



## LKV3000 & LKV4000 LOW TEMPERATURE KINEMATIC VISCOSITY BATH

### *OPERATION AND INSTRUCTION MANUAL*

REV B

**Koehler Instrument Company, Inc.**

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing



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# **CERTIFICATE OF CONFORMANCE**

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**Digital Refrigerated Kinematic Viscosity Bath, LKV3000 &  
LKV4000  
K22753, K22754, K22751, K22752**

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This certificate verifies that part numbers K22753, K22754, Digital Refrigerated Kinematic Viscosity Bath, were manufactured in conformance with the applicable standards set forth in this certification.

Specifications:	ASTM D445
	ASTM D2532
	ASTM D6074
	ASTM D6158
	IP 71
	ISO 3104
	DIN 51550
	FTM 791-305
	NF T 60-100

This unit is tested before it leaves the factory, to ensure total functionality and compliance to the above specifications and ASTM standards. Test and inspection records are on file for verification.



**Jesse Kelly  
Application Engineer  
Koehler Instrument Company**



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## 1 Introduction

The Koehler LKV3000 & LKV4000 Low Temperature Kinematic Viscosity Bath Series feature the latest design for performing sub ambient 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 Low Temperature 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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**<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](mailto: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:** LKV4000: K22751, K22753  
LKV3000: K22752, K22754

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

**Standard Temperature**

**Range**  
**(LKV3000):** 15 to -30°C  
(59 to -22°F)

**Extended Temperature**

**Range**  
**(LKV4000):** 15 to -70°C  
(59 to -94°F)

**Temperature Control**

**Stability:** Exceeds ASTM requirements

**Viscometer Ports:** Four (4) round ports  
2" (51mm)

**Capacity:** Four (4) glass capillary viscometers

**Bath Medium:** Dry Denatured Ethanol

**Bath Medium Capacity:** 14L (3.7 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 voids the manufacturer warranty, product safety, performance specifications, and/or certifications whether specified or implied, and may result in personal injury and/or property loss. Replacement parts must be O.E.M. exact replacement equipment.

**Unit Design.** This equipment is specifically designed for use in accordance with the applicable standard test methods listed in section 1.2 of this manual. The use of this equipment in accordance with any other test procedures, or for any other purpose, is not recommended and may be extremely hazardous.

**Chemical Reagents Information.** Chemicals and reagents used in performing the test may exhibit potential hazards. Any user must be familiarized with the possible dangers before use. We also recommend consulting the Material Data and Safety Sheet (MSDS) on each chemical reagent for additional information. MSDS information can be easily located on the internet at <http://siri.uvm.edu> or <http://www.sigma-aldrich.com>.

### 3 Getting Started

The instructions for preparing the equipment assume that the user is aware of the contents of this document, which lists the warranty conditions and important precautions.

#### 3.1 Packing List

- LKV3000 or LKV4000 Low Temperature Kinematic Viscosity Instrument
- LKV3-LKV4-Manual LKV3000 & LKV4000 Kinematic Viscosity Instrument and Data Acquisition Software Operation and Instruction Manual
- K23700-02002 Viscometer Port Cover (4)

Additional Accessories purchased separately  
(See Section 4.2 for more information):

#### 3.2 Unpacking

Carefully unpack and place the instrument and accessories in a secure location. Use extra care while unpacking the Borosilicate 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.

**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.

#### 3.4 Software Installation

Insert the CD-ROM into the CD tray of the PC. The CD should automatically display the setup screen. If this does not happen within 10 seconds, then browse the files on the CD-ROM and double click on the setup file (setup.exe) to start the installation. Follow the instructions on the screen to setup the software. Once the installation has been completed, then you are ready to run the software. The software is in demo mode, you must register it in order for the software to work with the unit.

To register the software, start the program and then go to >> Help >> Register. A registration screen (shown in Figure 1) will appear with a registration number. Please e-mail Koehler at software@koehlerinstrument.com or call with the registration number for the unlock code. Once the software has been registered, please restart the software.



