



K2533X COPPER STRIP TEST TUBE BATH

OPERATION AND INSTRUCTION MANUAL

REV C

Koehler Instrument Company, Inc.

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing



CERTIFICATE OF CONFORMANCE

Copper Strip Test Tube Bath K2533X

This certificate verifies that part number K2533X, Copper Strip Test Tube Bath, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:	ASTM D130
	IP 154
	FSPT DT-28-65
	ISO 2160
	DIN 51759
	FTM 791-5325
	NF M 07-015

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



EC Declaration of conformity

Koehler Instrument Company, Inc.
of 1595 Sycamore Av., Bohemia, New York USA

We declare that the product listed below meets all basic requirements in accordance with the following Directive(s) by design, type, and version placed upon the market by us.

2004/108/EC The Electromagnetic Compatibility Directive
2006/42/EC The Machinery Directive by way of the Low-Voltage directive 2006/95/EC

And hereby declare that:

Equipment: **Copper Strip Tarnish Test Apparatus**
Model Number(s): **K25339**

Qualifications:

This product may only to be used in a professional laboratory setting by authorized personnel following the instruction handbook.

and

This product declaration is valid for unmodified equipment when installed and operated by authorized personnel following the instruction handbook.

Conforms to the following standards (as applicable):

Safety	Low-Voltage directive 2006/95/EC
EN 61010-1:2010	Safety Requirements for electrical equipment for measurement, control and laboratory use; by engineering design and risk review and by meeting the requirements of Hi-Pot Test (1500 VAC, 60 sec. per table 5) as detailed in the product's technical documentation.
EMC	Meets the essential requirements of EMC Directive 2004/108/EC by engineering design review and by meeting the requirements of Conducted Emissions Test for Group 1 Class A as detailed in the product's technical documentation.
EN 55011:2007	



James R. Ball
Dir. Research & Development

1595 Sycamore Av.
Bohemia, NY 11716
United States of America
December 19, 2013

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631-589-3800

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 K2533X Copper Strip Test Tube Bath is designed for copper strip corrosion tests of products not requiring a test bomb including diesel fuel, fuel oil, automotive gasoline, stoddard solvent, kerosene and lubricating oil.

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

Read all instructions pertaining to safety, set-up and operation. Proper operation is the user's responsibility.

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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Fax: +1 631 589 3815
Email: info@koehlerinstrument.com
<http://www.koehlerinstrument.com>

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:

- D130: Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- D4048: Detection of Copper Corrosion from Lubricating Grease
- D6074: Characterizing Hydrocarbon Lubricant Base Oils
- D6158: Specification for Mineral Hydraulic Oils

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 2160: Petroleum products – Corrosiveness to Copper – Copper Strip Test

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 154: Petroleum products – Corrosiveness to Copper – Copper Strip Test

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

DIN Publication:

- DIN 51759

5. Federal Test Method (FTM)

FTM Publication:

- FTM 791-5325
- FTM 791-5309

6. Association Francaise de Normalisation (AFNOR)

AFNOR Publication:

- NF M 07-015

7. FSPT DT-28-65

1.3 Instrument Specifications

Models: K25330
K25339

Electrical Requirements: 115V 60Hz
220-240V 50/60Hz

Temperature Range: Ambient to 190°C
(374°F)

Temperature Control Stability: ± 1°C (± 2°F)

Capacity: 17 Test Tubes

Bath Medium: Water, Technical Oil

Bath Medium Capacity: 18.9 L (5 gal)

Dimensions (l x w x h): 15x12 ½ x14 in
(39x32x36 cm)

Net Weight: 27 lbs (12.2 kg)

1.4 Software Specifications

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

Processor Speed: 500 MHz or higher

Operating System: Windows ® 98 SE, 2000, NT, ME, XP, 7 (32-Bit)

Memory (RAM): 64 Mb RAM (128 Mb RAM recommended)

Disk Space: Hard 30 Mb free space (minimum)

Communication Ports: One RS232 port

Other Software: Microsoft ® Excel (97 or above)

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.

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 20 °C above the set point. The power can only then be restored by identifying and correcting the problem and allowing the unit to return cool below the alarm temperature.

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

- K2533X Copper Strip Corrosion Bath
- K2533X Copper Strip Corrosion Bath Operation and Instruction Manual

3.2 Unpacking

Carefully unpack and place the instrument and accessories in a secure location. Lift the bath from the carton and remove all packing from the top and bottom of the bath. 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.

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.

