



## **K14601/K14671 TAG CLOSED CUP FLASH POINT TESTER**

### ***OPERATION AND INSTRUCTION MANUAL***

REV A

***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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### Manual Tag Closed Cup Flash Point Tester K146XX

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This certificate verifies that part number K146XX, Manual Tag Closed Cup Flash Point Tester, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:                      ASTM D56  
   IP 304  
   FTM 791-1101

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





**EC Declaration of conformity**

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

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.

2004/108/EC The Electromagnetic Compatibility Directive  
2006/42/EC The Machinery Directive by way of the Low-Voltage directive 2006/95/EC

And hereby declare that:

Equipment: **TAG CLOSED CUP FLASH POINT TESTER**  
Model Number(s): **K14671**

**Qualifications:**

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

and

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 2006/95/EC
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 Conducted Emissions Test for Group 1 Class A as detailed in the product's technical documentation.
EN 55011:2007	



James R. Ball  
Dir. Research & Development

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**Jan 1, 2015**

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631-589-3800



## WEEE Directive Compliance Statement

### 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).

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## 1 Introduction

The Koehler K146X1 Tag Closed Cup Flash Point Tester is designed for determining the flash and fire points of liquid products at temperatures up to 325°F (163°C) by the Tag Closed Cup method. The 115V tester is referred to as the K14601 while the K14671 refers to the 220-240V. Both the K14601 and the K14671 models are electrically heated. The tester conforms to the ASTM D56 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 Tag 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 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.

**Toll Free: 1-800-878-9070 (US only)**  
**Tel: +1 631 589 3800**  
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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 D56: Standard Test Method for Flash Point by Tag 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:

- IP 304: Determination of Flash Point Closed Cup Equilibrium Method

#### 3. Federal Test Method (FTM)

#### FTM Publication:

- FTM 791-1101

### 1.3 Instrument Specifications

**Models:** K14601  
K14671

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

**Ring Heater:** Model: 190-120-001  
200W 120V

**Dimensions (LxWxH):** 17 x 10 x 11"  
43.2 x 25.4 x 28 cm

**Net Weight:** 13lb  
5.9kg

## 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>.

### Light Petroleum Naphtha:

-Extremely flammable. Vapors may cause flash fire. Keep away from heat, sparks, open flames, or any other ignition sources. Do not smoke near the area. Turn off all stoves, heaters, motors and pilot lights during use and until all vapors are gone.

-Beware of static discharges.

-Vapors or spray mist harmful if inhaled.

-Keep container closed

-Prevent buildup of vapors by opening all windows and doors to achieve cross ventilation. Also, use under a hood to ensure proper ventilation.

-Avoid contact with eyes, skin and clothing. Always wear safety clothing (eye protection, gloves, lab coat, etc.)

-Wash hands thoroughly after each use.

## 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

- K14601(115V) / K14671 (220-240V) / Tag Closed Cup Flash Point Tester
- K14520 Brass Test Cup
- Operation Manual for Tag Closed Cup Flash Point Tester

### Accessories:

- 250-000-09F ASTM 9F Thermometer  
Range: 20 to 230°F
- 250-000-09C ASTM 9C Thermometer  
Range: -5 to +110°C
- 250-000-57F ASTM 57F Thermometer  
Range: -4 to +122°F
- 250-000-57C ASTM 57C Thermometer  
Range: -20 to +50°F

### 3.2 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.
5. Lift instrument from cart and place on bench.

- 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.

### 3.3 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.

**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 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.



**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.

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



**WARNING:** For safety, disconnect the power when performing any maintenance and/or cleaning. Do **NOT** turn the power on unless the bath is filled with the proper medium; otherwise, damage may occur to the unit and the warranty will be void.

## 4 Descriptions

Figures 1 through 4 show the separate parts that come with this unit.



Figure 1: Base of Tag Closed Cup Flash Point Tester

### Descriptions of Figure 1:

- Power switch:** After the unit is connected to a power outlet, the power switch turns the unit on. The power switch in the “up” position turns it on and the power switch in the “down” position turns it off.



**WARNING:** Be sure to completely Power Off 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. **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.



Figure 2: Water Bath

**Descriptions of Figure 2:**

1. **Thermometer Holder:** This holds the thermometer used to measure the temperature of the water bath.
2. **Water Inlet**
3. **Water Outlet (Overflow)**

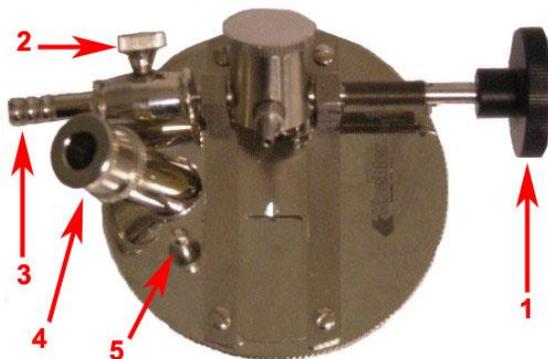


Figure 3: Cover Assembly

**Descriptions of Figure 3:**

1. **Black Knob:** The black knob introduces the test flame to the sample inside the test cup.
2. **Needle Valve:** The needle valve adjusts the flame.
3. **Gas Inlet:** This inlet connects to a gas source.
4. **Thermometer Holder:** This holds the thermometer used to measure the temperature of the sample.
5. **Flame Reference Guide:** The flame should be the same size as this flame reference guide. The flame size can be adjusted by regulating the valve on the gas hose connection.