Figure 1: Registration Screen

## 4 Descriptions

### 4.1 Instrument Controls

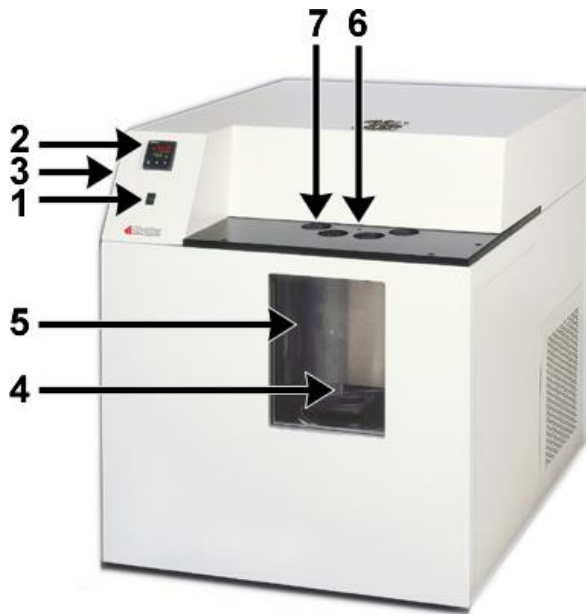


Figure 3. Instrument Descriptions

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, the stirrer, the lamp and the optical sensors power supply are powered on.
2. **Temperature Controller.** The temperature controller regulates the bath temperature for the test procedure. Refer to Section 4.3 for full operational details.
3. **RS484 Port.** For connection to external PC for Data Acquisition.
4. **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.
5. **Temperature Regulation:** The cooling coils stabilize the bath temperature to desired setting within  $\pm 0.02^{\circ}\text{C}$ .
6. **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.

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

### 4.2 Accessories for Running Tests

#### Glass Capillary Viscometer Tubes for LKV3000 and LKV4000

Koehler offers a full selection of glass capillary kinematic viscometers, which are ordered separately from the LKV3000 & LKV4000 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-OS	25	0.002	0.5 to 2
378-050-C01-OS	50	0.004	0.8 to 4
378-075-C01-OS	75	0.008	1.6 to 8
378-100-C01-OS	100	0.015	3 to 15
378-150-C01-OS	150	0.035	7 to 35
378-200-C01-OS	200	0.1	20 to 100
378-300-C01-OS	300	0.25	50 to 250
378-350-C01-OS	350	0.5	100 to 500
378-400-C01-OS	400	1.2	240 to 1,200
378-450-C01-OS	450	2.5	500 to 2,500
378-500-C01-OS	500	8	1,600 to 8,000
378-600-C01-OS	600	20	4,000 to 20,000
378-650-C01-OS	650	45	9,000 to 45,000
378-700-C01-OS	700	100	20,000 to 100,000

### Cannon®-Fenske Opaque 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.

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

### Ubbelohde Viscometers

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	Approx. Constant, cSt/s	Kinematic Viscosity Range, cSt
378-000-C03-OS	0	0.001	0.3 to 1
378-00C-C03-OS	0C	0.003	0.6 to 3
378-00B-C03-OS	0B	0.005	1 to 5
378-001-C03-OS	1	0.01	2 to 10
378-01C-C03-OS	1C	0.03	6 to 30
378-01B-C03-OS	1B	0.05	10 to 50
378-002-C03-OS	2	0.1	20 to 100
378-02C-C03-OS	2C	0.3	60 to 300
378-02B-C03-OS	2B	0.5	100 to 500
378-003-C03-OS	3	1	200 to 1,000
378-03C-C03-OS	3C	3	600 to 3,000
378-03B-C03-OS	3B	5	1,000 to 5,000
378-004-C03-OS	4	10	2,000 to 10,000
378-04C-C03-OS	4C	30	6,000 to 30,000
378-04B-C03-OS	4B	50	10,000 to 50,000
378-005-C03-OS	5	100	20,000 to 100,000

### Viscometer Holders

Koehler offers a wide range of viscometer holders for use with the LKV3000 & LKV4000 instruments. The correct holder must be used with the corresponding viscometer tube for proper operation:

Viscometer Tube Type	Corresponding Holder
Cannon®-Fenske Routine Cannon®-Fenske Opaque	K23381
Ubbelohde BS/U-Tube	K23382