4 Descriptions

4.1 Instrument Controls



1. **Power Switch:** This switch controls the power to the entire unit. The power switch controls power to the temperature controller.
2. **Temperature Controller:** The temperature controller regulates the bath temperature. Refer to Section 4.3 for full operational details.
3. **Motor:** Constantly circulates bath medium to prevent temperature gradients and ensures temperature stability. When cleaning and/or servicing, please be sure to disconnect unit power to avoid possible injury.
4. **Temperature Probe:** Senses bath temperature within the unit and relays the information to the temperature controller.

4.2 Accessories for Running Tests

Koehler offers a full selection of accessories to run ASTM D130, D4048 and related specifications, which are ordered separately from the K2533X instrument. Koehler also offers thermometers for testing. All accessories with their part numbers are listed on the next page.

Accessories for D130

Part Number	Description
K25080	Copper Strips 12.5 x 1.5-3.0mm x 75mm to ASTM specifications
332-004-004	Test Tube 25 x 150mm
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage
K25100	ASTM Copper Strip Corrosion Standards Colored reproductions of tarnished strips encased in a plastic plaque
380-150-001	Silicone Carbide Paper, 150-grit For polishing of copper strips prior to testing. Pack of 50 sheets.
380 220-001	Silicone Carbide Paper, 220-grit, FEPA Grade. Pack of 50 sheets. For polishing of copper strips prior to testing.
380-150-003	Silicone Carbide Grain, 150-grit, FEPA Grade. 1 lb package. For final polishing of copper strips prior to testing.
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base.
K25090	Multi-Strip Polishing Vise Similar to k25000 but capable of holding four strips at a time.
250-000-12F	ASTM 12F Thermometer. Range: -5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range: -20 to +102°C
K25330-4B-8T	Optional rack to hold 4 test bombs and 8 test tubes
K25330-6B-6T	Optional rack to hold 6 test bombs and 6 test tubes

Accessories for D4048

Part Number	Description
K25308	Test Jar Rack Inserts in K2533X bath to hold sixteen Test Jars (332-004-001)
K25080	Copper Strips 12.5 x 1.5-3.0mm x 75mm to ASTM specifications
332-004-001	Test Jar
K460-0-8	Vented Cork
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage
K25100	ASTM Copper Strip Corrosion Standards Colored reproductions of tarnished strips encased in a plastic plaque
380-150-001	Silicone Carbide Paper, 150-grit For polishing of copper strips prior to testing. Pack of 50 sheets.
380 240-001	Silicone Carbide Paper, 240-grit For polishing of copper strips prior to testing. Pack of 50 sheets.
380-150-000	Silicone Carbide Grain, 150-grit For final polishing of copper strips prior to testing. 1 lb package.
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base.
K25090	Multi-Strip Polishing Vise Similar to K25000 but capable of holding four strips at a time.
250-000-130F	ASTM 130F Thermometer. Range: 20 to +220°F
250-000-130C	ASTM 130C Thermometer. Range: -7 to +105°C

4.3 Temperature Controller

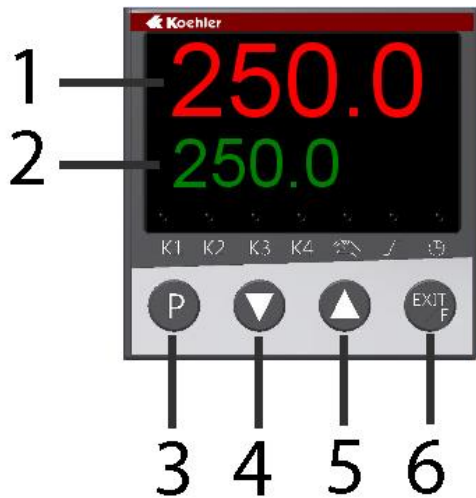


Figure 4. Temperature Controller

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

5.1 Filling the Bath



WARNING: Heater must be submerged in liquid before unit is turned on. During operation of the bath, monitor liquid level to avoid heater burnout.

Fill bath manually through tube openings with suitable bath medium to the desired level.

5.2 Running a Test

Connect the power line to a properly fused and grounded receptacle of the correct voltage, as per applicable wiring diagram.

