



K12200 / K12290 8-UNIT OXIDATION BATH

OPERATION AND INSTRUCTION MANUAL

REV B

Koehler Instrument Company, Inc.

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

CERTIFICATE OF CONFORMANCE


Oxidation Stability Bath K122XX

This certificate verifies that part number K122XX, Oxidation Stability Bath, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:

ASTM D943
ASTM D2274
ASTM D2893
ASTM D4310
ASTM D6158
ACOS CD12-57
DIN 51586
DIN 51587
ISO 4263
ISO 12205
NF M 07-047
NF T 60-150

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

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1 Introduction

The Koehler 8-Unit Oxidation Bath is a constant temperature oil bath with solid state temperature control, calibrate flow meters and a condenser water manifold for oxidation stability tests on fuels and lubricants. The unit is composed of an oxidation bath with an eight-unit test holder conforming to ASTM D943, D2274, D2893, D4310, D6158, AOCs CD12-57, DIN 51586, DIN 51587, ISO and DIN 51587 specifications, which evaluates the oxidation characteristics of oils in the presence of oxygen and catalysts at elevated temperatures.

This manual provides important information regarding safety, technical reference, installation requirements, operating condition specifications, user facility resource requirements, and operating instructions for the 8-Unit Oxidation Bath and Data Acquisition Software. 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 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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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 D943: Oxidation Characteristics of Inhibited Mineral Oils
- ASTM D2274: Oxidation Stability of Distillate Fuel Oil
- ASTM D2893: Oxidation Characteristics of Extreme Pressure Lubrication Oils
- ASTM D4310: Determination of Sludging and Corrosion Tendencies of Inhibited Mineral Oils
- ASTM D6158: Standard Specification for Mineral Hydraulic Oils

2. International Organization for Standardization (ISO)
1, rue de Varembé
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 4263: Petroleum and Related Products – Determination of the ageing behavior of inhibited oils and fluids – TOST test
- ISO 12205: Petroleum Products – Determination of the Oxidation Stability of Middle Distillate Fuels

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/>
4. Deutsche International Norm (DIN)
<http://www.din.de>

DIN Publication:

- DIN 51586
- DIN 51587

5. Association Française de Normalisation (AFNOR)
<http://www.afnor.fr>

AFNOR Publication:

- NF T 60-150
- NF M 07-047

6. American Oil Chemists' Society (AOCS)
<http://www.aocs.org>

AOCS Publication

- AOCS CD12-57: Fat Stability-Active Oxygen Method

1.3 Instrument Specifications

Models: K12200
K12290

Electrical Requirements: 115V 50/60Hz, 13.0A
220-240V 50/60Hz,
6.8A

Temperature Range: Ambient to 100°C
(212°F)

Temperature Control
Stability: $\pm 0.2^\circ\text{F}$ ($\pm 0.1^\circ\text{C}$)

Test Capacity: 8 Oxidation Cells

Bath Capacity: 10 gal (37.8L)

Bath Medium: White Technical Oil

1.4 Software Specifications

PC System
Requirements: Intel® Pentium II Processor or
similar (minimum)

Operating
System: Windows® 98 SE, 2000, NT,
XP, Vista

Memory
Requirements: 64Mb RAM (128Mb RAM
recommended) 30 Mb Hard
Disk Space (minimum)

Other One RS-232 communication
port
Microsoft® Excel 97
(minimum)

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

- K12200 / K12290 8-Unit Oxidation Bath
- K12200-Manual 8-Unit Oxidation Bath Operation and Instruction Manual

Accessories (purchased separately, see Section 4.2 for more information):

- K12200-SFW Oxidation Stability Software Package

3.2 Unpacking

Carefully unpack and place the instrument and accessories in a secure location. Ensure that all parts listed on the packing list are present. Inspect the unit and all accessories for damage. If any damage is found, 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

Equipment Placement. Place the instrument on a firm, level table in an area with adequate ventilation or in a hood. The unit may be leveled by making minor turning adjustments to the feet located at the base of the unit. Please note that Koehler does not supply a level with this equipment.

Ventilation. A fume hood or exhaust system is required when operating the unit. Flammable vapors and/or steam are generated during operation and must not be permitted to accumulate. A canopy-style hood may be used if the height from the top of the unit to the canopy is 5 feet or less. The exhaust blower should have a rating of 1000 C.F.M. or greater.

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.

