



KV3000 KINEMATIC VISCOSITY INSTRUMENT

OPERATION AND INSTRUCTION MANUAL

REV A

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

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1 Introduction

The Koehler KV3000 Kinematic Viscosity System is for performing kinematic viscosity tests with glass capillary viscometers according to the ASTM D445 test method 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 Kinematic Viscosity Instrument 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 D445: Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
- ASTM D2170: Kinematic Viscosity of Asphalts (Bitumens)
- ASTM D6074: Standard Guide for Characterizing Hydrocarbon Lubricant Base Oils
- ASTM D6158: Standard 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 3104: Petroleum products – Transparent and opaque liquids – Determination of kinematic viscosity and calculation of dynamic viscosity

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 71: Kinematic viscosity and calculation of dynamic viscosity
- IP 319: Kinematic viscosity of bitumens

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

DIN Publication:

- DIN 51550: Determination of Kinematic Viscosity and Dynamic Viscosity

5. Federal Test Method (FTM)

FTM Publication:

- FTM 791-305: Kinematic Viscosity of Petroleum Products

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

AFNOR Publication:

- NF T 60-100: Kinematic Viscosity of Petroleum Products

1.3 Instrument Specifications

Models:	K23700, K23790, K23706, K23796
Electrical Requirements:	115V 50/60 Hz 220-240V 50/60 Hz
Temperature Range:	15 -150°C (302°F)
Temperature Control Stability:	Exceeds ASTM Standards
Viscometer Ports:	Seven (7) Round 2" (51mm) ports
Capacity:	Seven (7) Glass Capillary Viscometers
Bath Medium:	Water or suitable head transfer fluid
Bath Medium Capacity:	22L (5.8 gal) or 34 L (8.9 gal)

2 Safety Information and Warnings

Safety Considerations. The use of this equipment may involve *hazardous* materials and operations. This manual does not purport to address all of the safety problems associated with the use of this equipment. It is the responsibility of any user of this equipment to investigate, research, and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Equipment Modifications and Replacement Parts. Any modification or alteration of this equipment from that of factory specifications is **NOT** recommended and will void 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

- KV3000 Digital Constant-Temperature Kinematic Viscosity Bath
- Seven (7) Round Viscometer Port Covers
- Pt-100 RTD probes (2) - (RTD probes are pre-installed at the factory)

3.2 Unpacking

Carefully unpack and place the instrument and accessories in a secure location. Use extra care while unpacking the Pyrex[®] glass jar. 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.

is 5 feet or less. The exhaust blower should have a rating of 1000 C.F.M. or greater.

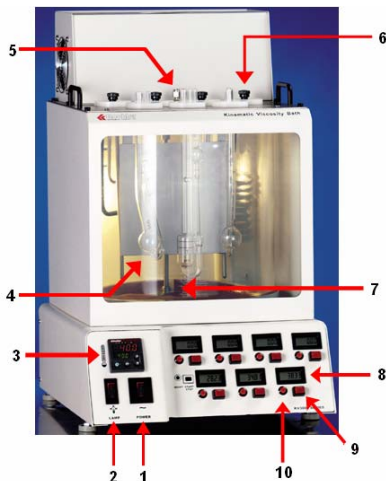
Power: Connect the line cords to properly fused and grounded receptacles with the correct voltage as indicated in section 1.3 or on the back of the unit.

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.

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

4 Descriptions

4.1 Instrument Controls



1. **Power Switch.** This switch controls the power to the entire unit. When the power switch is in the **ON** position, the digital temperature controller, and the stirrer are powered on.

2. **Lamp Switch.** This switch controls turning **ON/OFF** the lamp for illuminating the test samples.

3. **Temperature Controller.** The temperature controller regulates the bath temperature for the test procedure. Refer to Section 4.3 for full operational details.

4. **Temperature Regulation:** The heater coils stabilize the bath temperature to desired setting within $\pm 0.02^{\circ}\text{C}$. Running coolant through the cooling coils allows bath to maintain temperatures near or below ambient.

