# operation and instruction manual


## K17400, K17490

Abel Closed Cup Flash Point Tester

service | innovation | technology

REV K-A

Koehler INSTRUMENT COMPANY, INC.

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

# CERTIFICATE OF CONFORMANCE

## Manual Abel Closed Cup Flash Point Tester
## K17400, K17490

**This certificate verifies that part numbers K17400, K17490, Manual Abel Closed Cup Flash Point Tester, was manufactured in conformance with the applicable standards set forth in this certification.**

**Specifications:** **IP 170**
**ISO 13736**

**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.**

**Vincent Colantuoni**
**Product Manager**

**Koehler Instrument Company, Inc.**
**1595 Sycamore Ave.**
**Bohemia, NY 11716**
**United States of America**

**Serial Number:** _____

**Date:** _____

CE

## EC Declaration of conformity

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

**This declaration of conformity is issued under the sole responsibility of the manufacturer. We declare that the product listed below meets all basic requirements in accordance with the following Directive(s) by design, type, and version placed upon the market by us.**

2006/42/EC The Machinery Directive by way of the Low-Voltage directive 2014/35/EU

**And hereby declare that:**
Equipment: **Manual Abel Closed Cup Flash Point Tester**

Model Number(s): ***K17400, K17490***

## Qualifications:

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

**and**

**The object of the declaration described above is in conformity with the relevant union harmonization legislation. This product declaration is valid for unmodified equipment when installed and operated by authorized personnel following the instruction handbook.**

**Conforms to the following standards (as applicable):**

| | |
|---|---|
| Safety | Low-Voltage directive 2014/35/EU |
| EN 61010-1:2010 | Safety Requirements for electrical equipment for measurement, control and laboratory use; by engineering design and risk review and by meeting the requirements of Hi-Pot Test (1500 VAC, 60 sec. per table 5) as detailed in the product's technical documentation. |
| EMC | Meets the essential requirements of EMC Directive 2004/108/EC by engineering design review and by meeting the requirements of |
| EN 55011:2007 | Conducted Emissions Test for Group 1 Class A as detailed in the product's technical documentation. |

*Vincent Colantuoni*
Vincent Colantuoni
Product Manager

1595 Sycamore Ave.
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United States of America
March 28, 2022

www.koehlerinstrument.com 631-589-3800

## WEEE Directive

**Background**
The goal of the WEEE Directive is to encourage design of environment-friendly products that increase reuse, recycling and other forms of recovery to reduce waste streams and applies to listed Electronic and Electrical Equipment (EEE) and Koehler's equipment falls broadly into Appendix 1A; Section 9 Monitoring and Control Equipment: Measuring, weighing or adjusting appliances for household or as laboratory equipment.

Any associated non-embedded equipment such as Lighting (Saybolt Color) and PCs/Printers also fall under WEEE. If provided with an order these ancillary items must be WEEE compliant. For these and other reasons (printer cartridges are regionalized) the equipment must be supplied through a third party supplier in Europe.

The WEEE Directive applies to electrical and electronic equipment falling under the categories set out in Annex IA provided that the equipment concerned is not part of another type of equipment that does not fall within the scope of this Directive. Annex IB contains a list of products which fall under the categories set out in Annex IA.

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:037:0024:0038:en:PDF

We do not qualify for any of the 10 exemption categories.
http://www.dpa-system.dk/en/WEEE/Products/Exemptions

**Professional use**
For equipment defined for 'professional use' local authorities have no role to play. Producers and importers are basically responsible for collection of WEEE recyclables from the professional user and for subsequent management. A separate statement is given cataloging the items that require separation from the equipment along with basic information on subsequent processing or recycling prior to disposal of the equipment.
http://www.dpa-system.dk/en/WEEE/Products/Private-or-professional-use

**Responsibility for Registration and Annual Reporting:**
Koehler will not sell directly to end users in the EU and so has no responsibility to register within each EU state and to make annual reports. Koehler declares that this responsibility is born by the importer who is the first level of the distribution chain and is subject to producer responsibility. We will communicate this in writing to our distributor/importers in the EU stating they are responsible to satisfy WEEE registration and reporting requirements in the EU states where they conduct sales activities.

It is illegal to market electrical and electronic equipment covered by producer responsibility without being registered.

http://www.dpa-system.dk/en/WEEE/Producers/Whoissubjecttoproducerresponsibility

**Product Design**
Koehler's designs allow for complete disassembly to a modular level which usually allows for standard recycling. A qualified refrigeration system technician must be consulted when disassembling and de-commissioning any equipment with refrigeration systems.

