



**K10404
LIQUID OXIDATION BATH
6 VESSEL MODEL**

OPERATION AND INSTRUCTION MANUAL

REV B

Koehler Instrument Company, Inc.

1595 Sycamore Avenue • Bohemia, New York 11716-1796 • USA

Toll Free: 1-800-878-9070 (US only) • Tel: +1 631 589 3800 • Fax: +1 631 589 3815

<http://www.koehlerinstrument.com> • e-mail: info@koehlerinstrument.com

Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

CERTIFICATE OF CONFORMANCE

Liquid Oxidation Bath K10404

This certificate verifies that part numbers K10404 Liquid Oxidation Bath, were manufactured in conformance with the applicable standards set forth in this certification.

Specifications:

ASTM D525
ASTM D873
IP 40
IP 138
ISO 7536
DIN 51780
DIN 51799
FTM 791-3352
FTM 791-3354
NF M 07-012
NF M 07-013

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).

Table of Contents

1	Introduction	8
1.1	<i>Koehler's Commitment to Our Customers</i>	8
1.2	<i>Recommended Publications</i>	8
1.3	<i>Instrument Specifications</i>	8
2	Safety Information and Warnings.....	9
3	Getting Started	10
3.1	<i>Packing List.....</i>	10
3.2	<i>Unpacking</i>	10
3.3	<i>Assembly Instructions</i>	10
4	Descriptions	11
4.1	<i>Temperature Controller Operation</i>	11
5	Operation.....	11
6	Service	12
7	Replacement Parts.....	12
8	Storage	12
9	Warranty	12
10	Returned Goods Policy	13
11	Wiring Diagram	14
	Notes	15

1 Introduction

Koehler Model K10404 6-Unit Liquid Oxidation Bath determines the tendency of gasoline and aviation fuels to form gum and deposits under accelerated aging conditions.

This manual provides operating instructions for the K10404 4-Unit Liquid 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.

Toll Free: 1-800-878-9070 (US only)
Tel: +1 631 589 3800
Fax: +1 631 589 3815

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 D525: Oxidation Stability of Gasoline (Induction)
- ASTM D873: Oxidation Stability of Aviation Fuels (Potential Residue)

2. International Organization for Standardization (ISO)
1, rue de Varembe
Case postale 56
CH-1211 Geneva 20, Switzerland
Tel: 41 22 749 01 11
Fax: 41 22 733 34 30
<http://www.iso.org>

ISO Publication:

- ISO 7536

3. 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 40: Oxidation Stability of Gasoline (Induction Period Method)
- IP 138: Oxidation Stability of Aviation Fuel (Potential Residue Method)

4. Deutsche International Norm (DIN)

DIN Publication:

- DIN 51780
- DIN 51799

5. Federal Test Method (FTM)

FTM Publication:

- FTM 791-3352
- FTM 791-3354

1.3 Instrument Specifications

Models: K10404

Electrical

Requirements: 220-240V 50/60Hz
18.1A

Temperature Range: Ambient to 121°C
(302°F)

Capacity: 4 Pressure Vessels

Heater Range: 0 - 3000W

Dimensions: 24x14x29.5
Lxwxh,in.(cm) (61x36x75)

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.

Over Temperature Protection. This unit is equipped with Over Temperature Protection (OTP) circuitry to prevent overheating. The unit will automatically interrupt power whether equipment malfunction or operator error causes the temperature to exceed either 20 °C above the set point or the maximum recommended temperature range. The power can only then be restored by identifying and correcting the problem, allowing the unit to return to normal operating temperatures, and resetting the power to the unit.

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>.

Isopropyl Alcohol:



WARNING: Flammable. Avoid prolonged breathing of vapor or spray mist.

- Keep away from heat, sparks, open flames, and any other sources of ignition.
- Keep container closed. Use with adequate ventilation.
- Avoid prolonged or repeated skin contact

Acetone:



WARNING: Flammable liquid. Avoid inhalation of vapors

- Keep away from heat, sparks, open flames and any other source of ignition.
- Keep container closed. Use with adequate ventilation.
- Irritant. May cause eye, skin or respiratory tract irritations.

n-Heptane:



WARNING: Extremely Flammable. Harmful if inhaled

- Keep away from heat, sparks, open flames and any other source of ignition.
- Keep container closed. Use with adequate ventilation
- Avoid prolonged breathing of vapor or spray mist.
- Avoid prolonged or repeated skin contact.

