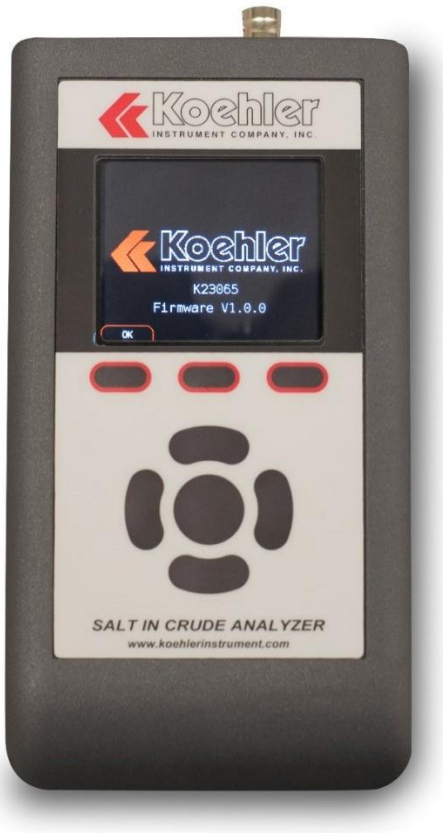
operation and instruction manual



K23065-UN & K23065-CE

Salt In Crude Analyzer

service | performance | technology

REV K-C

Koehler INSTRUMENT COMPANY, INC.

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WEEE Directive

Background
The goal of the WEEE Directive is to encourage design of environment-friendly products that increase reuse, recycling and other forms of recovery to reduce waste streams and applies to listed Electronic and Electrical Equipment (EEE) and Koehler's equipment falls broadly into Appendix 1A; Section 9 Monitoring and Control Equipment: Measuring, weighing or adjusting appliances for household or as laboratory equipment.

Any associated non-embedded equipment such as Lighting (Saybolt Color) and PCs/Printers also fall under WEEE. If provided with an order these ancillary items must be WEEE compliant. For these and other reasons (printer cartridges are regionalized) the equipment must be supplied through a third party supplier in Europe.

The WEEE Directive applies to electrical and electronic equipment falling under the categories set out in Annex IA provided that the equipment concerned is not part of another type of equipment that does not fall within the scope of this Directive. Annex IB contains a list of products which fall under the categories set out in Annex IA.

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:037:0024:0038:en:PDF

We do not qualify for any of the 10 exemption categories.
http://www.dpa-system.dk/en/WEEE/Products/Exemptions

Professional use
For equipment defined for 'professional use' local authorities have no role to play. Producers and importers are basically responsible for collection of WEEE recyclables from the professional user and for subsequent management. A separate statement is given cataloging the items that require separation from the equipment along with basic information on subsequent processing or recycling prior to disposal of the equipment.
http://www.dpa-system.dk/en/WEEE/Products/Private-or-professional-use

Responsibility for Registration and Annual Reporting:
Koehler will not sell directly to end users in the EU and so has no responsibility to register within each EU state and to make annual reports. Koehler declares that this responsibility is born by the importer who is the first level of the distribution chain and is subject to producer responsibility. We will communicate this in writing to our distributor/importers in the EU stating they are responsible to satisfy WEEE registration and reporting requirements in the EU states where they conduct sales activities.

It is illegal to market electrical and electronic equipment covered by producer responsibility without being registered.

http://www.dpa-system.dk/en/WEEE/Producers/Whoissubjecttoproducerresponsibility

Product Design
Koehler's designs allow for complete disassembly to a modular level which usually allows for standard recycling. A qualified refrigeration system technician must be consulted when disassembling and de-commissioning any equipment with refrigeration systems.

Koehler's scientific testing equipment is robustly designed to function over a long service life and are typically repaired many times over the course of years rather than being replaced. We believe that re-use and refurbishment is the very best form of re-cycling.

All batteries must be readily removable not soldered in place.

Recycling instructions

In the event that replacement becomes necessary, we will include instructions, particularized to each instrument that informs the customer of their recycling responsibilities and giving them guidance in doing this. All Koehler equipment has been placed on the market since 13th August 2005 and so Koehler is defined as a "new WEEE producer". As such we must provide information on refurbishment, treatment, and re-use.

Our instrument manual will include this compliance statement and indicate that any collection of materials will be handled by their authorized distributor. In the event that the distributor is unreachable or is no longer a distributor for Koehler Instrument, Co., other arrangements may be made including accepting the materials directly.

Recycling is free of charge. Shipping is the responsibility of the end users. Whether shipping to a distributor or to Koehler directly, safe, properly declared, and labeled packaging and shipping expenses are the sole responsibility of the end user.

