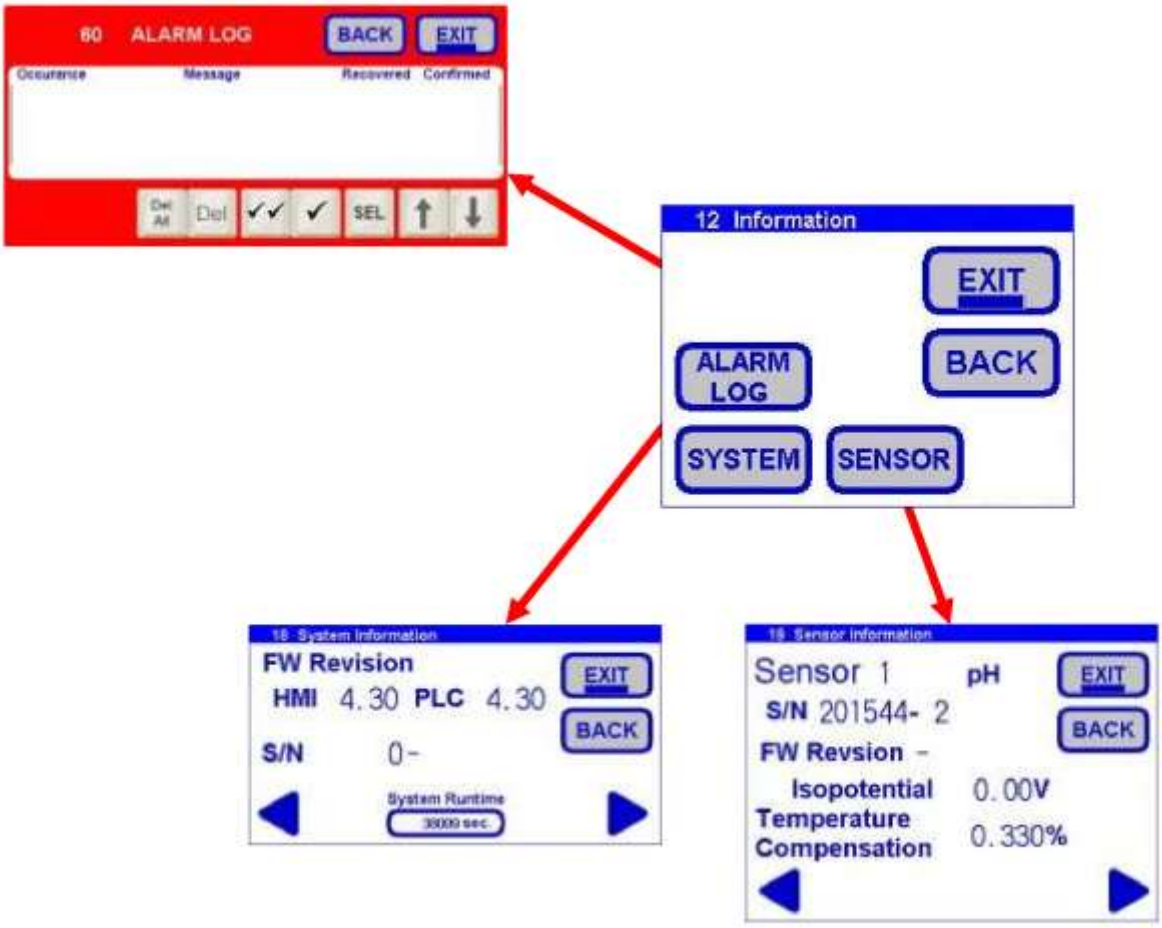
Pressing the red square (without checkmark) will turn on both the Calibration (green square with checkmark) and Configuration passwords. The gray square with check mark denotes the Configuration password **cannot** be turned off

Both passwords are the same by default but are user modifiable. The back-up password for both is not modifiable, please contact manufacturer if needed.