5. **Thermometer/Thermocouple Port:** This port allows for independent temperature measurement of the bath temperature with a thermometer or a Pt-100 RTD probe for precise temperature measurements and digital temperature controller calibration. If the controller needs to be calibrated, then please contact the Koehler technical service department.

6. **Viscometer Ports:** The viscometer, once engaged into the assembly, is placed into the bath through the viscometer ports on top of the instrument.

7. **Bath/ Bath Stirrer:** The stirrer 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. **LCD Timer Display:** Displays time of fluid flow through viscometers and is manually controlled by the operator. Time is recorded in seconds to one decimal place.

9. **Timer Start/Stop:** Depressing this button starts or stops the manual timer operation.

10. **Timer Reset:** Depressing this button resets timer to zero (0.0) whether the timer is in operation or stopped.

4.2 Accessories for Running Tests

Glass Capillary Viscometer Tubes for KV3000

Koehler offers a full selection of glass capillary kinematic viscometers, which are ordered separately from the KV3000 instrument, for measuring kinematic viscosity of liquid products as per ASTM D445 and related standard test methods. All types of viscometers conform to ASTM D445 and related methods for glass capillary kinematic viscometers. All viscometers with part numbers for the automatic test are listed below. The constant for each individual viscometer is written on the Certificate of Calibration, included in the packaging.

IMPORTANT: It is recommended when using a new viscometer for the first time to run a test with suitable standard. Different locations may result in a slightly different constant.

Cannon®-Fenske Routine Viscometers

The Cannon®-Fenske Routine viscometer is a rugged and inexpensive viscometer that works well if the sample is transparent or translucent.

- For kinematic viscosity of transparent liquids up to 20,000cSt.
- Requires a sample of approximately 7mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C01	25	0.002	0.5 to 2
378-050-C01	50	0.004	0.8 to 4
378-075-C01	75	0.008	1.6 to 8
378-100-C01	100	0.015	3 to 15
378-150-C01	150	0.035	7 to 35
378-200-C01	200	0.1	20 to 100
378-300-C01	300	0.25	50 to 250
378-350-C01	350	0.5	100 to 500
378-400-C01	400	1.2	240 to 1,200
378-450-C01	450	2.5	500 to 2,500
378-500-C01	500	8	1,600 to 8,000
378-600-C01	600	20	4,000 to 20,000
378-650-C01	650	45	9,000 to 45,000
378-700-C01	700	100	20,000 to 100,000

Cannon®-Fenske Opaque Reverse Flow Viscometers

The reverse flow viscometers are designed for testing opaque liquids. These viscometers wet the timing section of the viscometer capillary only during the actual measurement and must

be cleaned, dried and refilled before a repeat measurement can be made. By contrast, other viscometer types commonly used to measure transparent liquids allow the sample to be repeatedly drawn up into the capillary, permitting duplicate measurements.

- For measurement of transparent and dark liquids having kinematic viscosities of up to 20,000cSt
- Requires a sample of approx 12mL.
- Can be used for viscosities of asphalts by ASTM D2170 method.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C02	25	0.002	0.4 to 2
378-050-C02	50	0.004	0.8 to 4
378-075-C02	75	0.008	1.6 to 8
378-100-C02	100	0.015	3 to 15
378-150-C02	150	0.035	7 to 35
378-200-C02	200	0.1	20 to 100
378-300-C02	300	0.25	50 to 250
378-350-C02	350	0.5	100 to 500
378-400-C02	400	1.2	240 to 1,200
378-450-C02	450	2.5	500 to 2,500
378-500-C02	500	8	1,600 to 8,000
378-600-C02	600	20	4,000 to 20,000
378-650-C02	650	45	9,000 to 45,000
378-700-C02	700	100	20,000 to 100,000

Ubbelohde

Ubbelohde viscometers measure transparent liquids, and unlike the Cannon®-Fenske Routine viscometers, they maintain the same viscometer constant at all temperatures. This is advantageous when samples are to be measured at different temperatures.

