



K70XXX ROTARY PRESSURE VESSEL OXIDATION BATH

OPERATION AND INSTRUCTION MANUAL

REV B

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PETROLEUM TESTING & ANALYSIS INSTRUMENTATION • CUSTOM DESIGN & MANUFACTURING

CERTIFICATE OF CONFORMANCE

Rotating Pressure Vessel Oxidation Tester K70XXX

This certificate verifies that part number K70XXX, Rotating Pressure Vessel Oxidation Tester, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:

- ASTM D2112
- ASTM D2272
- ASTM D4742
- IP 229

This unit is tested before it leaves the factory, to ensure total functionality and compliance to the above specifications and ASTM standards. Test and inspection records are on file for verification.



Jesse Kelly
Application Engineer
Koehler Instrument Company

WEEE Directive Compliance Statement

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 K70XXX Rotary Pressure Vessel Oxidation Bath is a digitally controlled constant temperature bath that simulates the conditions to perform oxidation stability analysis of petroleum based oils. This bath rotates oxidation pressure vessels at 100 rpm at an angle of 30° in accordance to ASTM specifications. It tests samples at a temperature ranging from ambient to 200°C. An over temperature protection feature is provided by a built in control that automatically interrupts power to the bath when the bath liquid temperature exceeds 220°C.

This manual provides operating instructions for the K70XXX Rotary Pressure Vessel Oxidation Bath, and should be used in conjunction with applicable standard test methods.

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 more than 50 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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Email: info@koehlerinstrument.com

<http://www.koehlerinstrument.com>

1.2 Recommended 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 D2112: Oxidation Stability of Inhibited Mineral Insulating Oils by Pressure Vessel
- ASTM D2272: Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel
- ASTM D4742: Oxidation Stability of Gasoline Automotive Engines by Thin Film Oxidation Uptake

2. Energy Institute (IP)
61 New Cavendish Street
London, WIM 8AR, United Kingdom
Tel: 44 (0)20 7467 7100
Fax: 44 (0)20 7255 1472
<http://www.energyinstpubs.org.uk/>

IP Publication:

- IP 229: Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel

1.3 Electrical Requirements

Model	Capacity	Voltage	Frequency	Amps
K70200	2 Vessels	220-240V	60 Hz	17.17 A
K70290	2 Vessels	220-240V	50 Hz	17.17 A
K70300	3 Vessels	220-240V	60 Hz	17.17 A
K70390	3 Vessels	220-240V	50 Hz	17.17 A
K70400	4 Vessels	220-240V	60 Hz	21.5 A
K70490	4 Vessels	220-240V	50 Hz	21.5 A

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 and 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>.

Acetone:



WARNING: Flammable Liquid.

- Keep away from heat, sparks, open flames and other sources of ignition.
- Do not smoke.
- Keep container closed.
- Use with adequate ventilation.
- Irritant. May cause eye irritation and transient injury may cause skin irritation; may cause respiratory tract irritation.
- Avoid inhalation of vapors.

3 Getting Started

3.1 Packing List

- K70XXX Rotary Pressure Vessel Oxidation Bath
- RTD Temperature Probe

Accessories (purchased separately):

- K70000-00000 Oxidation Pressure Vessel
- K705XX-XP Oxidata™ Pressure Measurement System
- K70011,2,7 Pressure Vessel Support Rack
- K70081-1 Male Quick Disconnect, ¼ NPT
- K70082 Female Quick Disconnect for Charging Hose
- K70080 Charging Hose
- K70013 Oxygen Pressure Regulator

Accessories for RPVOT (purchased separately):

- K70030 Copper Catalyst Coils (*Alternative to K70002, K70004, and K70090*)
- K70002 Winding Mandrel
- K70004 Drive Unit, 220-240V
- K70090 Copper Catalyst Wire (500 ft)
- K70021 RPVOT Kit (*Includes: RPVOT Sample Beaker, Cover, Silicone O-Ring and Spring*)
- 250-001-37C IP 37C Thermometer (ASTM D2272)
- 250-000-96C ASTM 96C Thermometer (ASTM D2112)