### 4.3 Temperature Controller Operation

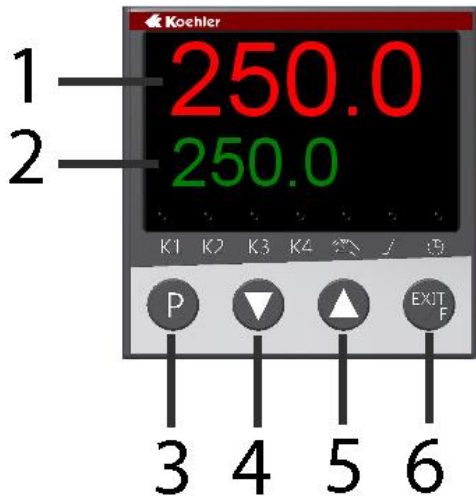


Figure 4. Temperature Controller

1. **Process Temperature Display.** The upper red LED display shows the process temperature as read from the RTD probe.
2. **Set Point Temperature Display.** The lower green LED display shows the set point temperature of the controller.
3. **Programming Key.** Permits scrolling through controller menu parameters. One Level Forward
4. **Down Key.** Used to decrease the set point temperature and to decrease or change parameter values when programming the temperature controller.
5. **Up Key.** Used to increase the set point temperature and to increase or change parameter values when programming the temperature controller.
6. **Exit / Function Key.** This key is used to exit or leave a level. One level backward

**IMPORTANT NOTE:** The digital temperature controller for the unit comes pre-programmed from the Koehler factory. Please do NOT attempt to re-program the digital temperature controller as this will void the product warranty. If assistance is

required, please do not hesitate to contact the Koehler technical service department.

**Setting the Temperature.** Set the desired operating temperature by adjusting the set point with the up and down keys. The set point will be displayed in the lower green Set Point LED display and the actual temperature will be displayed in the upper red Process LED display. Please allow the instrument to fully equilibrate before proceeding with any testing.

**Temperature Calibration.** This routine allows the digital temperature controller to be calibrated to a certified thermometer. In the calibration mode, the display will always give 2 decimal places.

- 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.

#### 4.4 Recommended Accessories

- **Withdrawal Bulb.** Use to pull sample into viscometer tube.  
Part number: K22090
- **Rubber Stopper.** Use to plug viscometer tube and hold up sample prior to testing.  
Part number: K23311

### 5 Operation

#### 5.1 Bath

Fill the bath with Dry Denatured Ethanol as specified in section 1.3. Fill the bath with the medium to the top avoiding any spillover into the instrument. Additional medium may need to be added as fluid is cooled to appropriate test temperature.

#### 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 Set Temperature

Insert a certified PT-100 RTD probe or ASTM Thermometer into the temperature port on top of the bath using the holder provided.

Set the desired bath temperature with the digital temperature controller and calibrate as per the certified temperature measuring device if necessary. (See Section 4.3 for full temperature controller operational details).

#### 5.4 Test Procedure

Proceed with performing the desired kinematic viscosity tests according to the standard test methods in section 1.2 of this document.

Engage charged viscometers into holders and place them into the four available ports in the viscosity bath.

### 6 Safety Features

The Koehler LKV3000 and LKV4000 Low Temperature Kinematic Viscosity Instrument is equipped with several safety and protection features, which are described in the following sections.

#### 6.1 Over-Power Protection

The Koehler LKV3000 and LKV4000 Low Temperature Kinematic Viscosity Instrument 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 LKV3000 and LKV4000 Low Temperature Kinematic Viscosity Instrument 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).