Air Supply Requirement. This unit requires an air source capable of supplying a flow rate of 94 mL/min per test cell. The air should be free from moisture, oil, and particulate matter. A drying tower should be incorporated to remove any contaminants. Air inlet pressure should not exceed 10 psi.

NOTE: Koehler Instrument does not supply air source required for running instrumentation.

3.4 Software Installation

1. **Installation.** Insert the CD-ROM into the CD tray of the PC. The CD should automatically display the setup screen. If this does not happen within 10 seconds, browse the files on the CD-ROM and double click on the setup file (setup.exe) to start the installation. Follow the instructions on the screen to setup the software. The software is ready to run once the installation has been completed.

NOTE: When first installed, the software is in demo mode, it must be registered in order for the software to work with the unit.

2. **Registration.** Start the program and then go to >> Help >> Register. A registration screen will appear with a registration number (Refer to Figure 1, below). E-mail Koehler at software@koehlerinstrument.com or call with the registration number for the unlock code. Once the software has been registered, it must be restarted before tests are run.

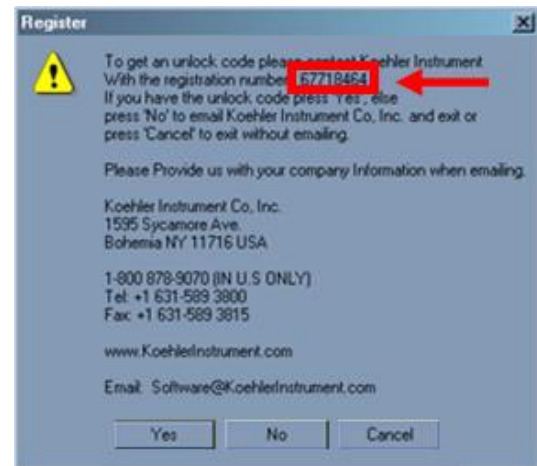


Figure 1. Registration Screen

3. **Communication Port Cables.** Using the communication port cables supplied for the Oxidation Stability Unit, connect the RS232 ports located on the unit to the communication ports on the PC.

4 Descriptions

4.1 Instrument Controls

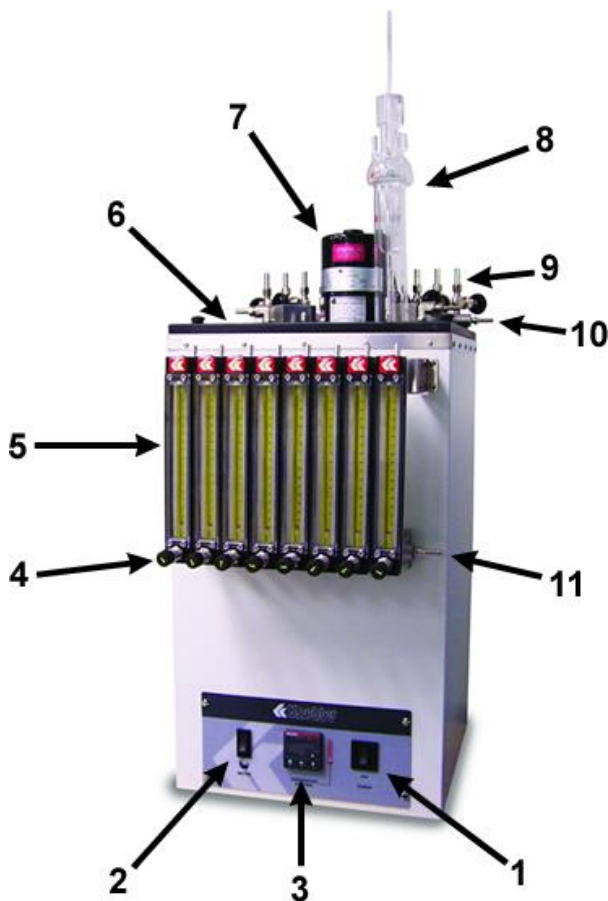


Figure 2: Instrument Descriptions

1. **Power Switch.** This switch controls the power to the entire unit. When the power switch is in the **ON** position, power is supplied to the unit, turning on the digital temperature controller.
2. **Motor Switch.** This switch controls turning **ON/OFF** the motor for stirring the bath medium.
3. **Temperature Controller.** The temperature controller regulates the bath temperature for the test procedure. Refer to Section 4.3 for full operational details.
4. **Flowmeter Adjustment Knob.** Used to adjust inlet flowrate during Flowmeter Calibration and Testing Procedure.
5. **Flowmeter.** For indicating and monitoring of the Oxygen flow rate during the test method.