- Suspended-level type viscometers are for transparent liquids of up to 100,000cSt
- Requires a sample volume of approx 11mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-000-C03	0	0.001	0.3 to 1
378-00C-C03	0C	0.003	0.6 to 3
378-00B-C03	0B	0.005	1 to 5
378-001-C03	1	0.01	2 to 10
378-01C-C03	1C	0.03	6 to 30
378-01B-C03	1B	0.05	10 to 50
378-002-C03	2	0.1	20 to 100
378-02C-C03	2C	0.3	60 to 300
378-02B-C03	2B	0.5	100 to 500

378-003-C03	3	1	200 to 1,000
378-03C-C03	3C	3	600 to 3,000
378-03B-C03	3B	5	1,000 to 5,000
378-004-C03	4	10	2,000 to 10,000
378-04C-C03	4C	30	6,000 to 30,000
378-04B-C03	4B	50	10,000 to 50,000
378-005-C03	5	100	20,000 to 100,000

Viscometer Holders

Koehler offers viscometer holders for use with the KV3000. The correct holder must be used with the corresponding viscometer tube for proper operation:

Viscometer Tube Type	Corresponding Holder
Cannon®-Fenske Routine	K23381
Reverse Flow	K23383
Ubbelohde	K23382

4.3 Temperature Controller Operation

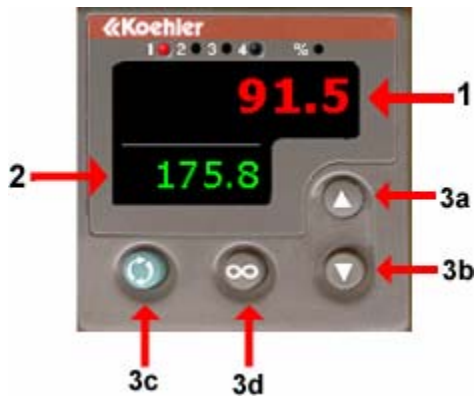


Figure 2. Temperature Controller

- Actual Temperature Display.** The upper red LED display shows the actual temperature as read from the RTD probe.
- Set Point Temperature Display.** The lower green LED display shows the set point temperature of the controller.
- Control Buttons.**
 - Up Key.** Used to increase the set point temperature and to increase or change parameters when programming temperature controller.
 - Down Key.** Used to decrease the set point temperature and to decrease or

change parameters when programming temperature controller.

- Advance Key.** Permits scrolling through controller menu parameters.
 - Infinity (Home) Key.** This key is used to return the temperature controller to the home page when scrolling through menu parameters. **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 LED display and the actual temperature will be displayed in the upper red LED display. Please allow the unit to fully equilibrate before proceeding with the test.
 - Temperature Calibration.** This routine allows the digital temperature controller to be calibrated to a certified thermometer. In calibration mode, the display will automatically show two decimal places.
 - Use a certified calibrated thermometer or thermocouple to acquire the true temperature. Determine the difference between the thermometer or thermocouple and the value displayed on the controller for the actual temperature.
 - Press the advance key four times until **CAL1** is displayed in the lower green LED 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.
 - Use the up or down keys to adjust to the new calibration offset value calculated in the previous step. Resume regular operations by pressing the infinity key and verify if the new calibration is correct.

6. **Toggle Between °C and °F.** This routine allows the digital temperature controller to be toggled between showing temperature readings in Celsius or Fahrenheit.
 - a. Press and hold the up and down keys simultaneously for 8 seconds until **INP1** is displayed in the upper red LED display and **SET** is displayed in the lower green LED display.
 - b. Press the up key until the global menu appears which is displayed as **GLBL** in the upper red LED display.
 - c. Press the advance key twice until **C-F** appears in the lower green LED display. The upper red LED display will show the current setting of either °C or °F. Press the up key to toggle setting. Resume regular operations by pressing the infinity key.

7. **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 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 advance key until lower green LED display shows **AUT**. The upper red LED display will read **OFF**. Use the up key to toggle **ON/OFF** the auto tune feature. When Auto Tune is active, the upper red LED display will blink **TUNE**. Auto Tune will automatically toggle off when the set point temperature is reached.
 - c. Resume regular operations by pressing the infinity key.

