



K264XX CONSTANT TEMPERATURE HYDROMETER BATH FOR SPECIFIC GRAVITY & REID

OPERATION AND INSTRUCTION MANUAL

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

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1 Introduction

The Koehler K264XX Constant Temperature Hydrometer Bath is the latest design for performing density/gravity determinations of petroleum products according to ASTM D323, D1298, D6074, D6158 and related test specifications.

This manual provides important information regarding safety, technical reference, installation requirements, operating condition specifications, user facility resource requirements, and operating instructions for the Constant Temperature Hydrometer 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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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:

- D323: Vapor Pressure of Petroleum Products (Reid Method)
- D1298: Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
- D6074: Characterizing Hydrocarbon Lubricant Base Oils
- D6158: Specification for Mineral Hydraulic Oils

1.3 Instrument Specifications

<i>Models:</i>	K26400, K26490
<i>Electrical Requirements:</i>	115V 50/60Hz 220-240V 50/60Hz
<i>Temperature Range:</i>	Ambient to 90°C (195°F)
<i>Temperature Control Stability:</i>	Exceeds ASTM Requirements
<i>Capacity:</i>	Twelve (12) hydrometer cylinders
<i>Bath Medium:</i>	Water, Technical Oil
<i>Bath Medium Capacity:</i>	71.9 L (19 gal)
<i>Dimensions (l x w x h):</i>	30x14x28 in (76x36x71 cm)
<i>Net Weight:</i>	64 lbs (29.0 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.

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 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.

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

- K264XX Instrument
- K26400-0-10 12-Cylinder Rack
- K264XX Operation and Technical 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.

NOTE: To flush mount, remove overflow outlet nipple and drain the valve and heater (all components have threaded connections). Place bath in previously prepared table opening and reinstall above components.

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.

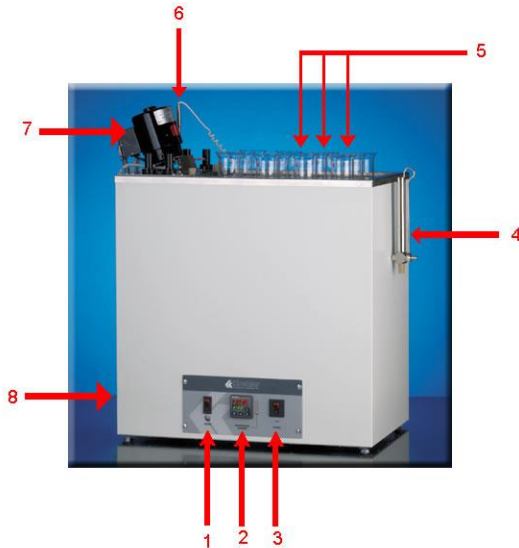
Power. Connect the line cords to properly fused and grounded receptacles with the correct voltage as indicated in section 1.3 or on the back of the unit.

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. **Motor Switch:** This switch controls power to the motor.
2. **Temperature Controller:** The temperature controller regulates the bath temperature. Refer to Section 4.3 for full operational details.
3. **Power Switch:** This switch controls the power to the entire unit. The power switch controls power to the temperature controller.
4. **Constant Water Level Device:** Maintains water level in the bath.
5. **Hydrometer Cylinders:** (Not included, See Section 4.2) Holds sample for testing.
6. **Temperature Probe:** Senses bath temperature within the unit and relays the information to the temperature controller.
7. **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.
8. **Overflow Outlet/Drainage Valves:** To avoid overflow and damage to the unit, the

valve on the left ensures outlet for bath medium should it be filled above capacity due to overfill or oil expansion. The valve on the right is a drainage valve connected to the bottom of the bath.

4.2 Accessories for Running Tests

Koehler offers a full selection of glass hydrometer cylinders and Reid Vapor Pressure Cylinders, which are ordered separately from the K264XX instrument. All types of cylinders conform to ASTM test methods. Koehler also offers Thermometers for testing. All accessories with part numbers are listed below.