6. **Oxygen Test Cell Assembly Ports.** After assembly of Oxygen Test Cell, the entire assembly is placed through the port and into the Oxygen stability bath.
7. **Motor.** Powers the stirring shaft and blade for stirring the bath medium for bath temperature uniformity.
8. **Oxidation Test Cell Assembly.** Oil Sample is placed within oxygen test tube and is contacted with oxygen in the presence of water and an iron-copper catalyst at an elevated temperature.
9. **Water Outlet.** Water exit location of internal oxygen cooling manifold system. Bath consists of eight outlet nozzles equipped with turn valves.
10. **Water Inlet.** Point of connection for Water feed for internal oxygen cooling manifold system.
11. **Air Inlet.** Point of connection for Oxygen feed to Oxidation bath. For Flowmeter Calibration, Certified Flowmeter is to be connected to this inlet. Flowmeter Calibration is discussed in detail in section 5.4 of this operation manual.

4.2 Accessories for Running Tests

The following accessories may be purchased separately for use with the K12200 / K12290 8-Unit Oxidation Bath:

For ASTM D943 and D4310:

Part Number	Description
K12281	Oxidation Cell Assembly <i>Consisting of:</i> (2) Viton O-Ring (1) Oxygen Delivery Tube (1) Oxygen Test Tube (1) Condenser (1) Thermometer Bracket (1) Oil Level Indicator Strip (1) Sampling Tube Holder (1) Sampling Tube Spacer (1) PTFE Stopper (1) Syringe Sampling Tube
	Flexible Tubing For delivery of Oxygen to the

	Oxidation Cell
250-002-001	Oxidation Cell Thermometer <i>Range: 80 to 100°C</i>
K12210	Catalyst Coil Low-metallloid steel wire and electrolytic copper wire wound in a double spiral. Packed in a sealed glass tube with a Nitrogen Atmosphere. Ready for use.
250-000-40C	ASTM 40C Thermometer <i>Range: 72 to 126°C</i>
380-100-001	Silicone Carbide Paper Used to polish steel and copper wire prior to winding into catalyst coils. 100-grit with cloth backing.
K24000	Wire Coiling Mandrel Mounts on bench for winding steel and copper wire into catalyst coils meeting ASTM specifications.
K12250	Steel Wire Low metallloid steel wire, 0.0625" (1.59mm) diameter, for catalyst coils. Supplied in 1000 ft (304.8m) lengths.
K12260	Copper Wire Electrolytic copper wire, 0.064" (1.63mm) diameter, for catalyst coils. Supplied in 1000 ft (304.8m) lengths.

For ASTM D2274:

Part Number	Description
K122-0-18	Oxygen Delivery Tube
K122-0-19	Oxidation Test Tube
K122-0-20	Condenser
250-000-40C	ASTM 40C Thermometer <i>Range: 72 to 126°C</i>

For ASTM D2893:

Part Number	Description
K122-0-18	Oxygen Delivery Tube
K122-0-19	Oxidation Test Tube
K122-0-31	Slotted Cork Stopper for Test Tube
250-000-40C	ASTM 40C Thermometer <i>Range: 72 to 126°C</i>

4.3 Temperature Controller Operation

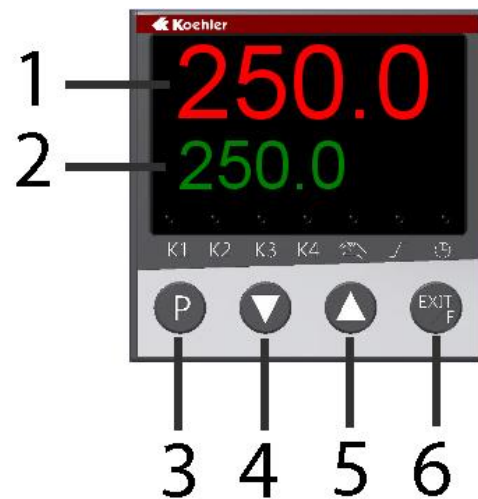


Figure 4. Temperature Controller

- 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

WARNING: Be sure to read the safety and hazard warnings, the installation procedure and any of the standard test methods mentioned in the introduction before operating this instrument.