- **Operation near or below ambient temperatures.** A water supply or external chiller may be used to maintain the temperature of the bath for cooler temperature. Hose-barb connections for water or refrigerated coolant are located at the top of the bath. There are two connections: inlet and outlet. The hose connections can be secured with copper wire to prevent the tubing from disengaging from the connection.

5 Operation

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
15 - 50°C*	Distilled water will be suitable.
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.

4.4 Recommended Accessories

- **Withdrawal Bulb.** Use to pull sample into viscometer tube.
Part number: K22090

- **Stopping Cork.** Use to hold sample in viscometer tube.
Part number: 334-102-001

5.2 Power

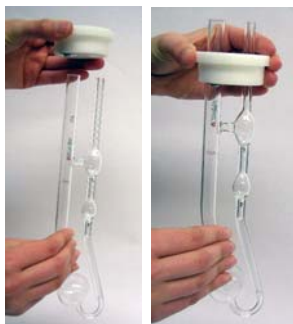
Turn on the main power switch to the unit.

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 Starting a Test

Before running a test, make sure the unit is level. Otherwise, the results will be affected.

1. Insert the Pt-100 RTD probe into the holder provided at the top of the bath. Insert the RTD connector into the receptacle located on the rear panel
2. Install the appropriate ASTM thermometer in the cover plate of the bath using the holder provided.
3. Set the desired operation temperature using the temperature control (See Section 4.3).
4. Install viscometer into its viscometer holder. Carefully slide the holder onto the top of the tube:



Charge the viscometer with sample and carefully lower into the bath through the viscometer ports.

IMPORTANT: Allow the bath *AND* the sample enough time to reach the temperature before starting measurements. Allow 10-15 minutes for the bath to equilibrate.

6 Safety Features

The Koehler KV3000 Kinematic Viscosity System is equipped with several safety and protection features, which are described in the following sections.

6.1 Over-Temperature Protection

The Koehler KV3000 Kinematic Viscosity System 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 KV3000 Kinematic Viscosity System 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 KV3000 Kinematic Viscosity System 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
278-104-002	Slow-Blow Fuse, 0.25A, 5x20 mm
278-003-001	Slow-Blow Fuse, 3.15A, 5x20mm [‡]
278-020-004	Time Delay Fuse, 20A, 600VAC
278-102-003	Fast-Acting Fuse, 0.5A, 2AG
275-103-027	Temperature Controller 100-240V, with RS-232 Board
279-115-009	Compact Fluorescent, 120V, 15W
379-001-001	Liquid Level Switch
K23700-02003	RTD Assembly
K23700-03024	Moisture Barrier Gasket
K23700-03006	Heater, 115V, 1250W [†]
K23700-03015	Heater, 230V, 1250W [‡]
K23700-03013A	Stainless Steel Shaft Motor, 115V, 60Hz, 1/20HP [†]
K23700-03014A	Stainless Steel Shaft Motor, 230V, 50/60W, 1/15HP [‡]
090-120-017	DPST Contactor, 120V, 30A [†]
090-240-021	DPST Contactor, 240V, 30A [‡]
240-230-004	Transformer ‡
092-001-001	Timer