Koehler's scientific testing equipment is robustly designed to function over a long service life and are typically repaired many times over the course of years rather than being replaced. We believe that re-use and refurbishment is the very best form of re-cycling.

All batteries must be readily removable not soldered in place.

**Recycling instructions**

In the event that replacement becomes necessary, we will include instructions, particularized to each instrument that informs the customer of their recycling responsibilities and giving them guidance in doing this. All Koehler equipment has been placed on the market since 13th August 2005 and so Koehler is defined as a "new WEEE producer". As such we must provide information on refurbishment, treatment, and re-use.

Our instrument manual will include this compliance statement and indicate that any collection of materials will be handled by their authorized distributor. In the event that the distributor is unreachable or is no longer a distributor for Koehler Instrument, Co., other arrangements may be made including accepting the materials directly.

Recycling is free of charge. Shipping is the responsibility of the end users. Whether shipping to a distributor or to Koehler directly, safe, properly declared, and labeled packaging and shipping expenses are the sole responsibility of the end user.

**WEEE Marking**

Since Koehler products are subject to the WEEE Directive we must display the WEEE symbol shown above in accordance with European Standard EN 50419 on the equipment. It must be indelible, at least 5mm in height, and clearly legible. If the equipment is too small the mark must be in the product literature, guarantee certificate, or on the packaging. Rules on marking are established in section 49 of the WEEE Order.

Koehler Instrument Company, Inc.
c/o RECYCLING
1595 Sycamore, Ave.
Bohemia, NY 11716

As a minimum the following substances, preparations and components have to be removed from any separately collected WEEE:
- Mercury containing components, such as switches or backlighting lamps (compact fluorescent lamps, CFL),
- Batteries
- Printed circuit boards if the surface of the printed circuit board is greater than 10 square centimeters (about 4 sq in.),
- Toner cartridges, liquid and pasty, as well as color toner,
- Chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC)
- Liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimeters and all those back-lighted with gas discharge lamps,
- External electric cables
- Components containing refractory ceramic fibers as described in Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress Council Directive 67/548/EEC relating to the classification, packaging and labeling of dangerous substances (2),
- Electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)

2. The following components of WEEE that is separately collected have to be treated as indicated:
- Equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15, such as those contained in foams and refrigeration circuits: the gases must be properly extracted and properly treated. Ozone-depleting gases must be treated in accordance with Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer (4).

# Table of Contents

# 1. Introduction

The Koehler K17400, K17490, Abel Closed Cup Flash Point Tester is the latest design for accurately determining flash and fire point temperatures of viscous petroleum products over an extended temperature range according to the IP 170 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 Abel Closed Cup Flash Point Tester. 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 almost 100 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. International Organization for Standardization (ISO)
   1, rue de Varembé
   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 13736: Determination of Flash Point – Abel Closed-Cup Method

2. 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:**
   - ISO 170: Petroleum Products – Determination of Flash Point – Abel Closed Cup Method

## 1.3. Instrument Specifications

| | |
|---|---|
| ***Models:*** | K17400<br>K17490 |
| ***Electrical Requirements:*** | 115V 60Hz<br>220-240V 50/60 Hz |
| ***Dimensions (wxdxh,in.(cm)):*** | 10 x 17.5 x 11.5<br>(25.4 x 44.5 x 29.2) |
| ***Net Weight:*** | 25 lbs (11.34 kg) |
| ***Gross Weight:*** | 35 lbs (15.88 kg) |
| ***Altitude:*** | Rated for use below 2000m |
| ***Environmental Conditions:*** | As per section 1.4.1 of IEC 61010 |

# 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 because it 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.
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. 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

- K174XX Abel Closed Cup Flash Point Tester
- Cover Assembly
- Brass Test Cup with Handle
- Thermometer Holder (2)
- K174XX-Manual K174XX Abel Closed Cup Flash Point Tester Operation and Instruction Manual

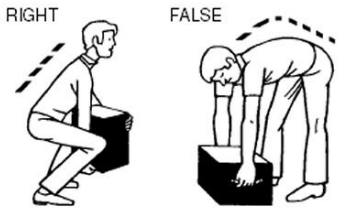
## 3.2. Additional Accessories Required for Testing

- 33087 Refrigerated Circulator, Low Temperature, -40 °C, 240V 50Hz
- 250-001-74C IP 74C Thermometer
- 250-001-75C IP 75C Thermometer
- 250-001-02C IP 2C Thermometer

## 3.3. Unpacking

1. Check Shock Watch Label on Cardboard Box for indication of rough handling and possible damage.
2. Check labeling for correct orientation of instrument. (e.g. This Side Up)
3. Carefully open top of box with box cutter and remove packing foam insert.
4. Extract instrument and place on suitable cart for transportation to work area / lab bench.