Toluene:



WARNING: Flammable liquid. Aspiration hazard. May cause cardiac disturbances.

- Keep container closed. Use with adequate ventilation
- May cause eye, skin, digestive, and respiratory tract irritations.
- May cause kidney and liver damage or central nervous system depression.

3 Getting Started

3.1 Packing List

- K10404 Liquid Oxidation Bath – 6 Vessel

Accessories (purchased separately):

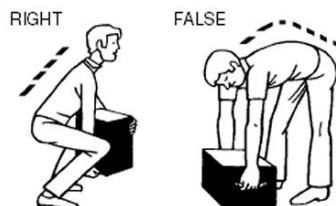
- K10500 Oxidation Pressure Vessel
- K10540 Glass Sample Container and Cover
- K10510 Gasket
- K10551 Pressure Line
- K10556 Oxygen Manifold Pressure Relief System
- K10520 Wrench
- K10530 Table Socket
- K10560 Bronze
- K10525 Burst Disc Assembly
- K105X5-XP Oxidata® Pressure Measurement System, 4 Unit
- 250-000-22F ASTM 22F Thermometer
Range: 204 to 218°F
- 250-000-22C ASTM 22C Thermometer
Range: 95 to 103°C

3.2 Unpacking

Remove the bath from the crate and place on a firm, level table.



WARNING: Be sure two or more individuals are available for extracting and lifting instrument from box to cart and from cart to bench. Individuals must lift in accordance to proper technique. See Figure below.



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%

3.3 Assembly Instructions

Assemble the pressure vessels and data acquisition system. Make sure that all the steps of the method are closely followed.

Oxygen Supply Requirements. This unit requires an Oxygen source for charging the pressure vessels.

Power. Connect the line cord to a properly fused and grounded receptacle of the correct voltage.

4 Descriptions

4.1 Temperature Controller Operation

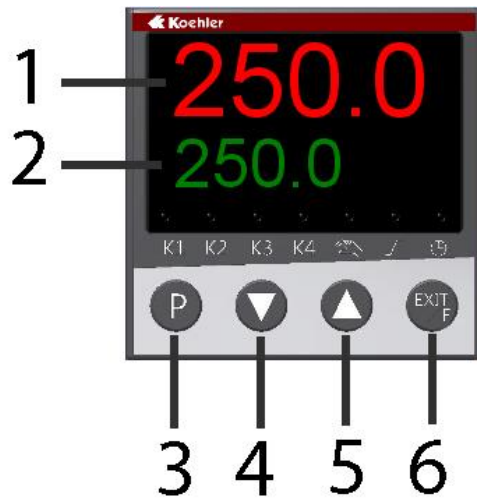


Figure 4. Temperature Controller

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 assembly procedure and any of the standard test methods mentioned in the Introduction before operating this instrument.
2. Turn ON the Line switches.
3. Observe the display panel of the digital temperature control. Upon power initialization all LED's will momentarily be illuminated. After five seconds, the control will reset and display the current bath temperature on top as PV or process (or actual) value. The bottom display is the setpoint value or SV.
4. To raise the apparatus temperature, push the ascending arrow until the desired temperature is displayed in the setpoint value display. To lower the setpoint value, push the descending arrow until the desired temperature is displayed.
5. To perform a test, clean the pressure vessels thoroughly (refer to the method), put in the sample and proceed according to the ASTM instructions.

6 Service

Under normal operating conditions and with routine maintenance, the K10404 Liquid 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 Replacement Parts

Part Number	Replacement Part
275-103-044	Digital Temperature Controller
278-020-004	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A
K70519	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.

8 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.