Accessories for TFOUT (purchased separately):

- K70093 Catalyst Package A (*For simulating IIID engine test*)
- K70095 Catalyst Package B (*For simulating IIIE engine test*)
- K70092 Aluminum Insert
- K70091 TFOUT Sample Container
- K70048 TFOUT Sample Container Cover
- K700-0-3A TFOUT Spring
- 250-000-100C ASTM 100C Thermometer

3.2 Unpacking

This unit comes packed in a special carton with foam inserts protecting the unit. Remove the unit and foam inserts (taped together) from the carton. Carefully remove the inserts from the

unit and be very cautious not to damage the delicate glass cell. Place the unit on a firm, level table away from direct sunlight which may affect sensitivity of the photocell.

3.3 Installation Instructions

Environmental Conditions: The instrument environment must comply with the following conditions for proper setup:

- No / Low Dust
- No direct sunlight
- Not near heating or AC ventilation ducts
- No Vibrations
- Clearance from other instruments
- Temperature Range: 5 to 40°C
- Elevation to 2000 meters
- Relative Humidity: < 80%

Power. Connect the line cords to properly fused and grounded receptacles with the correct voltage as indicated in section 1.3 or on the back of the unit.



WARNING: For safety, disconnect the power when performing any maintenance and/or cleaning. Do **NOT** turn the power on unless the bath is filled with the proper medium; otherwise, damage may occur to the unit and the warranty will be void.

3.4 Assembly Instructions

1. Line up the holes of the bomb rack to the holes on top of the bath and screw into place using the provided screws.
2. Insert the RTD probe into the probe holder, mounted on the top of the bath. Insert jack at the end of the probe in receptacle mounted on lower right side of the bath.
3. Check that the drain valve is closed, and then fill the bath with the appropriate heat transfer medium (water or white technical oil) to ½ inch below the top of the overflow pipe.

4 Descriptions

4.1 Temperature Controller Operation

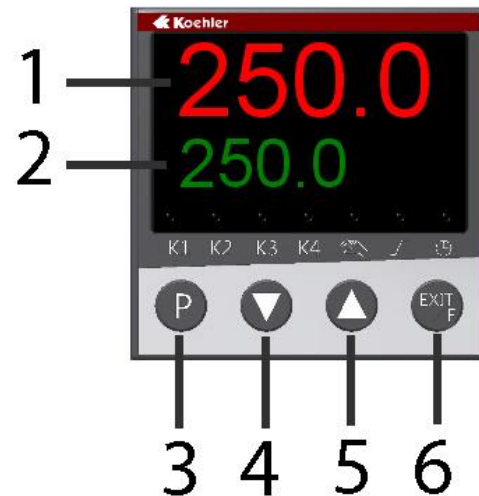


Figure 4. Temperature Controller

1. **Process Temperature Display.** The upper red LED display shows the process temperature as read from the RTD probe.
2. **Set Point Temperature Display.** The lower green LED display shows the set point temperature of the controller.
3. **Programming Key.** Permits scrolling through controller menu parameters. One Level Forward
4. **Down Key.** Used to decrease the set point temperature and to decrease or change parameter values when programming the temperature controller.
5. **Up Key.** Used to increase the set point temperature and to increase or change parameter values when programming the temperature controller.
6. **Exit / Function Key.** This key is used to exit or leave a level. One level backward

IMPORTANT NOTE: The digital temperature controller for the unit comes pre-programmed from the Koehler factory. Please do NOT attempt

to re-program the digital temperature controller as this will void the product warranty. If assistance is required, please do not hesitate to contact the Koehler technical service department.

Setting the Temperature. Set the desired operating temperature by adjusting the set point with the up and down keys. The set point will be displayed in the lower green Set Point LED display and the actual temperature will be displayed in the upper red Process LED display. Please allow the instrument to fully equilibrate before proceeding with any testing.

Temperature Calibration. This routine allows the digital temperature controller to be calibrated to a certified thermometer.