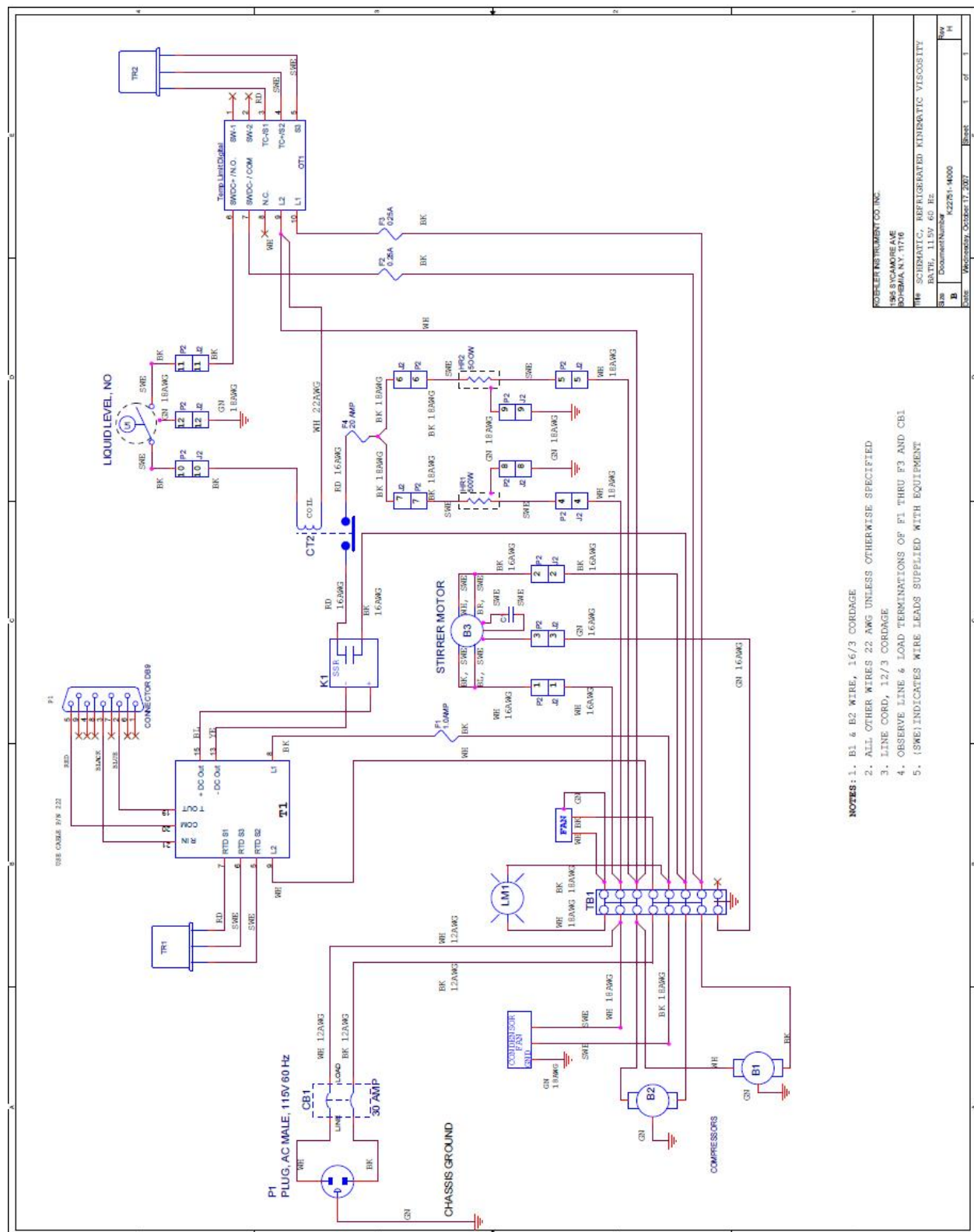
## 7.2 Replacement Parts

Part Number	Description
091-032-001	Solid State Relay, 4-32V, 20A
220-120-009	Cartridge Heater, 500W, 115V <sup>†</sup>
220-240-013	Cartridge Heater, 500W, 240V <sup>‡</sup>
265-500-001	RTD Temperature Probe, 1/4" x 12"
275-103-027	Temperature Controller, 100-240V
275-103-036	Temperature Safety Limit RTD Probe, 120V <sup>†</sup>
275-103-037	Temperature Safety Limit RTD Probe, 230V <sup>‡</sup>
278-001-002	Fuse, 1A, Slo-Blo, 5 x 20mm
278-020-004	Fuse, 20A, Time Delay, 600VAC
278-104-002	Fuse, 0.25A, Slo-Blo, 5 x 20mm
279-115-009	Compact Fluorescent Lamp, 120V, 15W
288-115-058	Motor, 115V, 60Hz, 1/8hp, 3000RPM <sup>†</sup>
288-230-020	Motor, 230V, 50/60Hz, 1/8hp, 3000RPM <sup>‡</sup>
K23700-02002	Port Cover Assembly