1. After filling the bath with proper medium, turn ON the power switch.
2. Set temperature controller to the desired temperature (See Section 4.3 for operational details). Allow bath to reach set temperature.
3. Proceed to test. *Refer to Section 1.2 for ASTM Test Methods.*

6 Replacement Parts

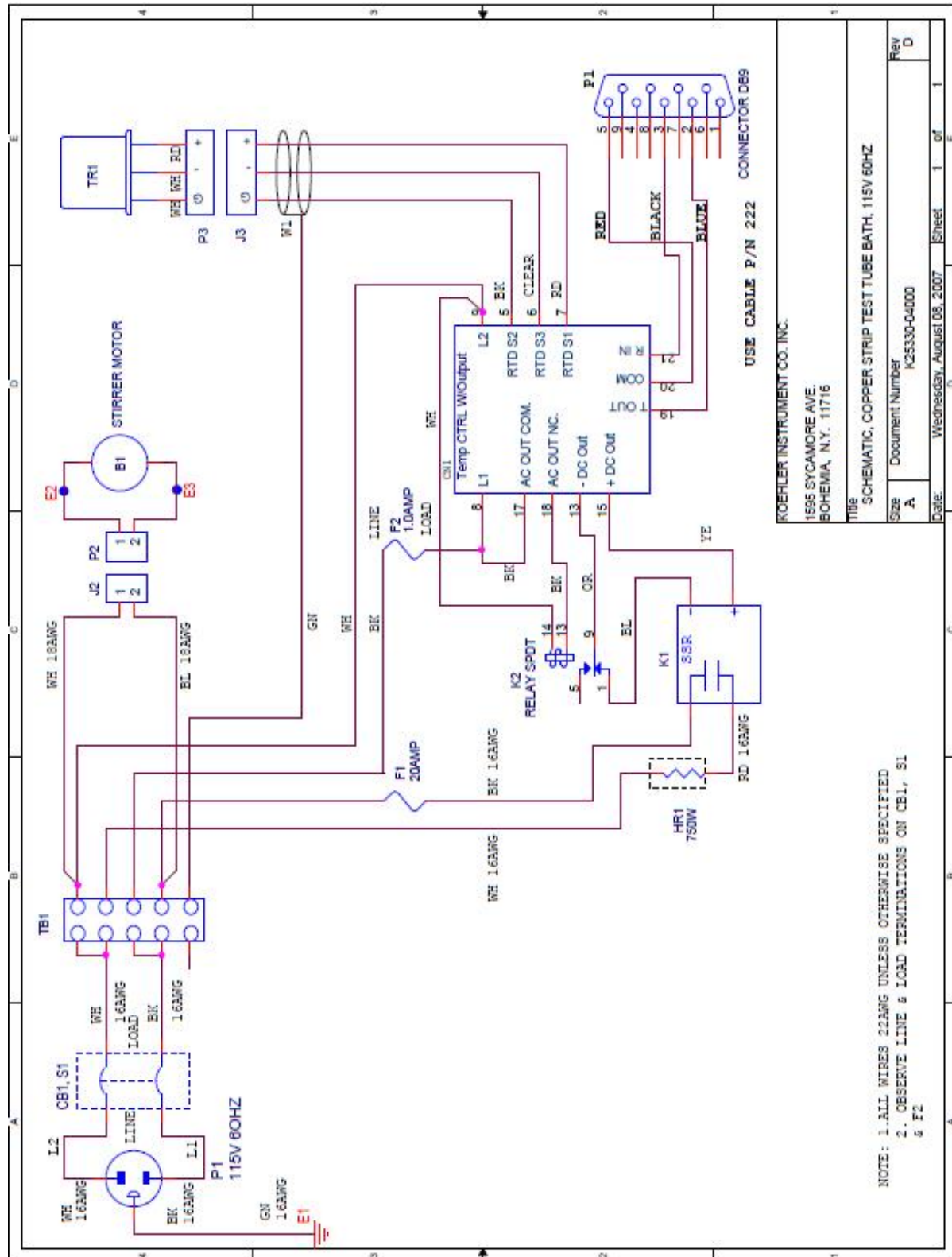
Part No	Description
271-010-014	Circuit Breaker, 10A, 2 pole
K346-0-3	Heater 115V, 750W [†]
K346A-0-3	Heater 230V, 750W [‡]
K70519	RTD Assembly
265-500-001	RTD Temperature Probe .25 X 12 in
278-020-004	Time Delay Fuse, 20A, 600VAC
278-001-002	Slo-Blo Fuse, 1A, 5 X 20 mm
091-032-001	Solid State Relay, 4-32VDC, 20A
K23700-03013A	Stainless Steel Shaft Motor 115V 60Hz 1/20 HP [†]
K23700-03014A	Stainless Steel Shaft Motor 230V, 50-60Hz, 1/15 HP [‡]
275-103-044	Temperature Controller, 100-240V, 50/60Hz 7A

