



K294XX EVAPORATION LOSS TEST BATH

OPERATION AND INSTRUCTION MANUAL

REV B

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

CERTIFICATE OF CONFORMANCE

Evaporation Loss Test Bath K294XX

This certificate verifies that part number K294XX, Evaporation Loss Test Bath, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:

ASTM D972
ASTM D2878
IP 183
FTM 791-351

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 evaporation loss test method of lubricating greases and oils determines the loss of volatile materials from a lubricant. This can affect the original performance characteristics of a lubricant for a specific use. The test involves the flow of a controlled amount of heated air over the sample for a specified period and then determining the change in the sample mass.

This manual provides important information regarding safety, technical reference, installation requirements, operating condition specifications, user facility resource requirements, and operating instructions for the K294XX Evaporation Loss Test Bath. 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.

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 D972: Standard Test Method for Evaporation Loss of Lubricating Greases and Oils

- ASTM D2878: Standard Test Method for Estimating Apparent Vapor Pressures and Molecular Weights of Lubricating Oils

2. Institute of Petroleum (IP)
61 New Cavendish Street
London, W1M 8AR, United Kingdom
Tel: 44 (0)20 7467 7100
Fax: 44 (0)20 7255 1472
<http://www.energyinstpubs.org.uk>
email: ip@petroleum.co.uk

IP Publication:

- IP 183: Determination of Evaporation Loss of Lubricating Grease

3. Federal Test Method (FTM)

FTM Publication:

- FTM 791-351

1.3 Specifications

Model: K29400
K29490

Electrical Requirements: 115V, 60Hz, 8.6 A
220-240V, 50/60Hz, 4.5 A

Testing Capacity: Two (2) Evaporation Cells

Max Bath Temp: 350°F (177°C)

Temp Uniformity: ±1°F (±0.5 °C)

Bath Medium: High Temperature Heat Transfer Fluid

Bath Capacity: 5.3 gal (20 L)

Dimensions (dia x h): 33" x 25 ½" (84 x 65cm)

Weight: 62 lbs (28 kg)

Shipping Weight: 90 lbs (41 kg)

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. Please refer to section 7.2.

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: The use of chemicals and reagents with this equipment may exhibit potential hazards. Any use must be familiarized with the possible dangers before use. We recommend consulting the Material Data and Safety Sheet (MSDS) on each chemical reagent for safety information. MSDS information can be easily located on the Internet at <http://siri.uvm.edu> or <http://www.sigma-aldrich.com>.

3 Getting Started

3.1 Packing List

- K29400/K29490 Evaporation Loss Test Bath 115V/230V
- Support Clamps (2)
- Thermometer Holder

Accessories (purchased separately):

- K29500 Grease Sample Cup
- K29540 Grease Sample Cup with Hood
- K29550 Oil Sample Cup
- K29530 Oil Sample Cup with Hood
- 250-000-22F ASTM 22F Thermometer
Range: 204 to 218 °F
- 250-000-22C ASTM 22C Thermometer
Range: 95 to 103 °C

- 250-000-67F ASTM 67F Thermometer
Range: 203 to 311 °F
- 250-000-67C ASTM 67C Thermometer
Range: 95 to 155 °C

3.2 Unpacking

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

3.3 Setup

Unit Placement: Place the bath on a firm, level table in an area with adequate ventilation and environmental control. Please allow at least 12" (30 cm) of open space around each side of the unit for proper ventilation.

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. Exhaust from Vacuum Pump Filter Outlet must be controlled by aforementioned means.

Leveling: For proper operation, the unit should be leveled. The use of a spirit level will ensure proper adjustment.

Filling the Bath: The bath should be filled 2" (5 cm) below the top of the overflow pipe with high temperature heat transfer fluid. Heat transfer fluid is available from Koehler Instrument Company. Please contact our Technical Service department for any questions or assistance.

Power: Connect the line cord for the High Temperature Evaporation Loss Test Bath to a properly fused and grounded receptacle with the correct voltage as indicated in section 1.4 or on the information plate at the back of the unit.

NOTE: It is important that the electrical power supply not vary more than 10% of the apparatus

specified voltage. The unit will not function properly and/or may be damaged.

WARNING: For user safety, please disconnect the line cords whenever performing any maintenance operations and/or cleaning of the unit.

WARNING: Do NOT turn the power on unless the bath is filled with the proper medium. Low liquid level exposes the heater, which may ignite the vapors above the fluid of the test bath. Damage may occur to the unit and the warranty would be void.

4 Descriptions

4.1 Definitions of Controls

1. **Line/Motor Switch:** This switch controls the power to the entire unit and to the motor. When the **Line Switch** is in the **ON** position, the digital temperature display and the motor are **ON**.
2. **Digital Temperature Controller:** The temperature controller regulates the bath temperature for the test procedure. Refer to Section 4.2 for full operational details.