5.1 Bath

Fill the bath with the appropriate heat transfer fluid based upon the testing temperature. Fill the bath with the medium to 2" (5 cm) from the top of the bath to allow room for fluid expansion. This will provide the proper depth for immersing the viscometers and allow for thermal expansion.

Testing Temperature	Recommended Fluid
Above 50°C	Koehler supplies highly refined white technical oil (part # 355-001-001) that contains an oxidation inhibitor to limit clouding at higher temperatures.
Above 110°C	Koehler supplies a clear silicone heat transfer fluid (part # 355-001-002) with high oxidation resistance and low volatility.

5.2 Power

Turn on the main power switch to the unit.

WARNING: 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 would be void.

5.3 Oxidation Cell Assembly

1. Fill the oxidation test tube with the test sample to the graduation mark.
2. Slide the catalyst coil over the inlet of the oxygen delivery tube.
3. Place the Oxygen delivery tube with the coil into the test tube.
4. Place the condenser over the oxygen delivery tube and test tube.
5. Place the sampling tube holder over the oxygen delivery tube.
6. Insert the syringe sampling tube through the syringe sampling tube spacer, and into the sampling tube holder.
7. Position the bottom end of the sampling tube inside the catalyst coil.
8. Insert the Teflon stopper in the Luer-Lok fitting end of the sampling tube.
9. Immerse the test cell assembly in the Oxidation Bath.
10. Connect the Oxygen delivery tube to a flowmeter with flexible tubing provided.

5.4 Flowmeter Calibration Procedure

Prior to testing, the flow meters should be set to deliver 3 L/hr of oxygen to the samples for test methods D943, D2274 and D4310. Calibrate the Flowmeters to 10 L/hr for test method D2893.

NOTE: Modified Oxidation Bath with high flowrate Flowmeters is required to run ASTM D2893.

To calibrate the Flowmeters on the instrument it is necessary to have an additional Calibrated and Certified Flowmeter capable of reading the air flow rate for your desired range.

1. Connect the air source to the Calibrated and Certified Flowmeter.
2. Connect the Certified Flowmeter to the Air Inlet Connection on the Flowmeter Rack of the Oxidation Bath.

NOTE: Each Flowmeter must be calibrated individually.

3. Turn off all flowmeters except the flowmeter you wish to calibrate by turning the adjustment knobs counterclockwise.
4. Turn on Air Source and adjust Certified Flowmeter to read desired flowrate (3 L/hr or 10 L/hr) depending on the type of flowmeter being used. The reading should be taken from the center of the ball.
5. Compare the reading on the Certified flowmeter with the flowmeter being calibrated. Adjust the flowmeter on the instrument to read the same flowrate as the Certified Flowmeter.
6. Periodically check the flowmeter settings. Once the flowmeters have been calibrated, it should be unnecessary to reset the flowmeters for as long as samples of similar viscosity are being tested. Nevertheless, it is recommended that the flowmeter settings be checked periodically.

5.5 Flowmeter Calibration Data

3 L/hr Flowmeter K122-2-29

Max. Flow	73 mL/min
Min. Flow	3 mL/min
Metered Fluid	Air
Tube Number	032-41-SA
Float Material	Sapphire
Float Density	3.98 g/mL
Standard Conditions	STP: 1 atm at 70°C
Room Temperature	65.3°F (18.5°C)
Metering Temperature	70.0°F (21.1°C)
Metering Pressure	14.70 psia
Metering Density	0.001200 g/mL
Density at STD. Cond.	0.001200 g/mL
Metering Viscosity	0.01812 cp
Accuracy	Standard
Barometric Pressure	764.0 mm of Hg

Scale Reading (mm)	Flow (mL/min)
150	73.0
140	63.7
130	56.8
120	49.2
110	42.5
100	36.4
90	31.3
80	26.3
70	21.1
60	16.8
50	12.7
40	10.0
30	6.9
20	4.6
10	3.0

10 L/hr Flowmeter K127-2-29

Max. Flow	264.0 mL/min
Min. Flow	16.0 mL/min
Metered Fluid	Air
Tube Number	062-01-ST
Float Material	316 stainless steel
Float Density	8.04 g/mL
Standard Conditions	STP: 1 atm at 70°F
Room Temperature	70.0°F
Metering Temperature	70.0°F
Metering Pressure	14.70 psia
Metering Density	0.001200 g/mL
Density at STD. Cond.	0.001200 g/mL
Metering Viscosity	0.01812 cp
Accuracy	Standard
Barometric Pressure	760.0 mm of Hg

Scale Reading (mm)	Flow (mL/min)
150	264.0
140	233.5
130	203.5
120	178.0
110	156.0
100	137.0
90	118.0
80	100.0
70	83.5
60	67.8
50	55.5
40	45.0
30	34.5
20	24.5
10	16.0

6 Safety Features

The Koehler K12200/K12290 8-Unit Oxidation Bath is equipped with several safety and protection features, which are described in the following sections.