Part Number	Description
K26410	Hydrometer Cylinders. Borosilicate glass cylinders. 15 ½ in. long with 2 ½ in. lip
K11500	Reid Vapor Pressure Cylinder. One-Opening Type
250-000-61F	ASTM 61F Thermometer, Range: 90 to 260°F
250-000-61C	ASTM 61C Thermometer, Range 32 to 127°C

4.3 Temperature Controller

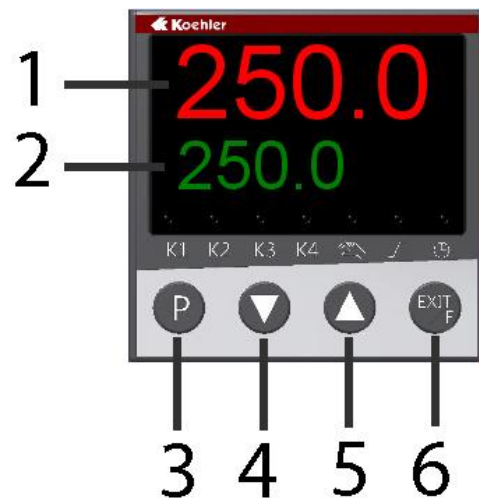


Figure 4. Temperature Controller

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.

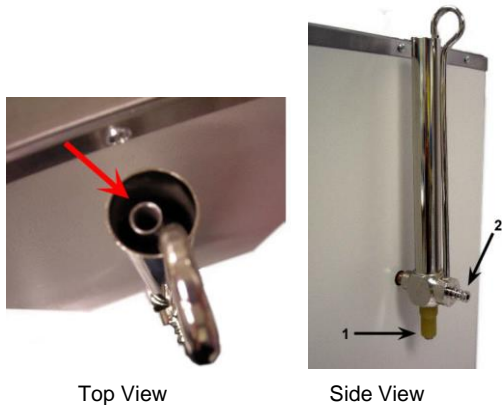
5 Operation

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.

Connect the overflow outlet to a draining receptacle.

Constant Water Level Device: The water level is controlled by adjusting the level on the inner tube of the device, indicated by the white arrow below. Push down on the inner tube to lower the water level or up from the bottom to raise the water level. Connect the outlet drain (1) to a draining receptacle in the case of overflow. Connect the inlet drain (2) to a gravity filled tank to fill the bath if the water level decreases.



Bath may be filled and level maintained in 2 ways:

1. Connect supply valve to a water supply and overflow pipe to suitable drain. Regulate supply valve to make up any small water loss during test. Excess water will drain off through the overflow.

CAUTION: DO NOT OVER SUPPLY

A glycol/water mix is recommended to avoid excess steaming.

2. Fill bath manually through bomb openings and use drain water from condenser to maintain water level from steam loss by feeding condenser drain water into water supply valve. Any excess water will drain off thru overflow. When terminating test be sure to shut off water supply valve in addition to condenser water supply.

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. Turn ON the motor switch to begin circulating the bath medium to ensure temperature stability while testing.
3. Set temperature controller to the desired temperature (See Section 4.3 for operational details). Allow bath to reach set temperature.
4. Proceed to test. Refer to Section 1.2 for ASTM Test Methods.