4.2 Temperature Controller Operation

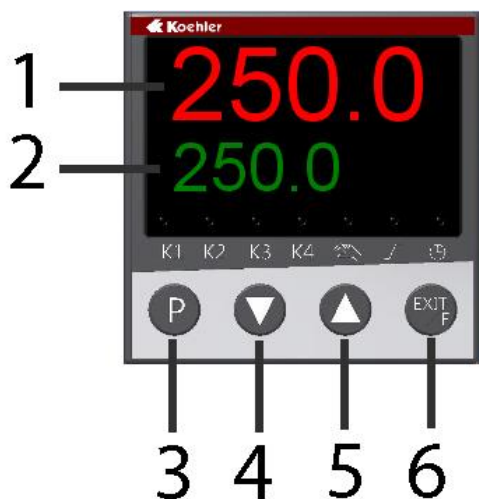


Figure 4. Temperature Controller

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.
- c.

5 Operation

This unit is designed for performing evaporation loss tests of lubricating greases and oils. Please be sure to read the safety and hazard warnings, the installation procedure, and any of the standard test methods before operating this instrument.

Proceed with performing the desired evaporation loss tests according to the following standard test methods:

ASTM D972, D2878, IP183, FTM791-351

6 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, please do not hesitate to contact the Koehler Technical Service department.

6.1 Routine Maintenance

The K294XX Evaporation Loss Test Bath requires little routine maintenance to provide many years of continuous service. The bath medium should be replaced if it becomes dirty. If any other service problems arise, please contact Koehler's Technical Service department. 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).

6.2 Replacement Parts

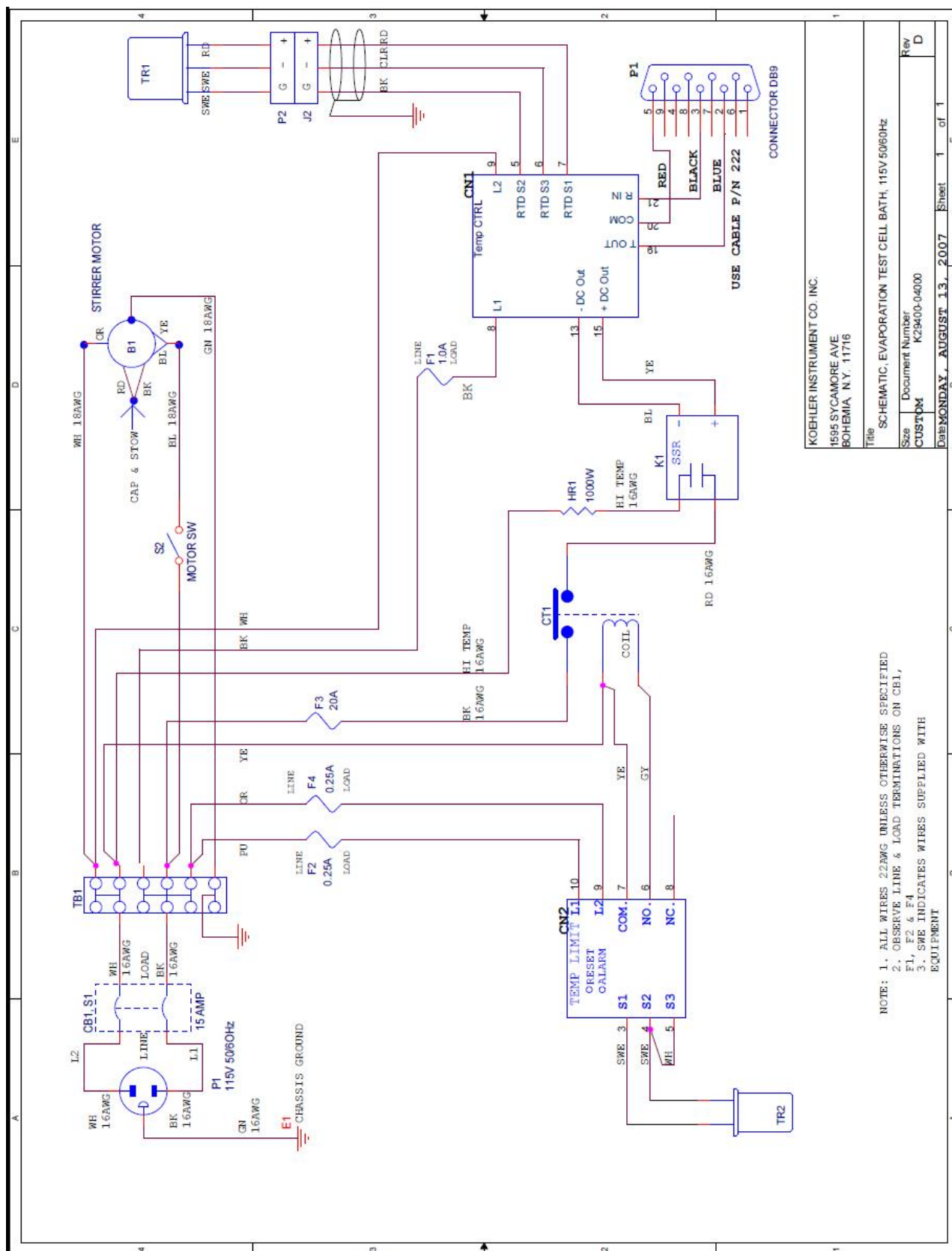
Part Number	Description
K23700-03013A	Motor, 115V, 60Hz, 1/15HP [†]
K23700-03014A	Motor, 230V, 50/60Hz, 1/15HP [‡]
050-001-028	Switch
K294-0-1	Heater, 1000W, 115V [†]
K294A-0-1	Heater, 1000W, 230V [‡]
K70519	Pt-100 RTD Probe Assembly
275-103-044	Temperature Controller, 100-240V