WEEE Marking

Since Koehler products are subject to the WEEE Directive we must display the WEEE symbol shown above in accordance with European Standard EN 50419 on the equipment. It must be indelible, at least 5mm in height, and clearly legible. If the equipment is too small the mark must be in the product literature, guarantee certificate, or on the packaging. Rules on marking are established in section 49 of the WEEE Order.

Koehler Instrument Company, Inc.
c/o RECYCLING
1595 Sycamore, Ave.
Bohemia, NY 11716

As a minimum the following substances, preparations and components have to be removed from any separately collected WEEE:
- Mercury containing components, such as switches or backlighting lamps (compact fluorescent lamps, CFL),
- Batteries
- Printed circuit boards if the surface of the printed circuit board is greater than 10 square centimeters (about 4 sq in.),
- Toner cartridges, liquid and pasty, as well as color toner,
- Chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC)
- Liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimeters and all those back-lighted with gas discharge lamps,
- External electric cables
- Components containing refractory ceramic fibers as described in Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress Council Directive 67/548/EEC relating to the classification, packaging and labeling of dangerous substances (2),
- Electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)

2. The following components of WEEE that is separately collected have to be treated as indicated:
- Equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15, such as those contained in foams and refrigeration circuits: the gases must be properly extracted and properly treated. Ozone-depleting gases must be treated in accordance with Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer (4).

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1. Introduction

The Koehler Salt in Crude Analyzer is a sophisticated instrument and designed for determining salt concentration in crude oils as per the ASTM D3230 test method. It is a multi-parameter analyzer that can display up to four parameters simultaneously.

This manual provides important information regarding safety, technical reference, installation requirements, operating condition specifications, user facility resource requirements, and operating instructions for the Salts-in-Crude Analyzer. This manual should also be used in conjunction with applicable published laboratory procedures. Information on these procedures is given in section 1.2.

1.1. Koehler's Commitment to Our Customers

Providing quality testing instrumentation and technical support services for research and testing laboratories has been our specialty for almost 100 years. At Koehler, the primary focus of our business is providing you with the full support of your laboratory testing needs. Our products are backed by our staff of technically knowledgeable, trained specialists who are experienced in both petroleum products testing and instrument service to better understand your requirements and provide you with the best solutions. You can depend on Koehler for a full range of accurate and reliable instrumentation as well as support for your laboratory testing programs. Please do not hesitate to contact us at any time with your inquiries about equipment, tests, or technical support.

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1.2. Recommended Resources and Publications

1. American Society for Testing and Materials (ASTM)
   100 Barr Harbor Drive
   West Conshohocken, Pennsylvania 19428-2959, USA
   Tel: +1 610 832 9500
   Fax: +1 610 832 9555
   http://www.astm.org
   email: service@astm.org

   ASTM Publication:
   - ASTM D3230: Salts in Crude Oil (Electrometric Method)

1.3. Instrument Specifications

Models:	K23065-UN K23065 with UN Certified Battery K23065-CE K23065 with CE Certified Battery
Electrical Requirements:	115/230V 50/60Hz
Temperature Range:	-5 to +55°C
Resolution:	± 0.01°C
Accuracy:	± 0.02°C
Conductance Range:	0-2µS, 2-20µS, 20-200µS, 200-1500µS
Conductance Resolution:	0-2µS: ± 0.001µS 2-20µS: ± 0.001µS 20-200µS: ± 0.01µS 200-1500µS: ± 0.1µS
Conductance Accuracy:	±0.5% of range (±0.2% of high range)
pH Measurement Range:	0-14 pH
pH Measurement Resolution:	0.01 pH 0.01 pH at point of calibration

2. Safety Information and Warnings

Safety Considerations. The use of this equipment may involve *hazardous* materials and operations. This manual does not purport to address all of the safety problems associated with the use of this equipment. It is the responsibility of any user of this equipment to investigate, research, and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Equipment Modifications and Replacement Parts. Any modification or alteration of this equipment from that of factory specifications is not recommended voids the manufacturer warranty, product safety, performance specifications, and/or certifications whether specified or implied, and may result in personal injury and/or property loss. Replacement parts must be O.E.M. exact replacement equipment.

Unit Design. This equipment is specifically designed for use in accordance with the applicable standard test methods listed in section 1.2 of this manual. The use of this equipment in accordance with any other test procedures, or for any other purpose, is not recommended and may be extremely hazardous.

Chemical Reagents Information. Chemicals and reagents used in performing the test may exhibit potential hazards. Any user must be familiarized with the possible dangers before use. We also recommend consulting the Material Data and Safety Sheet (MSDS) on each chemical reagent for additional information. MSDS information can be easily located on the internet at http://siri.uvm.edu or http://www.sigma-aldrich.com.