6 Replacement Parts

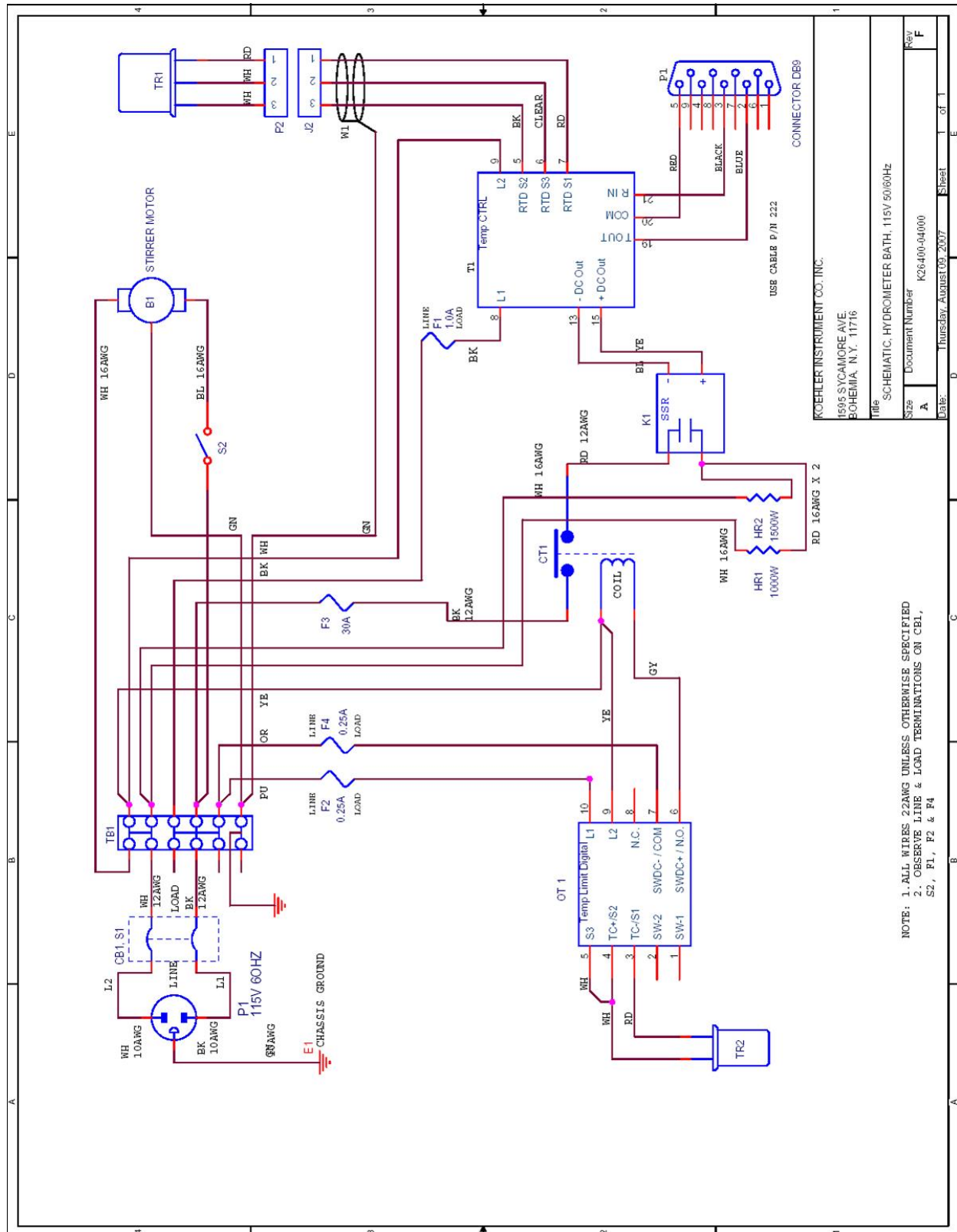
Part No	Description
271-025-004	Circuit Breaker, 25A, 2 pole
K26400-1-5A	Heater 115V, 1000W [†]
K26400-1-5	Heater 115V, 1500W [†]
K26490-1-5A	Heater 230V, 1000W [‡]
K26490-1-5	Heater 230V, 1500W [‡]
K70519	RTD Assembly
265-500-001	RTD Temperature Probe .25 X 12
265-600-001	RTD Temperature Probe .25 X 4 in (Over temp)
278-104-002	Slo-Blo Fuse, .25A 5 X 20 mm
278-001-002	Slo-Blo Fuse, 1A, 5 X 20 mm
091-032-002	Solid State Relay, 4-32VDC, 30A
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
275-103-036	Temperature Safety Limit, 120V [†]
275-103-037	Temperature Safety Limit, 230V [‡]
278-030-002	Time Delay Fuse, 30A, 600VAC

[†] For 115V model ONLY (K26400)