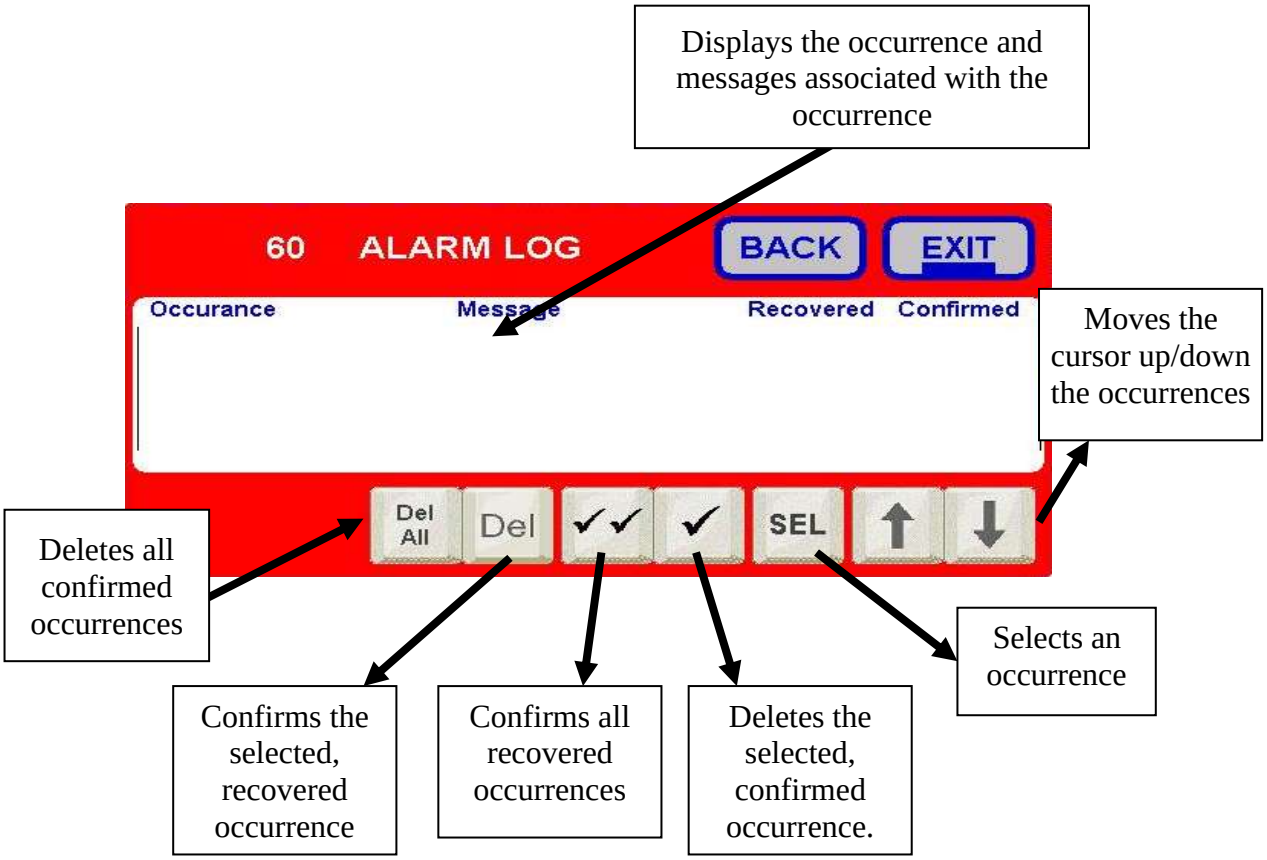
The Configuration password can be turned on independent of the calibration password

The respective password will be active on the next entry into the Calibrate or Configure screens