3. Getting Started

The instructions for preparing the equipment assume that the user is aware of the contents of this document, which lists the warranty conditions and important precautions.

3.1. Packing List

- K23065-UN or K23065-CE Salt in Crude Apparatus (Referred to in this document as K23065)
- Electrode Cap Assembly (K23065-1)
- 100mL Borosilicate Sample Beaker (332-002-017)
- Power Adapter (240-005-002)
- Micro USB Cable (240-003-020)
- Carrying Case (K23000-CASE)
- Calibration Jack (K23060-6)
- Cable, 5-Pin, Male, 1 Meter (465-005-004)

3.2. Unpacking

Carefully unpack and place the instrument and accessories in a secure location. Ensure that all parts listed in previous section are present. Inspect the unit and all accessories for damage. If you find any damage, keep all packing materials and immediately report the damage to the carrier. We will assist you with your claim, if requested. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment. Do not return goods to Koehler without written authorization.

3.3. Setup

Getting Started. Please charge the unit for 24 hours before using the unit with charging cable and adapter provided. To activate the unit, turn on by pressing the center circular button. If you press and hold the button for longer than 10 seconds the unit will turn off.

Calibration. In order to measure salt concentration, the instrument must be calibrated for **temperature, conductivity,** and **salt**. Temperature has been calibrated at the factory and under normal circumstances will not need to be recalibrated. It should be verified on a regular basis, however, to ensure that a failure has not occurred. Conductivity has also been factory calibrated, but should be recalibrated on a daily basis. (Refer to the conductivity calibration procedure in the operating instructions.) The salt parameter has been calibrated at the factory using theoretical values for operational test purposes only. The instrument must be recalibrated using laboratory prepared standards in order to provide any meaningful salt determinations.

4. Descriptions

4.1. General Description

Koehler's K23065 is a sophisticated, portable instrument for the measurement of conductivity and temperature in crude oil samples, plus pH in aqueous samples. In addition, it can utilize the conductance and temperature data to calculate and display salt concentration per ASTM D3230.

The K23065 has built in capability to record data and save to the database.

The device uses a 2.6" TFT display that provides complete and descriptive data presentations plus the ability to easily setup operational modes and parameters. Calibration data and system variables are maintained in non volatile memory. These values will not be lost when power is turned off.

The instrument is contained in a weatherproof housing with sealed keypad for maximum protection in a harsh field environment. A benchtop stand is also available as an optional accessory for laboratory use.

4.2. Microprocessor Control

The K23065 incorporates an internal microcontroller that oversees and directly activates all system functions. This allows the more complex portions of the control program to be written in a high level language and then compiled into the machine code required for instrument operation.

4.3. Display

The instrument display presents four lines of parameter readings simultaneously for operator review, see Figure 1 to see an example showing User Name / Sample ID, Salt Concentration, Conductivity and Temperature.

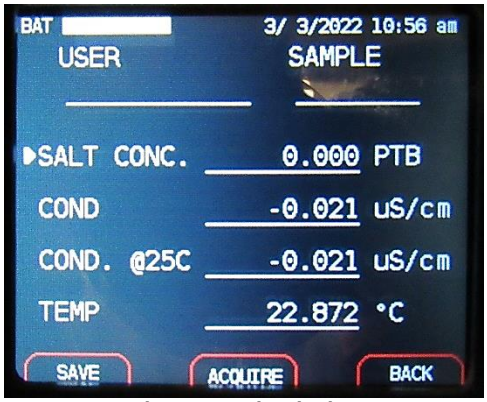

Figure 1. Main Display

The parameters are selected within the "Display Parameters" menu located in "Settings." Available display parameters include: User ID, Sample ID, Date, Time, Salt Concentration, Conductivity (non compensated), Conductivity corrected to 25°C, pH, pH in mV, and Temperature. See the menu in Figure 2 below. If more data is selected use the down / up arrow to access them.

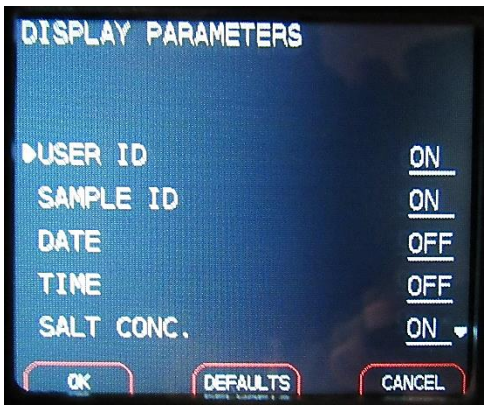

Figure 2. Display Parameters Screen

In the “Settings” menu the user can also set the Date and Time (Figure 3), select Measurement Units (Figure 4), and select the number of decimal places to be displayed (Figure 5). The measurement units of the temperature, conductivity, and salt concentration can be changed for user preference.