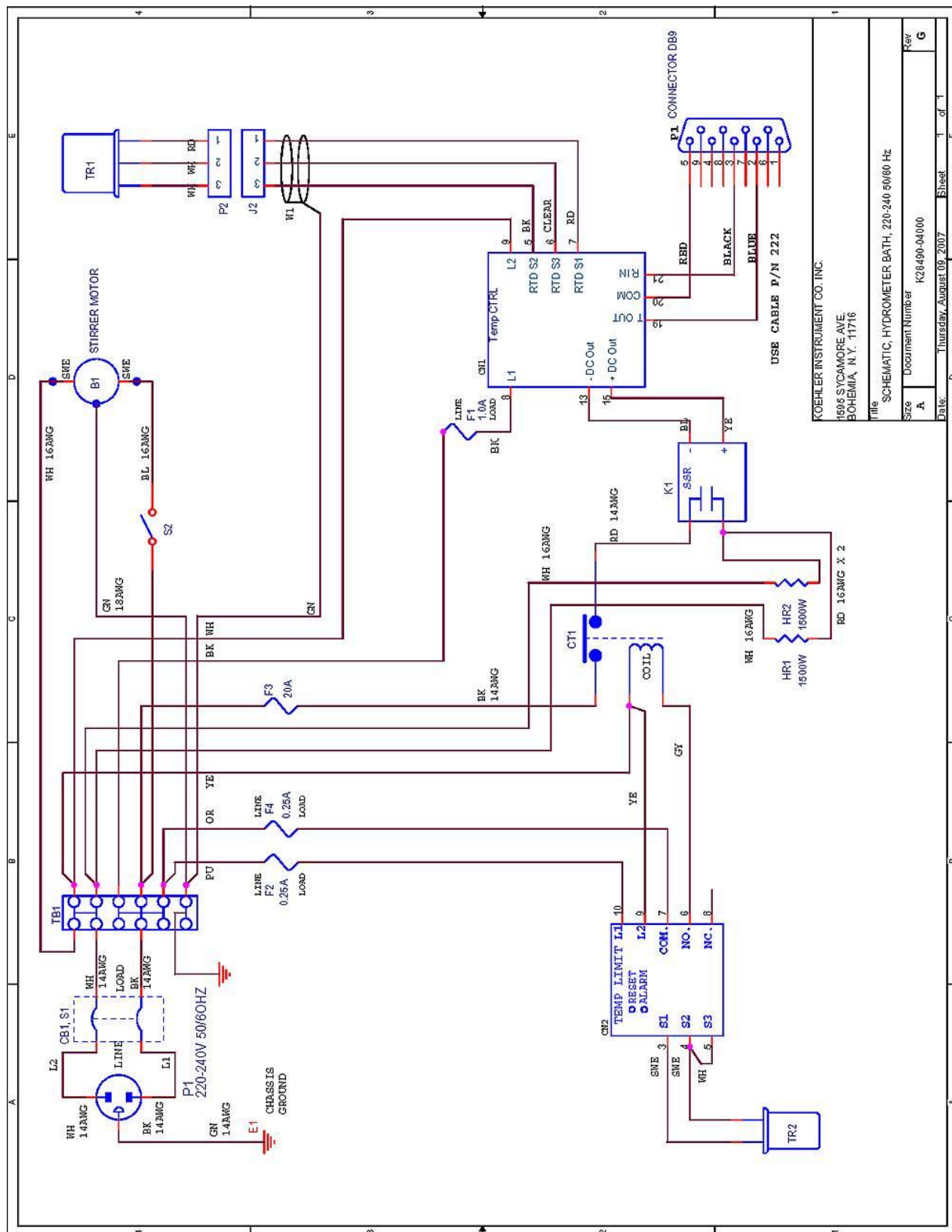
[‡] For 230V model ONLY (K26490)

7 Wiring Diagrams

7.1 K26400 (115 V Model)



7.2 K26490 (230 V Model)



8 Service

Under normal operating conditions and with routine maintenance, the K264XX Hydrometer 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.

Notes

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