6.1 Over-Temperature Protection

The Koehler K12200/K12290 8-Unit Oxidation Bath is equipped with Over-temperature Protection (OTP) circuitry, which prevents the unit from exceeding unsafe operating temperatures. If the unit cannot maintain the set point temperature and begins to decline, the OTP circuitry may have been activated. Please follow these steps.

1. Turn off the unit power switch and disconnect the line cord.
2. Determine the source of the problem and correct the situation.
3. Restart the unit. Monitor the operations to ensure that the unit is operating properly. If you are still experiencing trouble, please contact Koehler technical service for assistance.

6.2 Over-Power Protection

The Koehler K12200/K12290 8-Unit Oxidation Bath is equipped with Over-power Protection circuitry, which prevents the unit from unsafe electrical conditions. If power to the unit is lost,

then turn off the main power and turn it back on again. The main power switch also functions as a circuit breaker.

7 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. If you have any questions about maintaining your equipment, then please do not hesitate to contact the Koehler technical service department.

7.1 Routine Maintenance

The K12200/K12290 8-Unit Oxidation Bath 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).

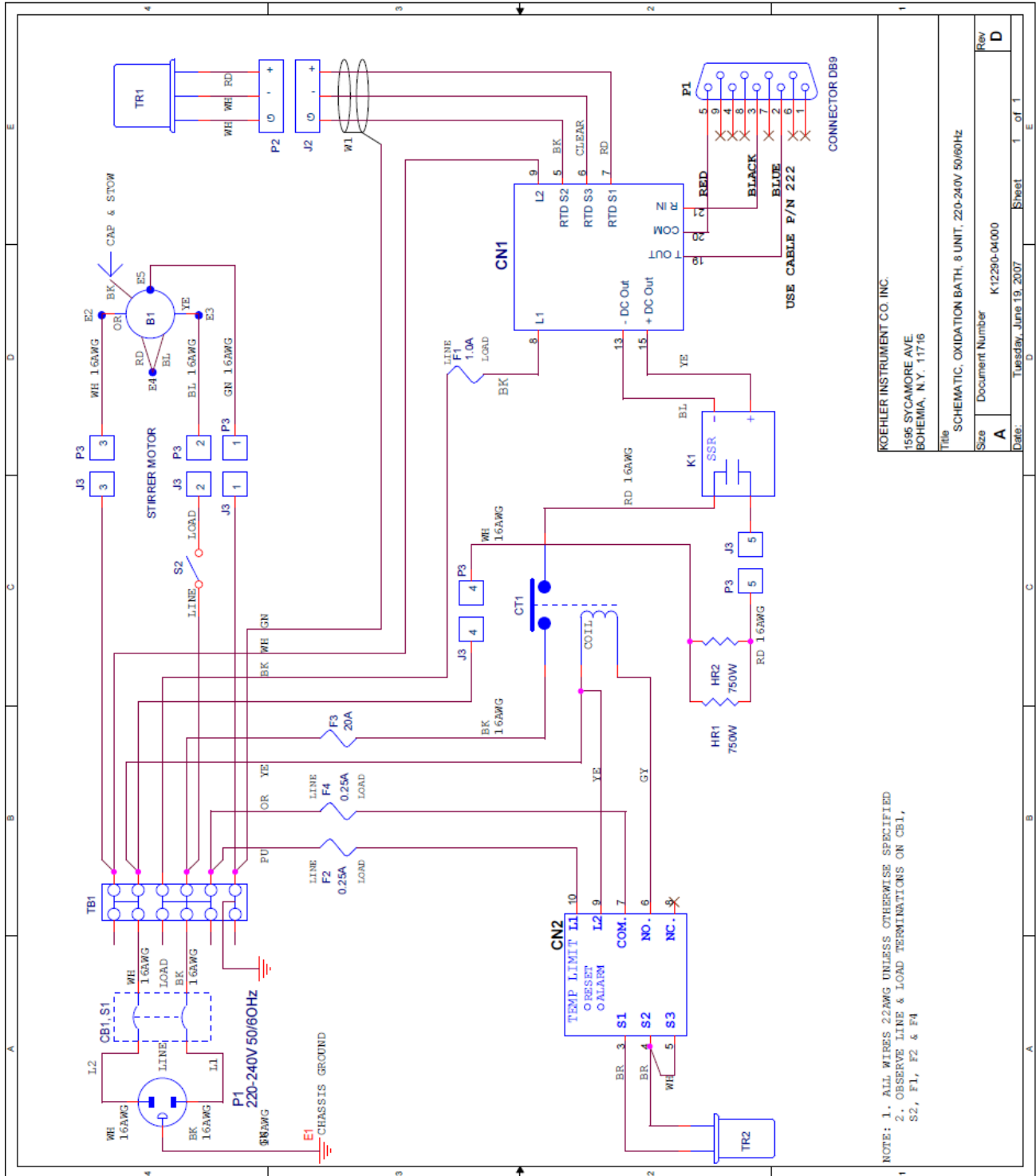
7.2 Replacement Parts

Part Number	Description
050-001-028	Single Pole Switch, 15A
091-032-001	Solid State Relay, 4-32 VDC, 20A
275-103-036	RTD Temperature Safety Limit, 120V [†]
275-103-037	RTD Temperature Safety Limit, 230V [‡]
278-001-002	Slow-Blow Fuse, 1A, 5x20 mm
278-020-004	Time Delay Fuse, 20A, 600VAC
278-104-002	Slow-Blow Fuse, .25A, 5x20mm
271-025-004	Circuit Breaker, 25 Amp, 2 Pole
265-600-001	RTD Temp Probe, .25 x 4", 600F
275-103-044	Temperature Controller 100-240V, 1 out
K122-2-15A	Cooling Coil
K122-2-6A	Stirrer Shaft and Blade Assembly
K122-2-15B	Inner Heater, 115V, 750W [†]
K122A-2-15B	Inner Heater, 230V, 750W [‡]
K122-2-15C	Outer Heater, 115V, 750W [†]
K122A-2-15C	Outer Heater, 230V, 750W [‡]
K23700-03013A	Stainless Steel Shaft Motor, 115V, 60Hz, 1/20HP [†]
K23700-03014A	Stainless Steel Shaft Motor, 230V, 50/60W, 1/15HP [‡]
K70519	RTD Assembly