[†]For 115V model ONLY (K29400)

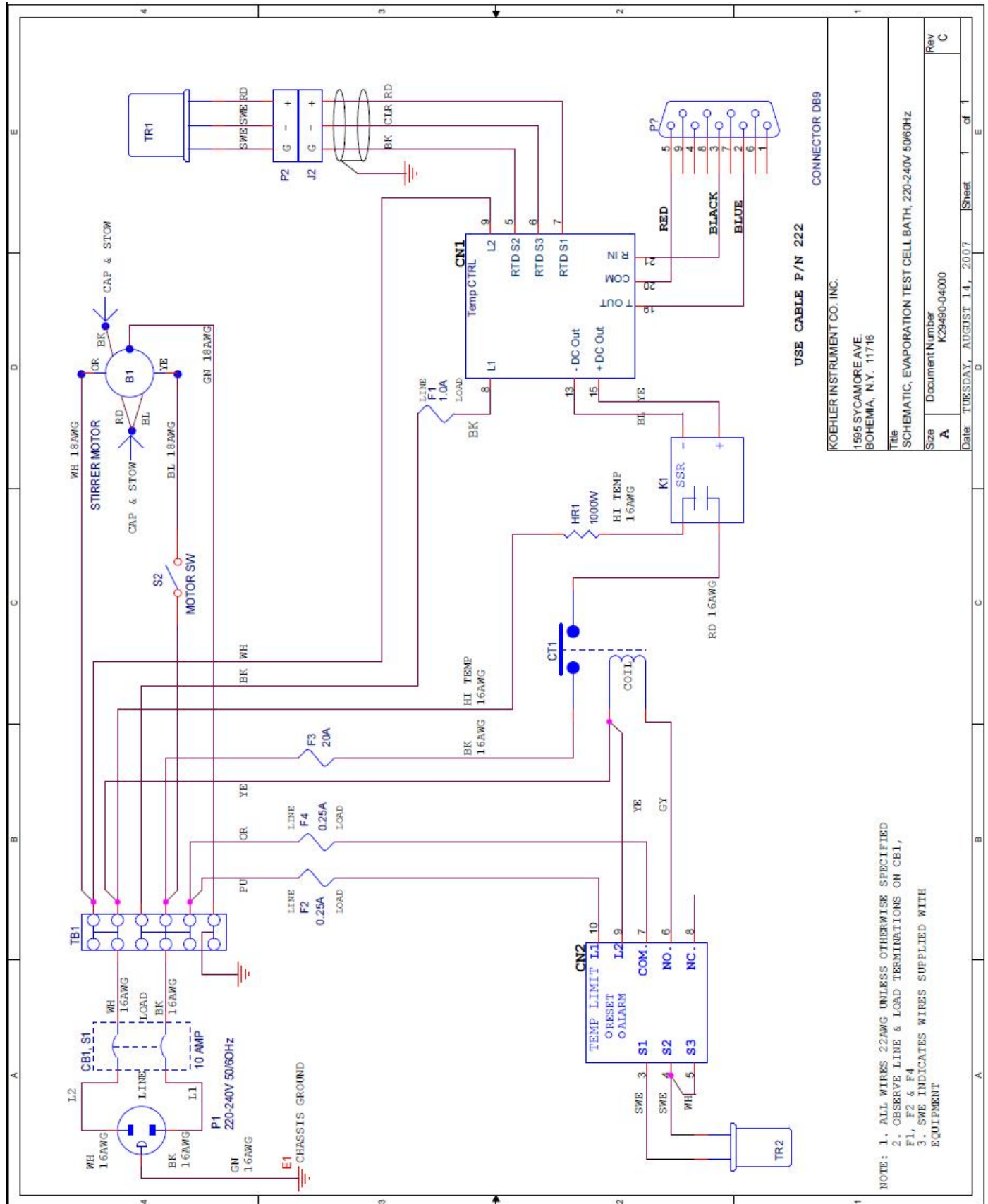
[‡]For 220V model ONLY (K29490)

7 Wiring Diagrams

7.1 K29400 115V



7.2 K29490 230V



8 Service

Under normal operating conditions and with routine maintenance, the K294XX Loss Test 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.

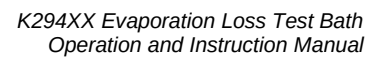
10 Warranty

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.



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Notes

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