**WARNING:** Be sure two or more individuals are available for extracting and lifting instrument from box to cart and from cart to bench. Individuals must lift in accordance to proper technique. See Figure below




5. Lift instrument from cart and place on bench.
6. Carefully unpack and place the instrument and accessories in a secure location. 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.

## 3.4. Setup

**Equipment Placement.** Make sure the instrument is placed 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.

**Environmental Conditions:** The instrument environment must comply with the following conditions for proper setup:

- No / Low Dust
- No direct sunlight
- Not near heating or AC ventilation ducts
- No Vibrations
- Clearance from other instruments
- Temperature Range: 5 to 40°C
- Elevation to 2000 meters
- Relative Humidity: < 80%

**Ventilation.** A fume hood or exhaust system is required for expending any fumes or vapors that have been generated while 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.

**NOTE:** Adjust the exhaust blower rate so that it removes generated vapors / steam, however be sure that the exhaust system does not create a draft large enough to remove vapors from the test cup area or blow out the test flame as this will affect results of the test.

**Gas Supply.** Connect the gas inlet to a regulated low pressure gas supply (0.5 to 1.0 psi). Use only **propane, LPG,** or **natural gas**. Do not use direct unregulated pressure from an **LPG** tank.

**NOTE:** Be sure Flame Control Switch (Figure 1, Item 3) is in the OFF position when Test Flame Applicator is not in use.

**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.

# 4. Descriptions

## 4.1. Instrument Description


**Figure 1. Instrument Descriptions (Front)**

1. **Power Switch:** Controls power to the entire unit. Pressing the switch to the ON position will energize the instrument. Pressing the switch to the OFF position will de-energize the instrument. Switch will illuminate when in the ON position

   **WARNING:** Be sure to completely Power Off the instrument prior to performing any service of the instrument. This can only be done by switching the Power Switch to the **OFF** position. Turning the heating control dial to the off position **WILL NOT** de-energize the instrument. Only clean instrument or perform maintenance when power indicating light is off.

2. **Stirrer Motor Switch.** Powers on and off the Stirrer Motor.

3. **Temperature Control Dial.** The analog dial is used to control the heating rate of the unit during the test procedure. This dial is non-linear, therefore, the numbers indicated on the dial plate **DO NOT** refer to specific temperatures or heating rates. The control dial can be switched to an **OFF** position however, please **NOTE** that this **DOES NOT** power off the instrument.

4. **Flame Control ON/OFF Switch.** Controls cut off valve from gas line. Turn switch to OFF position when Flame Applicator is not in use to ensure gas is not flowing.

5. **Gas Adjustment Knob.** Turn to adjust the size of the test flame prior to testing. Adjustment knob designed for only minor adjustment of gas for proper sizing of test flame. Gas must be regulated prior to entry to instrument.

6. **Test Area and Heating / Cooling Bath.** See Figure 2 for detailed descriptions.

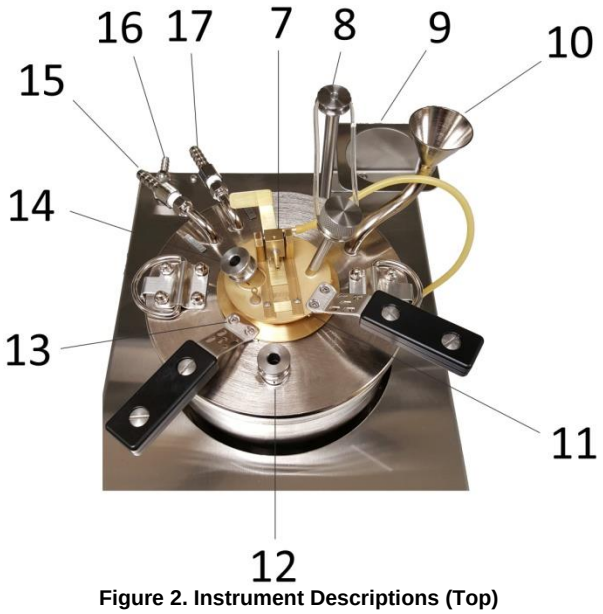



**Figure 2. Instrument Descriptions (Top)**

7. **Test Flame Dip Applicator:** To apply the test flame to the specimen. Pull the handle away from the test cup to dip the applicator into the sample as per test method specifications. Connect Gas Tubing from side of applicator to gas outlet at right side of instrument.