6.8.2 Information

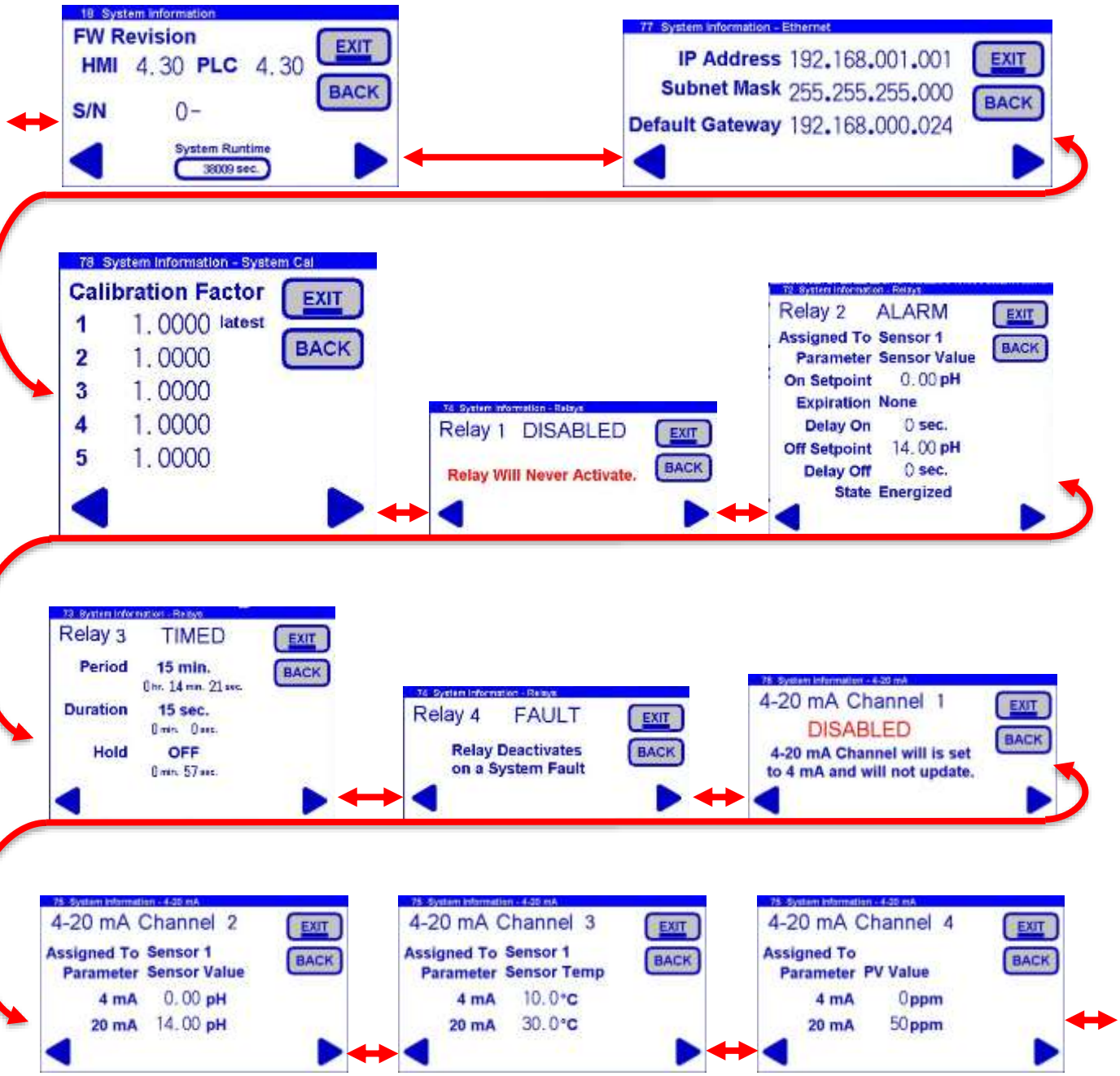


6.8.3 Information – Alarm Logs



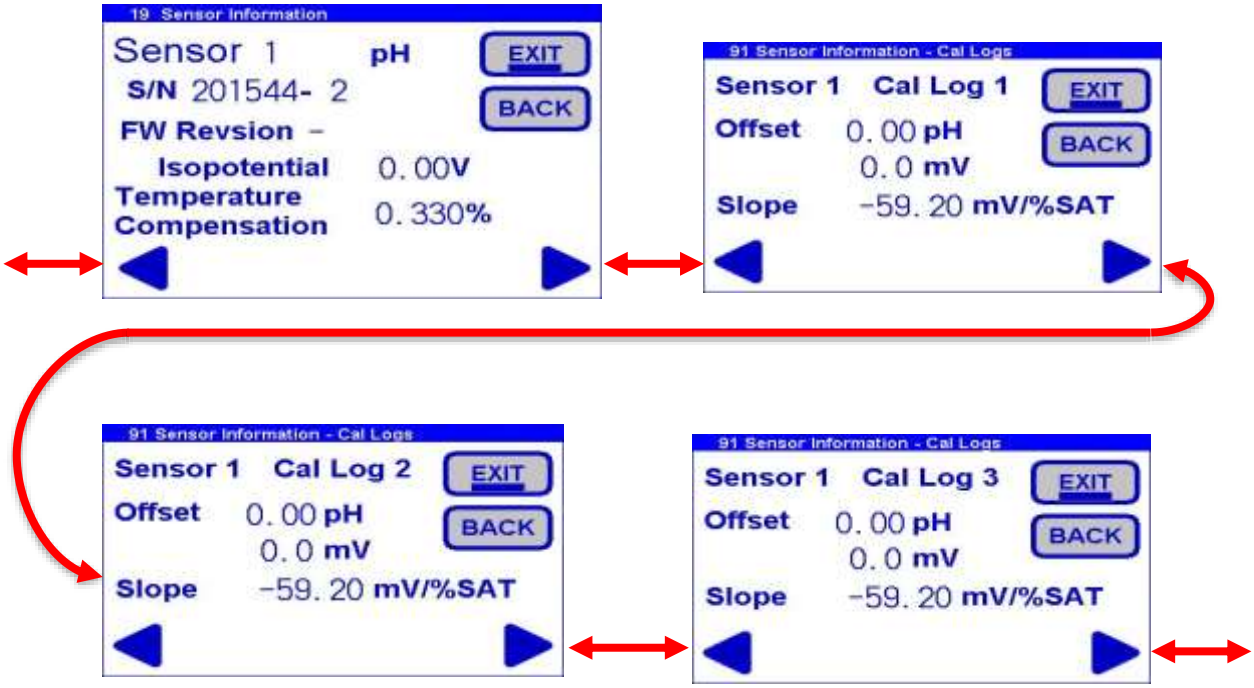
6.8.4 Information – System

The information Systems Key will display key systems information: Revisions, Ethernet information, Calibration factor logs, Relays and output information.



6.8.5 Information – Sensor

The Information Sensors key will provide important information regarding the pH sensor: Revisions, Cal Logs 1,2,and 3.



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Maintenance

Basic maintenance on the Model 6800T Analyzer requires refilling or replacing reagent containers and cleaning the reaction cell on a regular basis.

In addition we advise that you perform an overall visual check of the wetted parts for any leakage. If any leaks are detected, take immediate corrective action. Cleaning of the analyzer cabinet is best performed using a soft, non-aggressive cleaner.

The use of a logbook for registering reagent refilling, corrective measures and performed scheduled maintenance is strongly recommended.

Switch off the power to the analyzer prior to the performance of the basic maintenance work; the Model 6800T Analyzer cannot be operational during maintenance. Prior to any maintenance work, take into consideration all necessary precautions regarding personal safety (protective clothing, safety glasses etc.).

Always label and rinse all connected tubing with water prior to removal.

CAUTION: **THE MODEL 6800T ANALYZER IS BASED ON TITRATION METHOD USING ACID AS A TITRANT.**

MAKE SURE PROPER SAFETY PRECAUTIONS ARE TAKEN (E.G. USING SAFETY GLOVES AND GLASSES) WHEN HANDLING CHEMICAL SOLUTIONS.