[†] For 115V model ONLY (K25330)

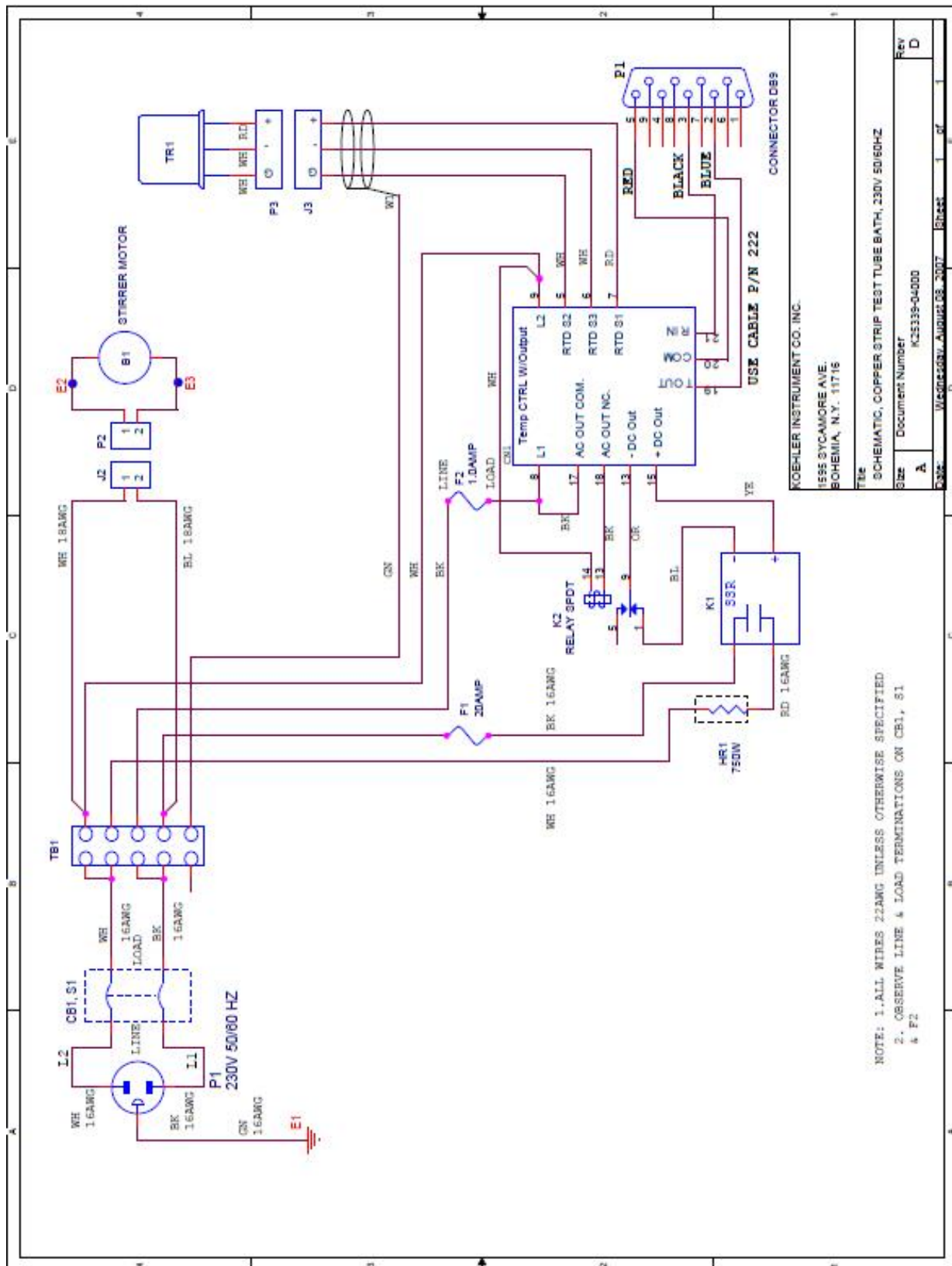
[‡] For 230V model ONLY (K25339)

7 Wiring Diagrams

7.1 K25330 (115 V Model)



7.2 K25339 (230 V Model)



8 Service

Under normal operating conditions and with routine maintenance, the K2533X Copper Strip Corrosion 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: _____

9 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.

10 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.

11 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 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.



*K2533X Copper Strip Test Tube Bath
Operation and Instruction Manual*

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