K122-2-29	Flowmeter with Curve, 3 L/hr
K127-2-29	Flowmeter with Curve, 10 L/hr

[†]For 115V model ONLY (K12200)

[‡]For 220V model ONLY (K12290)

8.2 K12290 Unit Wiring



KOehler INSTRUMENT CO. INC. 1595 SYCAMORE AVE. BOHEMIA, N.Y. 11716	
Title	SCHEMATIC, OXIDATION BATH, 8 UNIT, 220-240V 50/60Hz
Size	Document Number K12290-04-000
Rev	D
Date	Tuesday, June 19, 2007
Sheet	1 of 1

8 Troubleshooting

WARNING: Troubleshooting procedures involve working with high voltages and/or temperatures which may result in personal injury or death, and should only be performed by trained personnel. Please do not hesitate to contact Koehler for assistance.

9.1 Unit does not power up

1. Establish that the socket outlet is providing proper and adequate voltage.
2. Check if Overpower Protection circuitry located directly behind the temperature controller inside the front tray has been activated.
3. Check if line switch is in the **ON** position.
4. If problem persists, please call the Koehler technical service department for assistance.

9.2 Unit is on and keeps resetting into start up routine

- For 220V units, make sure that the socket outlet is greater than 215V.
- Check if there is a steady and reliable power source.
- Make sure the connector plug on the rear panel is firmly plugged in.

9.3 Unit is on but bath does not heat up

- Make sure that the actual temperature reading is not higher than the set-point temperature.
- Determine if the temperature controller is properly calibrated by comparison to an ASTM standard thermometer.
- Determine if the Overtemperature Protection (OTP) circuitry as been activated.

9.4 Bath heats up but temperature does not stabilize

- Make sure there are no drafts from open doors, windows, or environmental control vents in the vicinity of the bath.
- If the set temperature is close to ambient, then you may need to circulate cold water through the coils in order to achieve proper temperature stability.

9 Service

Under normal operating conditions and with routine maintenance, the K12200/K12290 8-Unit 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: _____

10 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.

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.