7.1 List of Maintenance Operations

7.1.1 Visual Check

Visually check the following items whenever possible:

- Liquid leakage
- Cell sample level (during cycle)
- Reaction cell cleanliness and condition
- % Reagent levels

7.1.2 Monthly

- Visual Check (as above)
- Replace Pinch Valve tubing
- Clean the Reaction Cell
- Replace Reagent(s) and reset reagent counters
- Run Calibrations:
    - System calibration

7.1.3 Every 4-6 months(depending on applications)

- Replace Peristaltic Pump tubing
- Manually clean 6Waymanifold with a syringe if blockage occurs
- Hydraulics tubing replacement
- Clean / Replace Fittings

7.1.4 Annual

Analyzer general inspection (for qualified personnel only)

7.2 Parts and accessories

Model 6800T Analyzer: Spare Parts	
Part#	Description
	KIT, 4pH & 7pH BUFFERS (1L EA), CLEANER (2L), REAGENT(S) 500ML *RECOMMENDEDSPARE PART
	4pH BUFFER (1L)
	7pH BUFFER (1L)
	CLEANER 5% HCL (2L)
	CLEANER 5% HCL (2.5 GAL CARBOY)
	KIT, REAGENT (1 OR 2) 500ML
	CAL SOLUTION 1000 ALKALINITY 500ML *RECOMMENDED SPARE PART
	BOTTLE W/ HOLE (500ML)
	BOTTLE W/ HOLE (1L)
	BOTTLE W/ HOLE (2L)
	CARBOY W/ HOLE (2.5 GAL)
	KIT, TUBING& FITTINGS, ANNUAL MAINTENANCE

	*RECOMMENDED SPARE
	KIT, FITTINGS, LIQUID SIDE
	KIT, TUBING, ANNUAL MAINTENANCE + QUARTERLY SAMPLE & PINCH VALVE TUBING
	ASSY, TUBING, REAGENT PUMP TO REACTION CELL
	ASSY, TUBING, REAGENT PUMP TO REAGENT BOTTLE
	ASSY, TUBING, SAMPLE PUMP * CHANGE QUARTERLY
	ASSY, TUBING, PINCH VALVE TO BOTTLE/DRAIN (5 PER ANALYZER) *CHANGEQUARTERLY
	ASSY, TUBING, SAMPLE PUMP TO REACTION CELL
	ELECTRODE *RECOMMENDED SPARE PART
	SENSOR W/ ELECTRODE
	PINCH VALVE ASSY (Specify -1,-2,-3,-4, or-7 position)
	KEY ENCLOSURE
	MAGNETIC STIRRER
	SAMPLE PUMP

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Analyzer Shut Down

If the Model 6800T Analyzer will be out of service for a period of two weeks or greater, proceed as follows:

1. Empty all reagent containers.
2. Rinse and refill all reagent containers with distilled water.
3. Prime all of the pumps with DI water.
4. Disconnect the sample feed line and fill the fast-loop reservoir (if present) with distilled water.
5. With the sample inlet tubing attached to a container of distilled water, run the analyzer for at least 2 cycles.
6. Empty the water from all lines.
7. Put the analyzer in stand-by condition.
8. Turn OFF the power to the analyzer and disconnect the plug from the wall socket.
9. Place the pH sensor electrode (sensing end) into 4 buffer for storage.

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Appendix

A.1 Specifications

TAI Sales Order Number:

Instrument Serial Number:

Method:	Titration of Single or Dual endpoints, pH inflection
Measuring range:	0 to >1000, 200 to 1000, 50 to 200, and 0 to 50 ppm or mg/l
Response time:	Dependent on the specific titration measurement
Repeatability:	+/- 2%
Power supply:	110-220VAC, 50-60 Hz, 80 VA
Reagent Used:	Up to 2
Data Logging:	Configurable Data Recording, Storage and Output
Analog output:	Four 4-20 mA outputs
Alarms:	4 configurable relays SPDT 15A 250VAC
Sample Temperature:	5 to 70 °C
Inlet Sample Pressure:	Atmospheric
Outlet Sample Pressure:	Atmospheric, waste tubing O.D.3/8
Sample flow for the fast loop reservoir:	100-500ml/min
Connections:	To the fast loop reservoir with flexible tubing O.D.1/4”

A.2 Spare Parts List

QTY	P/N	DESCRIPTION

IMPORTANT: Orders for replacement parts should include the model number, serial number, and range of the analyzer for which the parts are intended.