Figure 4: Brass Test Cup

Figure 5 shows the entire unit assembled.



Figure 5: Assembled Tag Closed Cup Flash Point Tester

## 5 Operation

1. All tests should be made in a room free of excessive drafts. The room or compartment should be darkened sufficiently to allow the flash to be readily seen. Avoid breathing over the surface of the test oil.
2. Set the tester on a firm and level table/bench. Put the water bath thermometer into place. Set a receptacle under the overflow sprout to catch the overflow. Fill the water bath with water at such a temperature as to have the temperature of the bath at least 20°F (11°C) below the probably flash point of the oil to be tested.
3. Put the oil cup in place in the water bath. Measure 50mL of the oil to be tested in a graduate and place into the oil cup. Temperature of the oil must be at least 20°F (11°C) below its probable flash point of the oil to be tested.
4. Remove any air bubbles from the surface of the oil using a piece of clean, dry paper.
5. If gas is available, place the cover on with the flash point thermometer in place and gas tube attached. The input pressure should not be greater than 2psi. The same style thermometer can be used for both the bath and the sample. Light the pilot light on the cover and adjust the flame to the size of the flame reference guide (Figure 3 #5) by regulating the valve on the gas hose connection.
6. Record the barometric pressure.
7. Record the temperature of the sample at the start of the test.
8. When the temperature of the oil reaches about 9°F (5°C) below the probable flash point of the oil, turn the black knob on the cover to introduce the test flame into the cup and turn it promptly back again. Do not let it snap back. The time consumed in turning the knob and back should be about one second.
9. Record the time of making the first introduction of the test flame.
10. Record the temperature of the oil sample at the time of the first test flame. Repeat the application of the test flame at every 1°F (0.5°C) rise in temperature of the oil until there is no flash of the oil within the cup. Do not be misled by an enlargement of the test flame or halo around it when it is entered into the cup, or by a slight flickering of the flame; the true flash consumes the gas in the top of the cup causing a very slight explosion.
11. Record the flash point and the time at which it is reached.
12. If the rise in temperature of the oil from the time of making the first introduction of the test flame to the time at which the flash point is reached is faster than 2°F (1.1°C) or slower than 1.6°F (0.9°C) per minute, the test should be questioned and the alcohol heating should be adjusted to correct the rate of heating. It will be found that the wick of the alcohol lamp can be so accurately adjusted as to give a uniform rate of rise in temperature within the above limits and remain so.
13. Do not turn off the test flame with the small regulating valve. Leave it adjusted to give the proper size of the flame.
14. Having completed the preliminary test, remove the heating lamp. Lift up the oil cup cover and wipe off the thermometer bulb. Lift out the oil cup, empty it and carefully wipe it clean.
15. Pour cold water into the water bath, allowing it to overflow into a receptacle until the temperature of water in the bath is lowered to 150°F (8°C) below the flash point of the oil as shown by the previous test. With cold water of nearly constant temperature, it will be found that a uniform amount will be required to reduce the temperature of the water bath to the required point.
16. Place the oil cup back into the bath and measure into it a 50mL charge of fresh oil. Destroy any bubbles on the oil's surface, place the cover back on with the thermometer, put in the heating lamp, record the temperature of both the oil and water, and proceed to repeat the test as described above. Introduce the test flame for the first

time at a temperature of 10°F (5.5°C) below the flash point obtained on the previous test.

17. Record the flash temperature as per test method (ASTM, IP, ISO, etc.).

## 6 Maintenance



**WARNING:** Disconnect power to the unit before servicing to avoid exposure to high voltages and/or temperatures which may result in personal injury or death. If you have any questions about maintaining your equipment, please do not hesitate to contact the Koehler technical service department.

### 6.1 Routine Maintenance

The K146X1 Tag 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).

### 6.2 Spare Parts

#### 6.2.1 Model K14601 (115V)

Catalog No.	Product Description
K14510	Mechanical Top, Complete
K14520	Brass Cup
K146-1-7	Water Bath Only
010-115-005	Wattstat, 115V
190-120-001	Heater, 115V

#### 6.2.2 Model K14671 (220-240V)

Catalog No.	Product Description
K14510	Mechanical Top, Complete
K14520	Brass Cup
K146-1-7	Water Bath Only
010-230-004	Wattstat, 240V
190-240-009	Heater, 240V 150W

## 7 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.

## 8 Service

Under normal operating conditions and with routine maintenance, the K146X1 Tag Closed Cup Flash Point Tester does not require service. Any service problem can be quickly resolved by contacting Koehler's technical service department either by letter, phone, fax, or email. In order to assure the fastest possible service, please provide us with the following information.