8. **Integrated Motor Assembly.** The Abel Flash Point tester is equipped with an integrated Stirrer Motor Mechanism. The motor rod rotates at a speed of 30 RPM as per test method specifications. The motor rod is powers the stirrer shaft by means of the clear belt shown. The belt is affixed to the motor rod therefore to engage and disengage the assembly, the belt must be connected to or removed from the stirrer shaft.

9. **Test Cup and Cover Holder.** For placing of the test cup and / or cover assembly between tests.

10. **Funnel.** To fill the reservoir with appropriate heat transfer medium.

11. **Cover Assembly.** Comprised of Test Cover, Stirrer Shaft, Test Flame Dip Applicator, Sample Thermometer Port, Flame Guide and Handle.

12. **Reservoir Thermometer Port Holder:** This holder is used to place the thermometer in the reservoir and measure the temperature.

13. **Abel Flash Cup:** The brass test cup contains the test specimen and is built with a heat resistant handle. An upwards bent pin inside the cup indicates the proper level according to the IP 170 test method.

14. **Sample Thermometer Port Holder.** Place a thermometer in the holder to monitor the sample temperature during testing.

15. **Cooling Medium Inlet/Outlet:** For connection to a cooling medium source. The K33087 Re-circulating Chiller specified in section 3.2 of this manual is recommended.

16. **Gas Inlet:** For connection to source gas. Connect the gas inlet to a regulated low pressure gas supply (0.5 to 1.0 psi). Use only **propane, LPG,** or **natural gas**. Do not use direct unregulated pressure from an LPG tank.

17. **Cooling Medium Inlet/Outlet:** For connection to a cooling medium source. The K33087 Re-circulating Chiller specified in section 3.2 of this manual is recommended.

# 5. Operation

## 5.1. Test Procedure

**1.** Be sure all tests be performed in a room free of excessive drafts. The room or compartment should be darkened sufficiently to allow the flash to be readily seen.

**2.** Place the IP 75C Thermometer in the reservoir Thermometer Port **(Figure 2, Item 12)**.

**3.** Using the Funnel **(Figure 2, Item 10)** fill the reservoir with water or, for less than or near 0 °C bath temperatures, use a mixture of equal volumes of ethanediol and water, or glycerol and water, or silicone oil, or other suitable liquids, to completely fill the reservoir and to fill the inner air chamber that surrounds the test cup to a depth of at least 38 mm.

**4.** Adjust the temperature of the heating vessel using an external cooling bath or re-circulating chiller if required, to at least 9 °C below the expected flash or to -35 °C , whichever is higher. The external circulator can be connected to the Inlet / Outlet Ports on the Reservoir **(Figure 2, Items 15 & 17)**.

**5.** Pour the sample in the test cup **(Figure 2, Item 13)** and place the test cup in position in the reservoir. Turn the test cup to lock it in its secure test position.

**6.** Place the cover assembly **(Figure 2, Item 11)** on the test cup and push it down into position.

**7.** Connect the clear belt from the Motor Rod **(Figure 2, Item 8)** to the Stirrer Shaft on the cover assembly

**8.** Place the IP 74C Thermometer in the test cup Thermometer Port **(Figure 2, Item 14)**.

**9.** Connect the gas source to the Gas Inlet Port **(Figure 2, Item 16)** at the back of the unit and ensure that the gas tubing from side of the test flame dip applicator **(Figure 2, Item 7)** is properly connected to the gas outlet at right side of instrument.

**10.** Press the Flame Control On/Off switch **(Figure 1, Item 4)** to the ON position.

**11.** Light Test Flame Dip Applicator **(Figure 2, Item 7)** using external heat source.

**12.** Use a test flame approximately 5/23 of an inch in diameter, the same size as the test flame guide located on the cover assembly **(Figure 2, Item 11)**. Turn the gas adjustment valve **(Figure 1, Item 5)** if needed, until the flame compares to the flame guide.