Figure 3. Date/Time

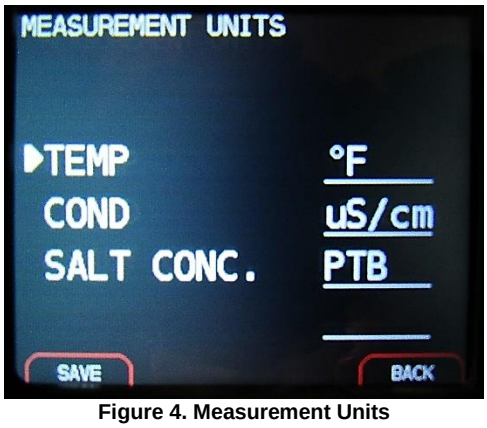

Figure 4. Measurement Units

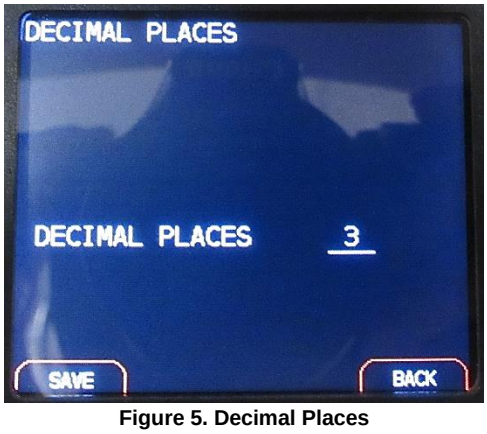

Figure 5. Decimal Places

4.4. Keypad

There are three soft buttons which change based on the screen you are in and there are 5 other buttons which are used for navigation. The center round button is the select button if the unit is on or it acts as an ON/OFF button if the unit is off.

4.5. Power Requirements

The K23065 has several power sources options. The primary source for portable (short term) field operation is the internal battery pack. The instrument has a built in battery charger for the internal battery. The internal battery is charged by plugging the external AC adapter into the Power connector on the side of the unit.

For continuous lab operation the instrument may be powered from an 115VAC source by plugging the external AC adapter into the Power connector.

The instrument maintains an auto shutoff feature to prolong battery life when it is being used for intermittent measurements. This feature may be deselected in the setup menu. When the unit is operated from the internal batteries it has enough capacity for approximately eight hours of continuous operation.

4.6. pH Input

The pH channel of the instrument uses a low noise, ultra-low input bias current instrumentation amplifier. It is configured as a differential input amplifier. The sensor to be used may be any combination pH electrode that will allow connection to the readout, BNC connector. The electrode should also have a temperature response that follows the "Nernst" equation, as this is the means used by the unit to temperature compensate the pH measurement.

The temperature value that is used during pH compensation is normally the measured temperature provided by the sensor in the conductance probe. During calibration the pH temperature may be input manually from the keypad or taken automatically from the conductance sensor.

5. Operation

The Koehler Salt-in-Crude Analyzer is a sophisticated instrument and designed for determining salt concentration in crude oils as per the ASTM D3230 test method. Please be sure to read the safety and hazard warnings, the installation procedure, and the standard test method before operating this instrument.

NOTE: Operator must Calibrate Salt-in-Crude Analyzer prior to use (See section 6)

5.1. Measurements

5.1.1. Conductivity

The conductivity measurement is performed by sensing the current produced in the cell while excited by a precision, bipolar signal. The circuitry eliminates dc-offset errors and minimizes troublesome polarization effects. The conductivity circuit automatically selects the most optimum range of operation out of the four available ranges.

The conductance cell is a precision machined Teflon and 316 stainless steel cell.

The system microcontroller periodically excites the electrode, performs the cell current measurement and applies offset and span correction to the resultant values. Thus, keeping a current conductivity value available for real time display or logging. From the calibrated conductance value, the system calculates conductivity at 25 °C, and Salt Concentration.

5.1.2. Temperature

The Temperature sensor is a thermo linear thermistor composite with an effective range of 5 to 50 °C.

5.1.3. pH

The K23065 employs high impedance, differential preamplifier in the pH circuit. The system uses a BNC connector for connection of the sensor. This input channel can use any combination pH electrode or specific ion electrode compatible with these characteristics.