9 Warranty

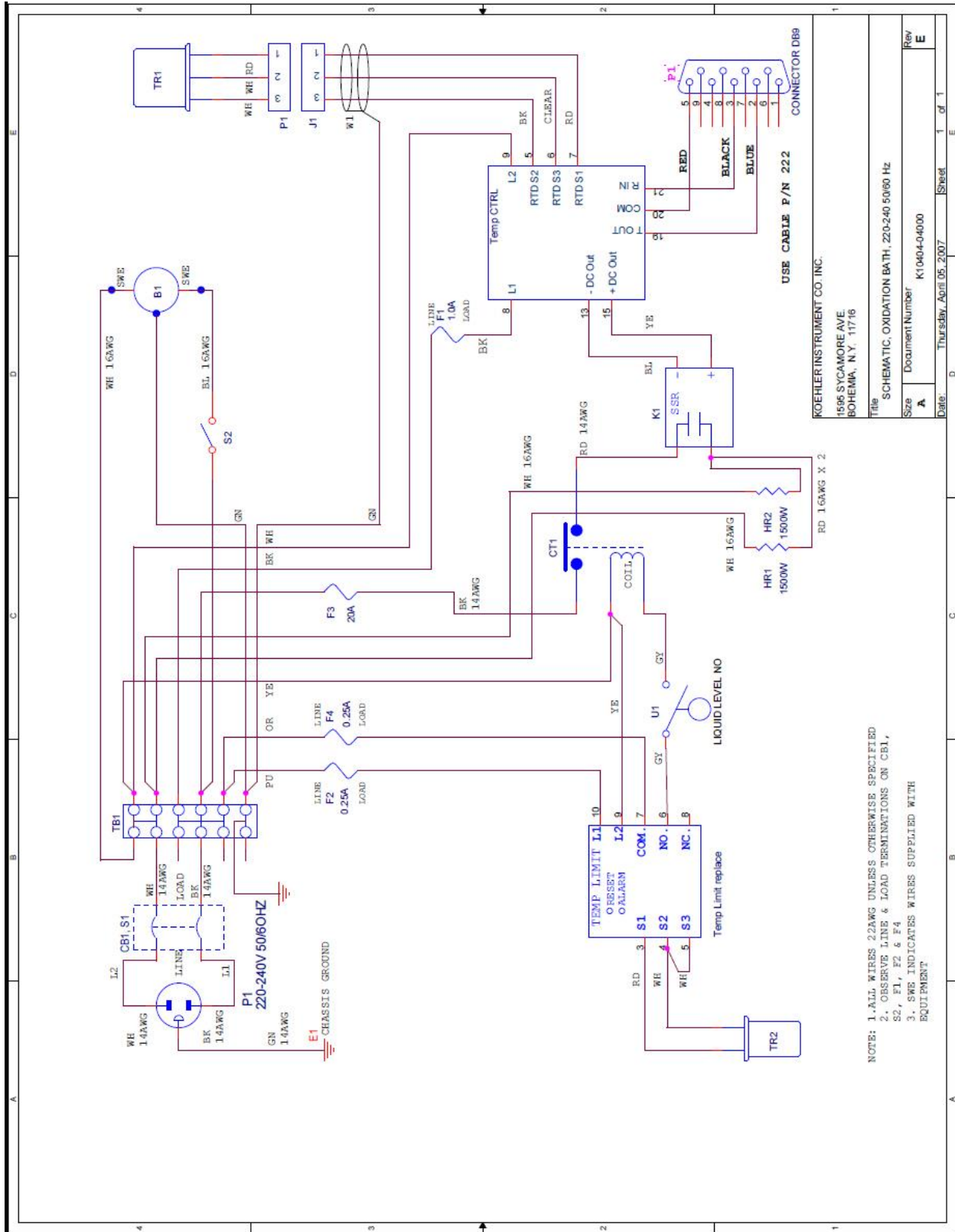
We, at Koehler, would like to thank you for your equipment purchase, which is protected by the following warranty. If within one (1) year from the date of receipt, but no longer than fifteen (15) months from the date of shipment, Koehler equipment fails to perform properly because of defects in materials or workmanship, Koehler Instrument Company, Inc. will repair or, at its sole

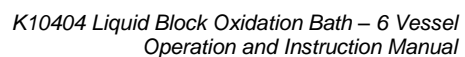
discretion, replace the equipment without charge F.O.B. its plant, provided the equipment has been properly installed, operated, and maintained. Koehler Instrument Company must be advised in writing of the malfunction and authorize the return of the product to the factory. The sole responsibility of 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.

11 Wiring Diagram



[illegible]



Notes

[illegible]