**13.** Press Power Switch **(Figure 1, Item 1)** to the **ON** position.

**NOTE:** A pre-test dip of the ignition source is strongly recommended before commencing the heating of the test sample, as this could indicate the presence of low flash point components. If a flash is detected during the pre-test dip, discontinue the test, discard the test portion and proceed commencing the test at a lower expected flash point temperature.

**14.** Turn Temperature Control Dial **(Figure 1, Item 3)** clockwise and apply heat to the vessel in such a manner that the temperature of the test sample in the test cup rises at a rate of approximately 1 °C/min from the first application of the ignition source to the end of the test.

**15.** Press the Stirrer Motor Switch **(Figure 1, Item 2)** to the ON position.

**NOTE:** Ensure that the test cup is securely locked in place prior to turning on the stirrer motor.

The Stirrer motor will turn on and stir at a rate of 30 RPM ± 5 RPM. Continue stirring for the duration of the test but turn off the stirrer motor during the application of the ignition source.

**16.** When the test specimen temperature is approximately 9 °C below the expected flash point or -35 °C, whichever is the higher, apply the ignition source by slowly and uniformly opening the slide **(Figure 2, Item 7)** over a period of approximately 2 seconds and then closing it over a period of approximately 1 second.

**17.** If a flash is detected on this first application of the ignition source, discontinue the test, discard the test portion and proceed commencing the test at a lower expected flash point temperature. If no flash occurs at a temperature below -30 °C, record and report this fact and discontinue the test.

**18.** Apply the test flame in this manner at every 0.5 °C rise in temperature until a distinct flash is detected in the interior of the test cup.

**19.** Report the flash point, corrected to standard atmospheric pressure and rounded to the nearest 0.5 °C.

**NOTE:** The application of the test flame can cause a blue halo or an enlarged flame prior to the actual flash point. This is not a flash point and shall be ignored.

# 6. Safety Features

The Koehler K174XX Abel Closed Cup Flash Point Tester is equipped with several safety and protection features, which are described in the following sections.

## 6.1. Over-Power Protection

The Koehler K174XX Abel Closed Cup Flash Point Tester 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.

**WARNING:** Disconnect power to the unit before servicing and accessing any internal portion of the instrument 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. 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.

## 7.1. Routine Maintenance

The K174XX Abel Closed Cup Flash Point Tester 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. Instrument Cleaning

- To clean the instrument's exterior, which includes all painted surfaces, either a solution of soap and water or laboratory grade detergent may be used.
- Apply cleaner to clean wipe or cloth, not to the instrument directly. Wipe surface clean.

- **Do Not** clean bath exterior with organic chemicals such as Acetone, Toluene, Hexane, etc.
- For more difficult cleaning of finished surfaces, a dilute solution or isopropanol in water may be used.
- It is not recommended that more aggressive solvents be used on painted surfaces since paint color will tarnish or be stripped from the instrument.
- Stainless Steel surfaces, such as on the top plate, may be cleaned using a more aggressive solvent such as a stainless steel cleaner.

 **SHOCK AND BURN HAZARD:** Only clean inside the bath when equipment is de-energized and unplugged from the mains power supply. Allow adequate time for heating coils to completely cool before cleaning.

## 7.3. Replacement Parts

**K17400 only (115V 60Hz)**

| Part Number | Replacement Part |
|---|---|
| 190-120-012 | Ring Heater, 400W, 120V |
| 010-115-005 | Wattstat 115V |
| 050-002-015 | Switch, DPST, Green Lens, 115V |
| 354-002-008 | Resistor, 47K, .25W, Thru-hole, CF |
| 271-005-004 | Switch, C-Breaker, 2P, 5A, Grn, w/o |