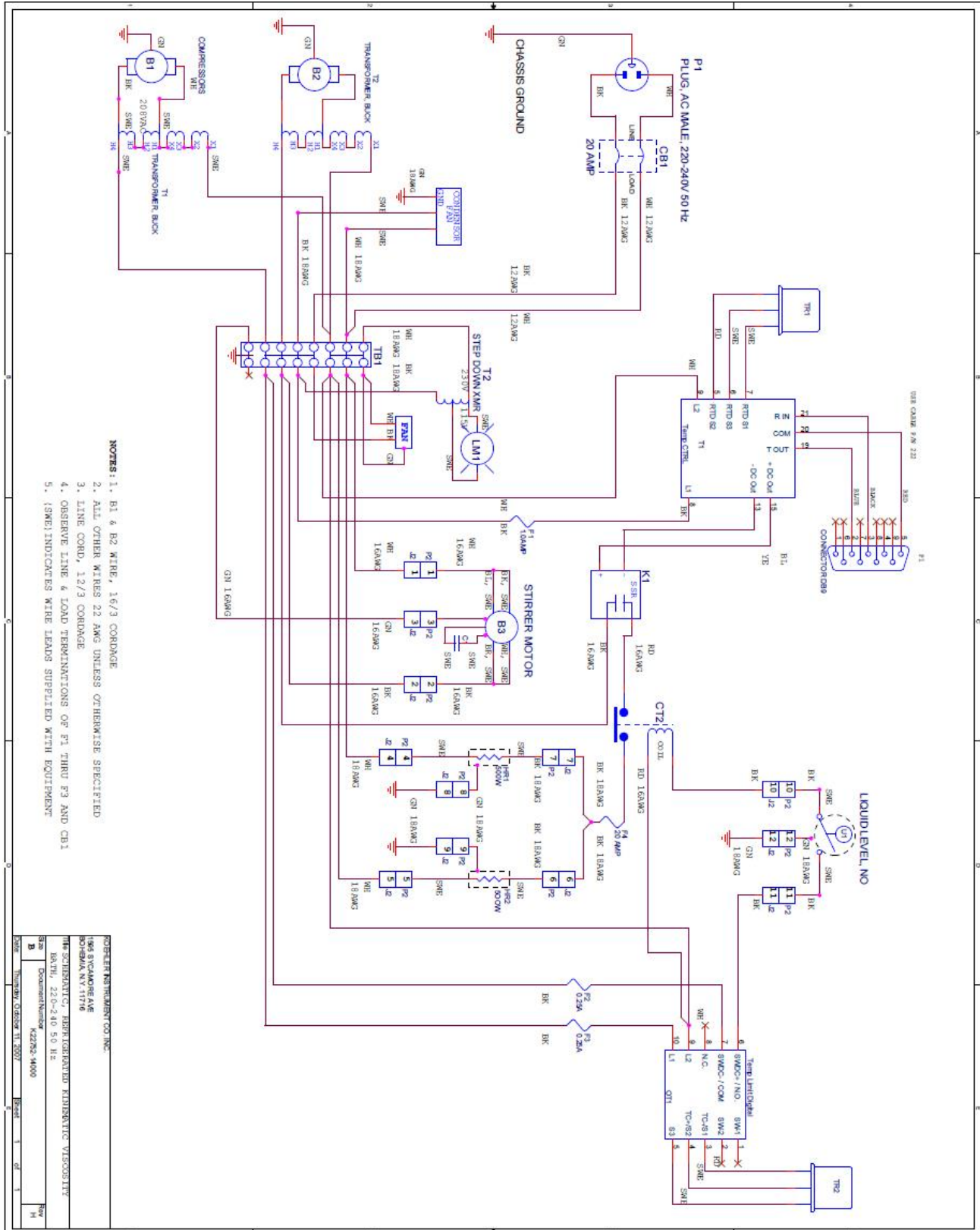
<sup>†</sup>For 115V model ONLY (K22751, K22753)

<sup>‡</sup>For 220V model ONLY (K22752, K22754)