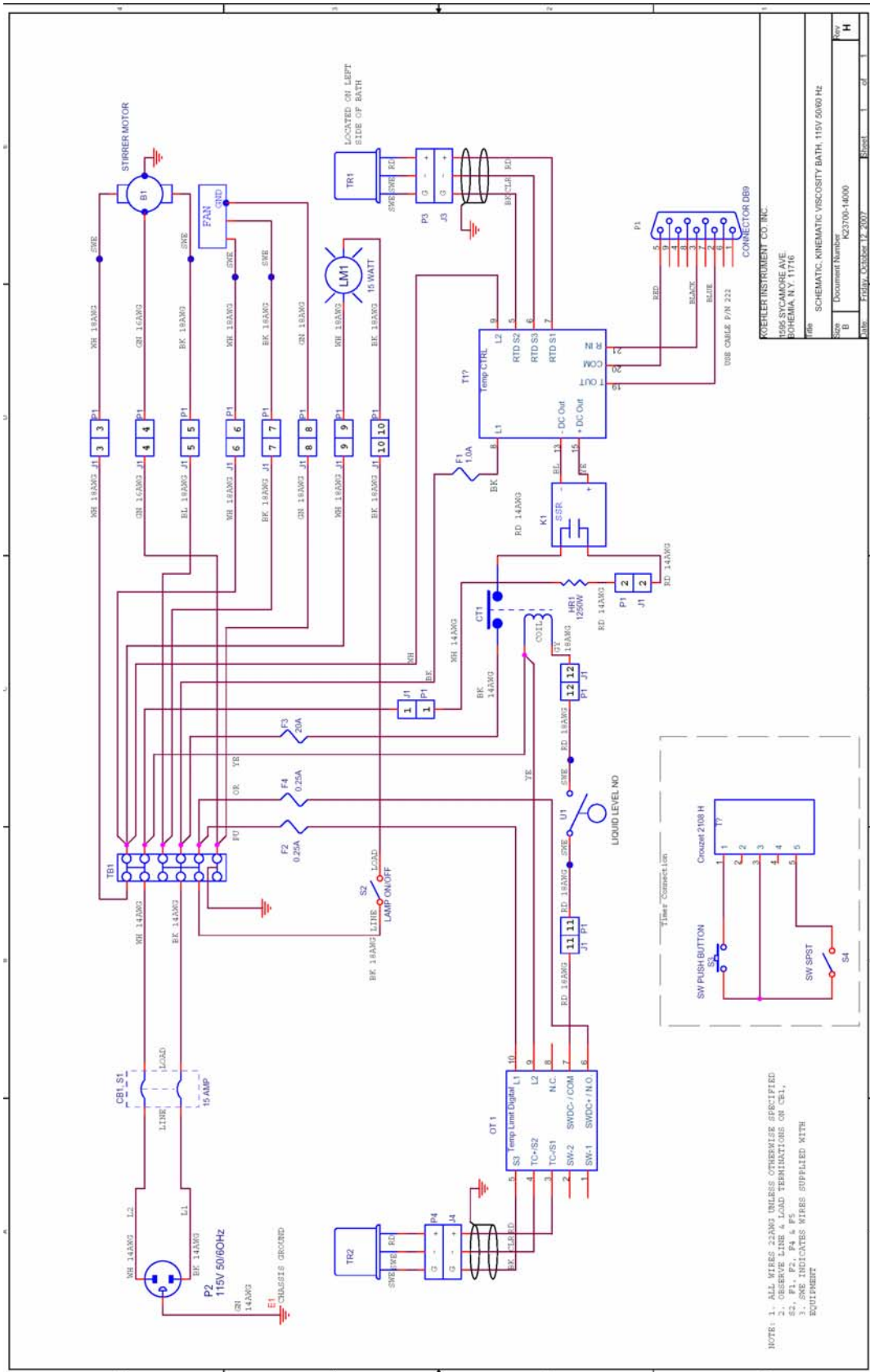
Note:

[†]For 115V model ONLY (K23700, K23706)

[‡]For 220V model ONLY (K23790, K23796)

8 Wiring Diagrams

8.1 115 V Unit (K23700, K23706) Wiring



KOEHLER INSTRUMENT COY. INC.	
1065 SYCAMORE AVE.	
BOHEMIA, N.Y. 11716	
File #	SCHEMATIC: KINEMATIC VISCOSITY BATH, 115V 50/60 HZ
Size	B
Document Number	K23700-14000
Date	Friday, October 17, 2007
Sheet	1 of 1
Key	H

9 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

- Establish that the socket outlet is providing proper and adequate voltage.
- Check if Overpower Protection circuitry located directly behind the temperature controller inside the front tray has been activated.
- Check if line switch is in the **ON** position.
- 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.

10 Service

Under normal operating conditions and with routine maintenance, the KV3000 Kinematic Viscosity System 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: _____

11 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.

12 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.

13 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.