**K17490 only (220-240V 50/60Hz)**

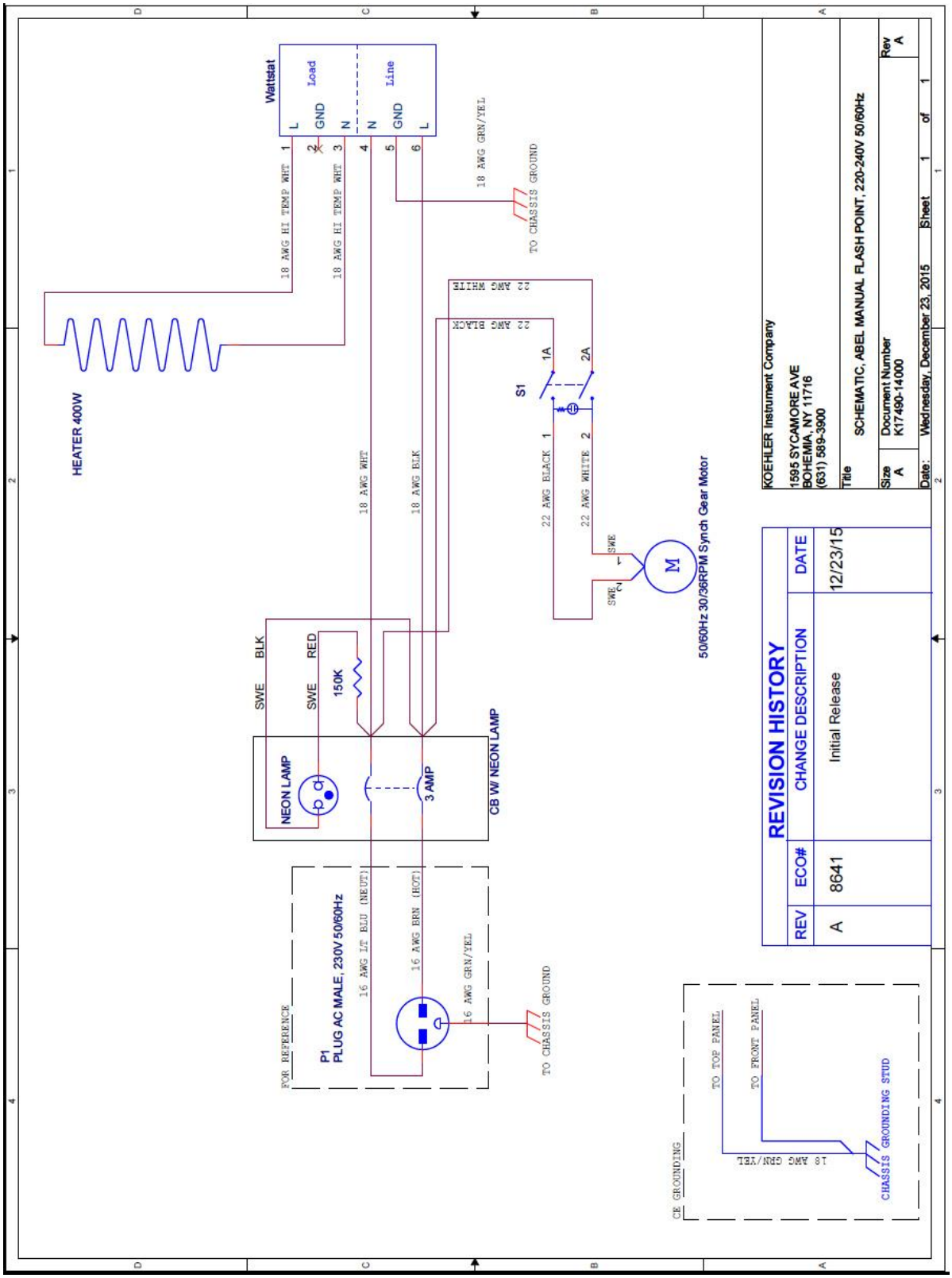
| Part Number | Replacement Part |
|---|---|
| 190-240-010 | Ring Heater, 400W, 240V |
| 010-230-004 | Wattstat, 230V |
| 050-230-002 | Switch, Rocker, Green Lens, 230V |
| 354-002-006 | Resistor, 150K, .25W, Thru-hole, RNF |
| 271-003-002 | Switch, C-Breaker, 2P, 3A, Grn, w/o |

**Both Units (K17400 & K17490)**

| Part Number | Replacement Part |
|---|---|
| 037-1032-01B | 10/32 Toggle Valve, Brass NP ST Toggle |
| K17400-23003 | Oil Cup Assembly w/ handle |
| K17400-23002 | Cover Assembly |
| 363-332-003 | 3/32 ID X 3/64 Wall Latex Tubing |

| Part Number | Replacement Part |
|---|---|
| 036-1032-01B | 10/32 Knurled Knob Brass, Needle Valve |
| K17400-03037 | Thermometer Ferrule Cap |
| K17400-03036 | Thermometer Ferrule Body |
| 288-230-026 | AC Gear Motor, 230V, 30/36 RPM |

# 8. Wiring Diagram



# 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.
- Check fuse on wattstat.
- 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 230V 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.

# 10. Service

Under normal operating conditions and with routine maintenance, the K17400 and K17490 Abel Closed Cup Flash Point Testers do 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

# Notes