### 8.1 K22751, 115V 60Hz

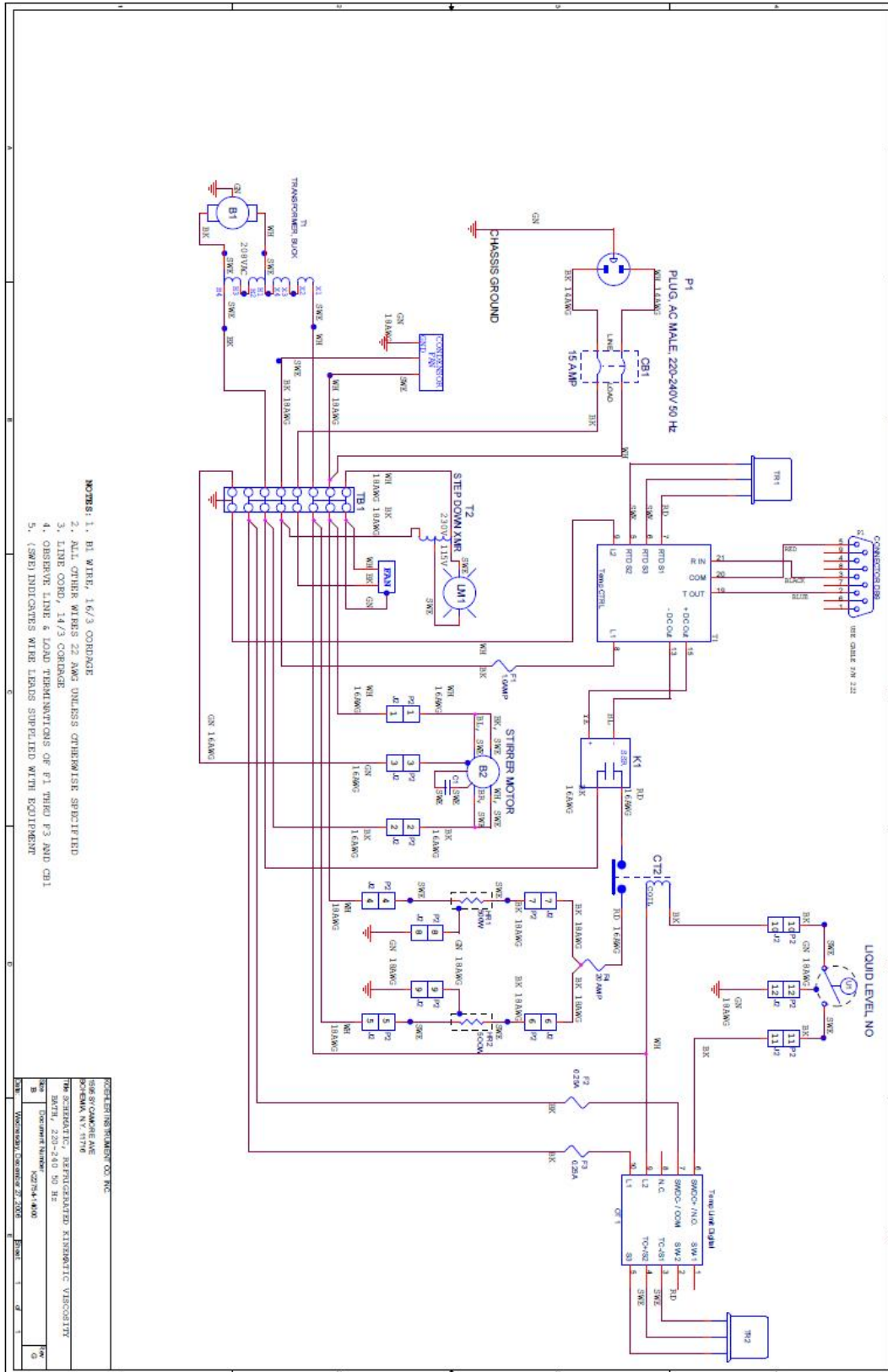


## 8.2 K22752, 220-240V 50/60Hz



- NOTES: 1. B1 WIRE, 14/3 CORDAGE  
2. ALL OTHER WIRING 22 AWG UNLESS OTHERWISE SPECIFIED  
3. LINE CORD, 12/3 CORDAGE  
4. RESERVE LINE & LOAD TERMINATIONS OF F1 THRU F3 AND C01  
5. (SWE) INDICATES WIRE LEADS SUPPLIED WITH EQUIPMENT

## 8.4 K22754, 220-240V 50/60Hz



## 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

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

### 9.2 Unit is on and keeps resetting into start up routine

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

### 9.3 Unit is on but bath does not cool down

- 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.

## 10 Service

Under normal operating conditions and with routine maintenance, the LKV3000 and LKV4000 Low Temperature Kinematic Viscosity Instrument 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 with will be returned to the sender. Goods must be returned freight prepaid. Returns will be subject to a restocking charge, the application of which will depend upon the circumstances necessitating the return. Some returns cannot be authorized, including certain products purchased from outside vendors for the convenience of the customer, products manufactured on special order, products shipped from the factory past ninety (90) days, and products which have been used or modified in such a way that they cannot be returned to stock for future sale.



## Notes

[illegible]



## Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.