- a. Use a certified calibrated measuring device to acquire the temperature. Calculate the difference between the measuring device and the Process value displayed on the controller.
- b. Press the program key two times until **Pct** is displayed in the lower green LED display. Press the DOWN key. CAL will display on the lower green display. If there is a value observed in the upper red LED display, add it to the calculated difference obtained in the previous step. This is the offset value.
- c. Press the Program Key. The lower green display will flash. Use the up or down keys to adjust to the new calibration offset value on the upper red display calculated in the previous step. When the value has been entered, the controller will automatically store the value. The lower green display will stop flashing. If further adjustments are necessary, press the Program Key again. Resume regular operations by pressing the Exit / Function key two times. Verify if the new calibration is correct by observing the upper red display and comparing the value with the calibrated reference device.

Auto Tune. This routine allows the digital temperature control to learn the heating parameters needed for any particular set point temperature. This operation should be

done when installing a new unit, after replacing or changing the bath medium type, or utilizing a different temperature set point 20% different from the previously used set point temperature.

- a. Set the operating temperature to the desired setting.
- b. Press the up and down arrow buttons simultaneously for about 5 seconds. When Auto Tune is active, the lower green LED display will blink **TUNE**. Auto Tune will automatically toggle off when the set point temperature is reached. Auto tune can be terminated by pressing the up & down buttons simultaneously again.

5 Operation

1. Be sure to read the safety and hazard warnings, the installation procedure and any of the standard test methods mentioned in the Introduction of this manual before operating this unit.
2. Turn the Line Switch and Stirrer Motor ON.
3. To set your temperature, press the ascending/descending arrows until the desired temperature is indicated on the lower green LED display of the temperature controller.
4. When the red LED display reaches the desired temperature, the temperature of the bath has stabilized.
5. Open the bath cover and insert the pressure vessels into their appropriate slots. You will know when the pressure vessels are locked into place when you can no longer rotate the pressure vessels manually.
6. Once the pressure vessels are in place, close the cover hood.
7. Attach pressure transducer to the bomb stem and turn ON the Motor Switch. This will begin rotating the pressure vessels at 100 rpm.

NOTE: Make sure the rotating pressure vessels are clear of any dangling objects (wires, electrical cords, etc.) or severe damage may occur.

8. Proceed to test in accordance with any of the test methods listed in the Introduction of this manual.

6 Service

Under normal operating conditions and with routine maintenance, the K70XXX Rotary Pressure Vessel Oxidation Bath should not require service. Any service problem can be quickly resolved by contacting 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: _____

7 Storage

This laboratory test instrument is equipped with electrical components. Storage facilities should be consistent with an indoor laboratory environment. This testing equipment should not be subjected to extremes of temperature and/or moisture.

This equipment was shipped from the factory in a corrugated cardboard container. If long term storage is anticipated, re-packing the instrument in a water-resistant container is recommended to ensure equipment safety and longevity.

8 Replacement Parts

Part Number	Replacement Part
050-001-028	Switch, Single Pole 15A
265-500-001	RTD Bath Probe
265-600-001	RTD Over Temperature Probe
275-103-044	Temperature Controller 100-240V
288-115-004	Stirrer Motor 115/230V 50/60Hz
288-115-009	Drive Motor 115/230V 50/60Hz
K702-0-8	Control Heater, 1000W 230V
K702-0-8A	Continuous Heater, 1000W 230V
K703-0-8	Control Heater, 1000W 230V
K703-0-8A	Continuous Heater, 750W 230V
K704-0-8	Control Heater, 1000W 230V
K704-0-8A	Continuous Heater, 750W 230V
K460-0-8	Thermometer Holder
K700B-0-41	Drive Shaft Seal
AS568-345-V14	O-Ring (Viton)
K102-31	Light Source

9 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.

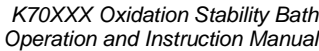
10 Returned Goods Policy

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.

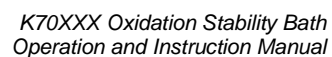
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