The pH channel is available for display in two modes. The first is the normal pH mode where the displayed data are temperature compensated pH units. This channel is calibrated using pH buffers. The other display mode for pH is millivolts. This is a separate analyzer channel and is in addition to the pH display channel. This input channel has a range of 0 to +/ 0.7500 volts DC. It is calibrated by applying a voltage standard to the pH input connector and selecting "pH mV" for calibration. This channel allows the user to track drift in a pH sensor because of aging or to record the output from a specific ion/orp sensor. The millivolt channel is not temperature compensated. During calibration it is recommended that the negative terminal of the voltage standard be connected to the pH/ion ground electrode, as well as the shield of the BNC connector.

5.2. Operation and Control

5.2.1. Power On

The central circular button is used to activate the instrument. If the unit is off, press the on key until the display activates. The arrow in Figure 6 is pointing to the on key:

Figure 6. Powering On

5.2.2. Database

After selecting 'OK' on the main screen, you will be brought to the 'Database' screen. Here you can view previous tests, delete them or run a new test. The 'Database' screen is shown in figure 7. Use the three keys at the top (outlined in red) to select either 'Upload' 'Run Test' or 'Delete'

To delete an entry in the database, select that entry and press the delete key. From here you will receive a message asking to confirm the deletion as shown in figure 8 below. Select 'Confirm' to delete the entry.

5.2.3. Run Test

From the main screen pressing the middle key labeled 'Run Test' will bring you to the test screen shown in figure 9.

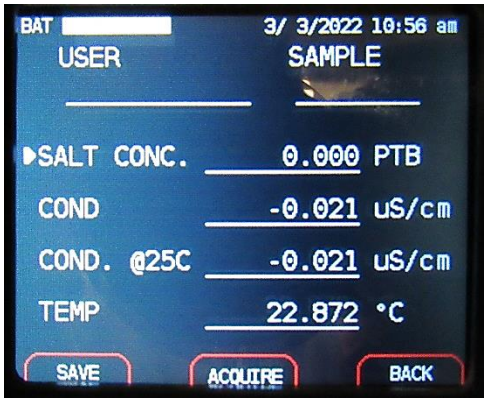

Figure 7. Run Test Screen

The three keys from this screen allow you to save the data, acquire the results and go back to the main database screen. When you select the middle key labeled 'Acquire' the screen in Figure 10 will appear while the analyzer acquires the results. Once the test is complete the screen in Figure 11 will appear with the results of the test. The results can then be saved by pressing the first key labeled 'Save'

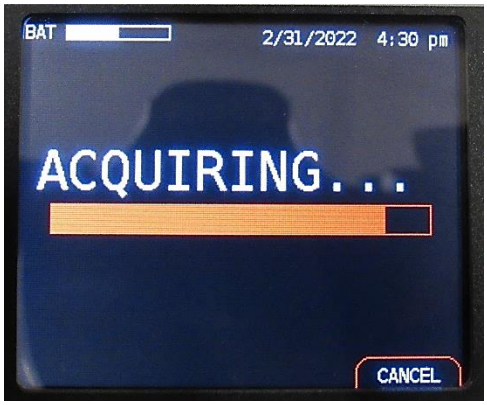

Figure 8. Acquiring Results

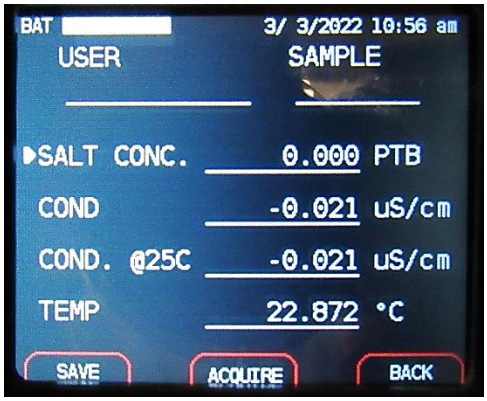

Figure 9. Results Screen

6. Calibration

The 'Calibrate' function gives the user the ability to calibrate any of the measurement channels (conductivity, temperature, daily blank, and salt curve.