Orders should be sent to:

TELEDYNE ELECTRONIC TECHNOLOGIES
Analytical Instruments

16830 Chestnut Street
City of Industry, CA 91748

Telephone: (626) 934-1500
Fax: (626) 961-2538

Web: www.teledyne-ai.com
or your local representative

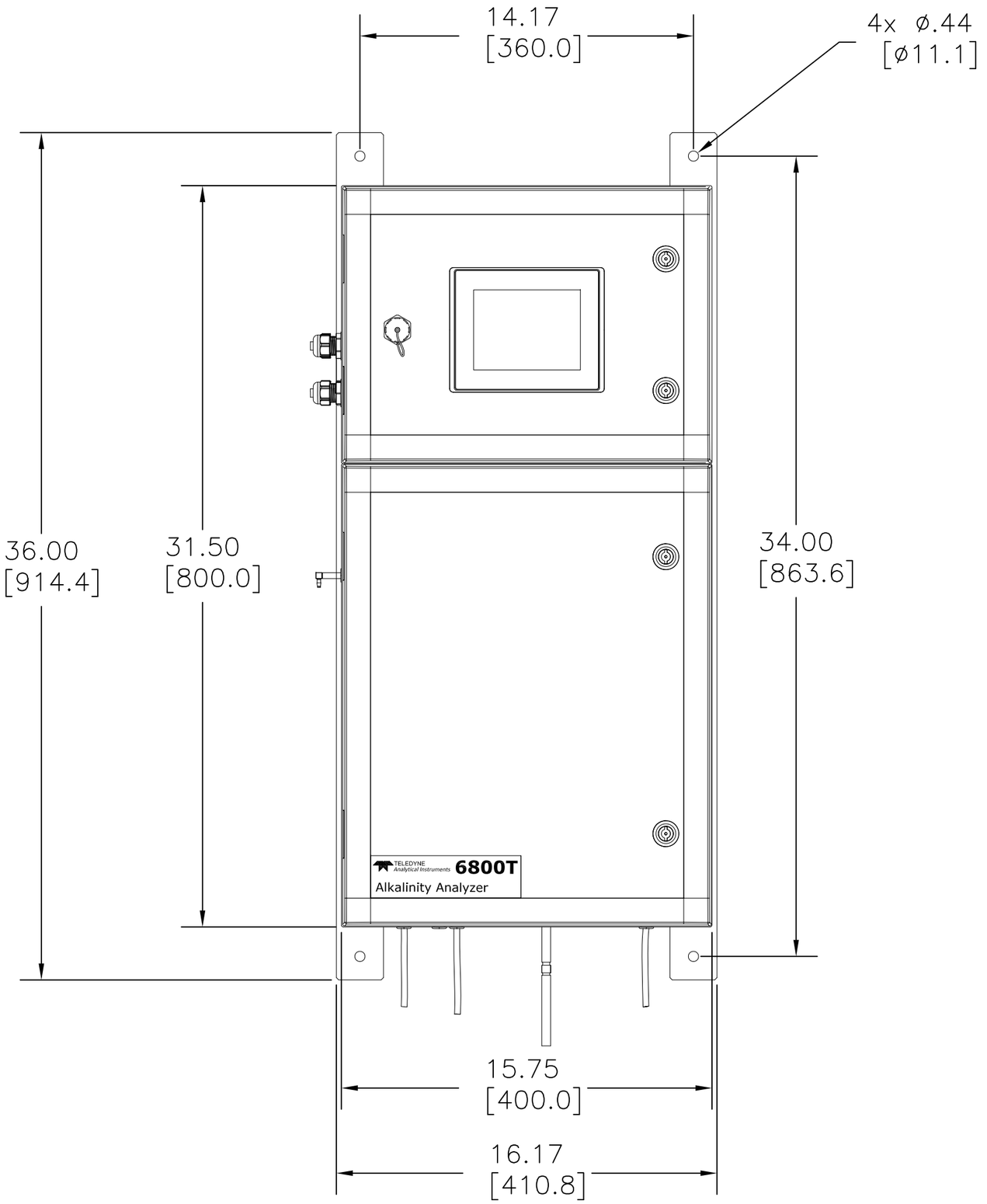
email: ask_tai@teledyne.com

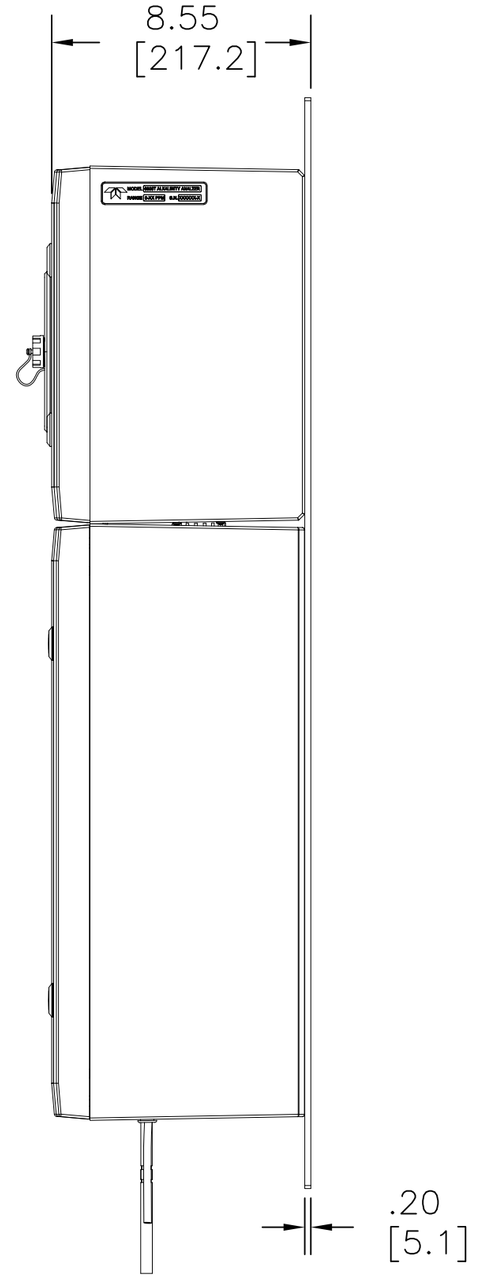
A.3 Drawing List

NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL DIMENSIONS ARE IN INCHES (±.06) AND MILLIMETERS (±1.), INCHES(mm)

REVISIONS				
REV	DESCRIPTION	DATE	APP.	REV. BY
0	INITIAL RELEASE	11/16/22	JCR	--





Use and Disclosure of Data
"Information contained herein is classified as EAR99 under the U.S. Export Administration Regulation.
Export, reexport or diversion contrary to U.S. law is prohibited."

UNLESS OTHERWISE SPECIFIED		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ANGULAR ±1/2° LINEAR [.X = ±.1, .XX = ±.02, .XXX = ±.010]		
S/	SIGNATURES	DATE
I/	DRFT: JOHN REYES	11/16/22
N/	CHK:	
P/	APPR:	
O/	ENGR: JOHN REYES	
F/	C.O.: STANDARD	
REFERENCE	CAD ID C96027-0	

TELEDYNE
Analytical Instruments
A Business Unit of Teledyne Instruments, Inc.
City of Industry, California 91748, USA

TITLE	SCALE	SIM	SHEET
OUTLINE DIAGRAM ALKALINITY ANALYZER MODEL 6800T	NONE	NONE	1 OF 1

MATL.	DWG NO.	REV
NONE	C- 96027	0