When the 'Calibrate' function is selected from the settings menu a 'Calibration' submenu is presented. Here a list of the available parameters is shown (Figure 12)

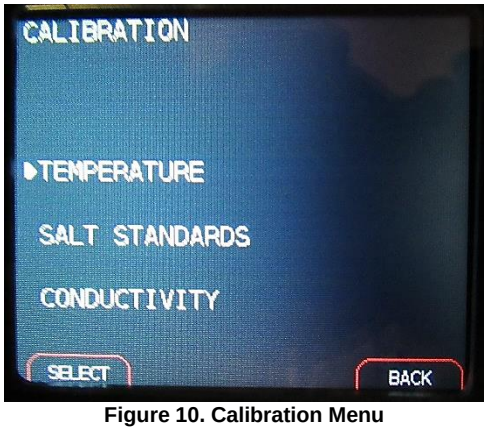

Figure 10. Calibration Menu

6.1. Calibrate Temperature

Under normal circumstances the temperature parameter is very stable and should not need to be recalibrated. If temperature calibration is lost or inadvertently changed then perform the following procedure. When the arrow cursor is pointing to temperature press the first key labeled ‘Select’ the K23065 will display what is shown in figure 13:

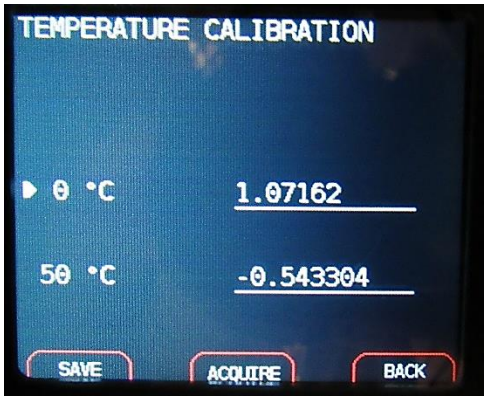

Figure 11. Temperature Calibration

Temperature must be calibrated at two points along its scale. One point will be a low value or 'Zero' point and the other an upscale value or 'Span' point. The 'Zero' point should be near 0.00 °C and the 'Span' value is pre-set at 50°C. When establishing the zero and span points the temperature sensor (the 1/4" stainless steel tube next to the conductivity electrodes) must be placed in a solution that is at the desired temperature. It should be noted that only the lower end of the temperature tube below the tip jacks can be immersed in the liquid.

6.1.1. Zero Temperature

When temperature is to be calibrated for zero offset the unit will retrieve the last temperature 'zero' value used.

To establish the zero point, prepare an ice/water slurry; place the sensor in the ice bath and allow the unit to equilibrate for several minutes, stirring or agitating the bath regularly. Use a laboratory thermometer to measure the temperature of the slurry; press the key labeled ‘Acquire’ and the unit will measure the temperature, derive the offset and store the calibration data in nonvolatile memory. When this is completed, the unit will revert to the 'Temperature Calibration' screen where the user may continue calibration or return to monitoring.

6.1.2. Span Temperature

When this mode is selected the temperature sensor must be introduced to a stable, upscale temperature solution. An ambient temperature solution works well. If the sensor has just been in the ice slurry for zero calibration it will take some time for the sensor to reach equilibrium. Once the temperature of the sensor has stabilized in the span medium select ‘50°C’

Use a laboratory thermometer to measure the temperature of the span solution. Press the 'Acquire' key and the unit will establish the slope of the temperature sensor, store the data in non-volatile memory and revert to the 'Temperature Calibration' screen where the user may continue calibration go back or save. Make sure to select the ‘Save’ key once both calibration points are entered.

6.2. Calibrate Daily Blank

The Daily Blank feature offers a means of adjusting the salt calibration information for slight variations in system offset. This is accomplished by introducing the conductivity/temperature sensor to the Blank standard prepared per ASTM D3230. In the Calibration Menu select ‘Salt Standards’ and when the 'Acquire' key is pressed the instrument will determine the conductivity of the solution; calculate the difference from the last Blank reading and adjust all of the Salt calibration data accordingly. The Salt Standards screen is shown below in Figure 14:

Figure 12. Salt Standards

NOTE: In this step as with any of the salt calibration procedures the volume of standard solution used must be kept constant. Approximately 90 ml of solution is recommended (just enough to cover the electrodes in their sample beaker). This volume should be measured precisely as it effects the conductivity measurement.

6.3. Calibrate Salt

The Salt Standards menu is the point where the instrument establishes its relationship between conductivity and salt concentration. Before entering this menu, the instrument's temperature reading should have been verified and conductivity "zero" and "span" set. In addition, the "salt" standards should have been prepared per ASTM D3230.

It should be noted that if a full calibration is to be performed Old Calibration data SHOULD be erased by pressing the 'Delete' key. This is the only way to ensure an appropriate curve for salt versus conductance. If, old calibrations are not erased, standards made with different blank solutions may be intermixed. This will provide erroneous salt measurements.

Once a Salt Calibration has been performed the operator may view the calibration data. If it is determined that a calibration point was overlooked or improperly performed the user may choose to NOT erase old calibration data and re-enter the calibration point in question.

Once the "Salt Standards" screen is selected a list of standard salt values is presented to the user. They are:
Blank, 1 ptb, 3 ptb, 5 ptb, 10 ptb, 16 ptb, 21 ptb, 26 ptb, 31 ptb, 40 ptb, 51 ptb, 66 ptb, 75 ptb, 86 ptb, 101 ptb, 151 ptb, and Exit

The calibration procedure is to be systematic:

1) Rinse the sensor electrodes in alcohol and dry.

2) Place the electrodes in a selected and precisely measured salt standard solution.

3) Select that standard from the list via the arrow keys and press "Acquire".

4) The instrument will store the salt value and conductance reading in a table of calibration values.

The operator should now repeat salt calibration steps 1 through 4 for all salt standard values. Once the calibration is complete select "Back" to go back to the Calibration Menu.

Several things should be noted about "Salt" calibration.

- The "Blank" standard must always be used.
- Not all of the remaining standard values are required to be entered. However, the instrument establishes a linear slope between each standard value used. Therefore, a much more accurate salt reading will be calculated if the maximum number of salt standards are entered.
- The instrument will not calculate a salt value if it encounters a conductivity measurement higher or lower than that obtained during salt calibration. In these instances, it will display 999999 ptb as the measured salt value. For this reason, it is advisable to utilize a salt standard well above those that will normally be measured, thus, avoiding ambiguous readings.

6.4. Calibrate Conductivity

Conductivity calibration involves establishing the zero and span points of the system. This is accomplished by using a dry sensor for "zero" and connecting a standard resistor for the conductance span value. Select ‘Conductivity’ from the Calibration Menu. This will bring you to the Conductivity Calibration screen shown below in Figure 15:

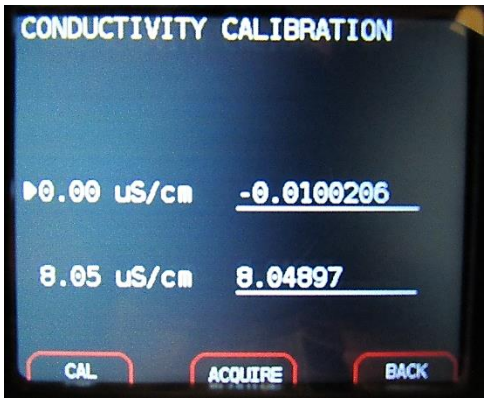

Figure 13. Conductivity Calibration

Press the arrow keys to move the selection character from 0.00 uS to 0.05 uS.

6.4.1. Zero Conductivity

When the conductance parameter is to be adjusted for zero offset connect the conductance/temperature sensor to the connector labeled C/T on the readout; make certain the electrodes have been cleaned (rinsed in alcohol) and dried; select "0.00uS/cm" on the Conductivity Cal Menu and press the ‘Acquire’ key to establish the zero offset point and store the new data in non-volatile memory. Once this has been done the K23065 will revert to the 'Conductivity Calibration' menu.

6.4.2. Span Conductivity

When conductivity span or slope is to be adjusted clip the conductance calibration jacks between the two conductivity electrodes. Select "8.05 uS/cm" on the unit and press "Acquire". The unit will measure the conductance, establish the new slope and store the data in non volatile memory. It will then revert to the 'Conductivity Calibration' menu. If the calibration procedure has been completed, choose the 'Cal'. This will save the calibration data.

7. Auto Shutoff

The K23065 has the capability to turn itself off automatically in order to conserve battery power. This is done approximately two minutes after the last key is struck. If this is desired select ‘Auto Shutoff’ from the settings menu. The K23065 will ask if you wish to enable the auto-shut off feature as shown in Figure 16 on the following page. If it is not desired select No and if it is desired select Yes. Once your selection is made press the ‘Save’ key. This selection is stored in non-volatile memory and will remain in effect until changed. If auto shutoff is not selected, the instrument must be turned off via the "Power Off" function in the main command menu.

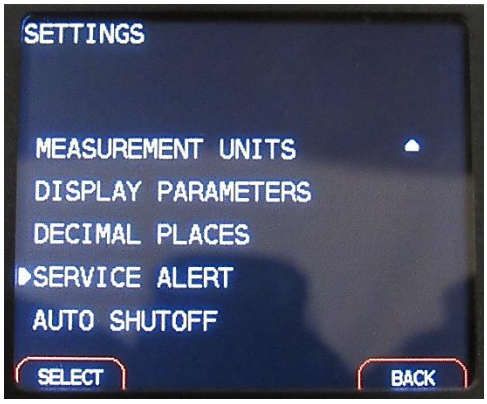

Figure 14. Auto-Shutoff

8. Maintenance

WARNING: Disconnect power to the unit before servicing to avoid exposure to high voltages and/or temperatures which may result in personal injury or death. The Koehler Salt-in-Crude Analyzer requires very little maintenance for proper operation. If you have any questions about maintaining your equipment, then please do not hesitate to contact the Koehler technical service department.

8.1. Battery Charging

The K23065 contains an internal battery pack. When fully charged these can provide approximately eight hours of continuous operation. The unit comes with an external AC adapter, which can be used to charge the internal battery pack. To power the K23065 from the AC adapter plug the adapter connector into the side of the instrument. The instrument may be run continuously in this manner. If the instrument is primarily operated from AC power the user should periodically monitor the internal battery voltage and recharge when the battery falls below 4.9 volts. It is not intended for the unit to be secured by simply unplugging the AC power adapter. The instrument should be turned off by holding the center button for 10 seconds.

To charge the internal batteries plug the adapter connector into the side of the unit. The unit has a built in battery charging circuit that will recharge the internal batteries in 14 16 hours. This is assuming the unit is not activated. If it is operating a very limited amount of charging current will be available for the batteries.

The charge state of either battery can be checked by displaying the battery voltages on the unit system display. The internal battery back should measure 5.4 volts or higher when at full charge (without the charger on).

8.2. Routine Maintenance

The K23065 Salt in Crude Analyzer requires little routine maintenance to provide many years of continuous service. However, over the course of time, some instrument parts may need to be replaced. When ordering replacement part(s), please provide the model number, serial number, and product shipment date of your equipment so that we can ensure you will receive the proper replacement part(s).

8.3. Replacement Parts

Part Number	Replacement Part
K23065-1	Electrode Cap Assembly
K23000-CASE	Salt in Crude Case
K23060-6	Calibration Jack
K23060-8	Table Top Stand

Part Number	Replacement Part
465-005-004	Cable, 5-Pin, Male, 1 Meter
332-002-017	100 mL Beaker
K23060-4	Power Adapter, Dual Voltage 115/230V

9. Service

Under normal operating conditions and with routine maintenance, the K23065 Salt in Crude Analyzer should not require service. If you experience an error and need to reset the analyzer, there is a reset pin that can be accessed using a pin or paper clip to perform a hard reset. If this doesn't solve the issue, please contact Koehler's technical service department either by letter, phone, fax, or email. In order to assure the fastest possible service, please provide us with the following information.

Model Number: _____

Serial Number: _____

Date of Shipment: _____

10. Storage

This laboratory test instrument consists of Electrical & Mechanical Components. Storage facilities should not be subject to extremes of high and low temperatures or extremes of high and low moisture conditions. Storage facilities should be consistent with indoor laboratory environment.

NOTE: Unit is shipped in corrugated cartons and if long term storage is anticipated, repacking with water resistant packing is recommended to insure a safe condition for the equipment.

11. Warranty

We, at Koehler, would like to thank you for your equipment purchase, which is protected by the following warranty. If within one (1) year from the date of receipt, but no longer than fifteen (15) months from the date of shipment, Koehler equipment fails to perform properly because of defects in materials or workmanship, Koehler Instrument Company, Inc. will repair or, at its sole discretion, replace the equipment without charge F.O.B. its plant, provided the equipment has been properly installed, operated, and maintained. Koehler Instrument Company must be advised in writing of the malfunction and authorize the return of the product to the factory. The sole responsibility of Koehler Instrument Company and the purchaser's exclusive remedy for any claim arising out of the purchase of any product is the repair or replacement of the product. In no event shall the cost of the purchaser's remedy exceed the purchase price, nor shall Koehler Instrument Company be liable for any special, indirect, incidental, consequential, or exemplary damages. KOEHLER INSTRUMENT COMPANY, INC. DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. Please save the shipping carton in the event the equipment needs to be returned to the factory for warranty repair. If the carton is discarded, it will be the purchaser's responsibility to provide an appropriate shipping carton.

12. Returned Goods Policy

To return products for credit or replacement, please contact Koehler Customer Service with your purchase order number, our packing list/invoice number, the item(s) to be returned and the reason for the return. You will be issued a Returned Authorization (RA) number, which must be prominently displayed on the shipping container when you return the material to our plant. Shipping containers without an RA number prominently displayed with will be returned to the sender. Goods must be returned freight prepaid. Returns will be subject to a restocking charge, the application of which will depend upon the circumstances necessitating the return. Some returns cannot be authorized, including certain products purchased from outside vendors for the convenience of the customer, products manufactured on special order, products shipped from the factory past ninety (90) days, and products which have been used or modified in such a way that they cannot be returned to stock for future sale.

Notes

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