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Date of Shipment: \_\_\_\_\_

## 9 Storage

This laboratory test instrument is equipped with electrical components. Storage facilities should be consistent with an indoor laboratory environment. This testing equipment should not be subjected to extremes of temperature and/or moisture. This equipment was shipped from the factory in a corrugated cardboard container. If long term storage is anticipated, re-packing the instrument in a water-resistant container is recommended to ensure equipment safety and longevity.

## 10 Warranty

We, at Koehler, would like to thank you for your equipment purchase, which is protected by the following warranty. If within one (1) year from the date of receipt, but no longer than fifteen (15) months from the date of shipment, Koehler equipment fails to perform properly because of defects in materials or workmanship, Koehler Instrument Company, Inc. will repair or, at its sole

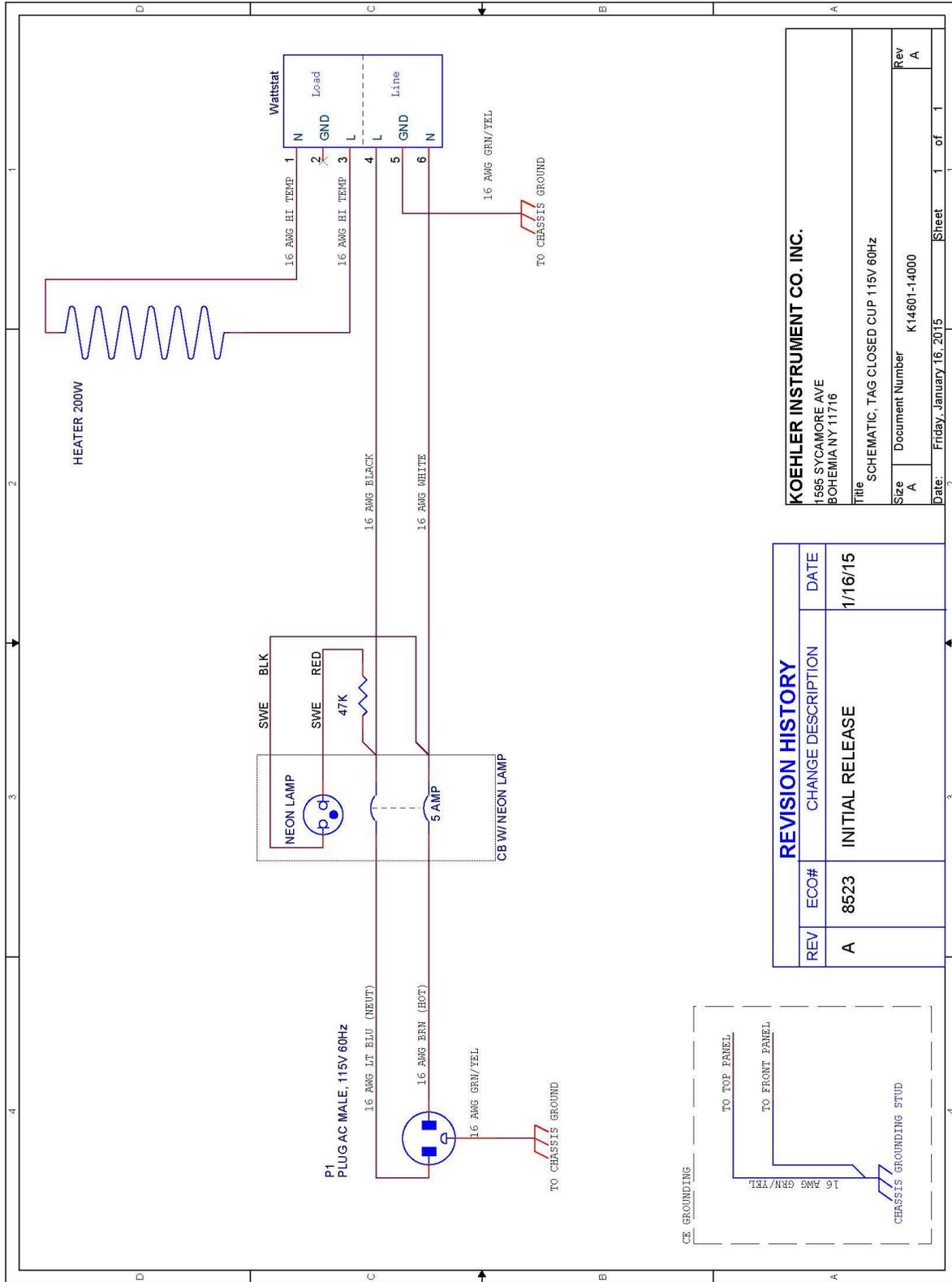
discretion, replace the equipment without charge F.O.B. its plant, provided the equipment has been properly installed, operated, and maintained. Koehler Instrument Company must

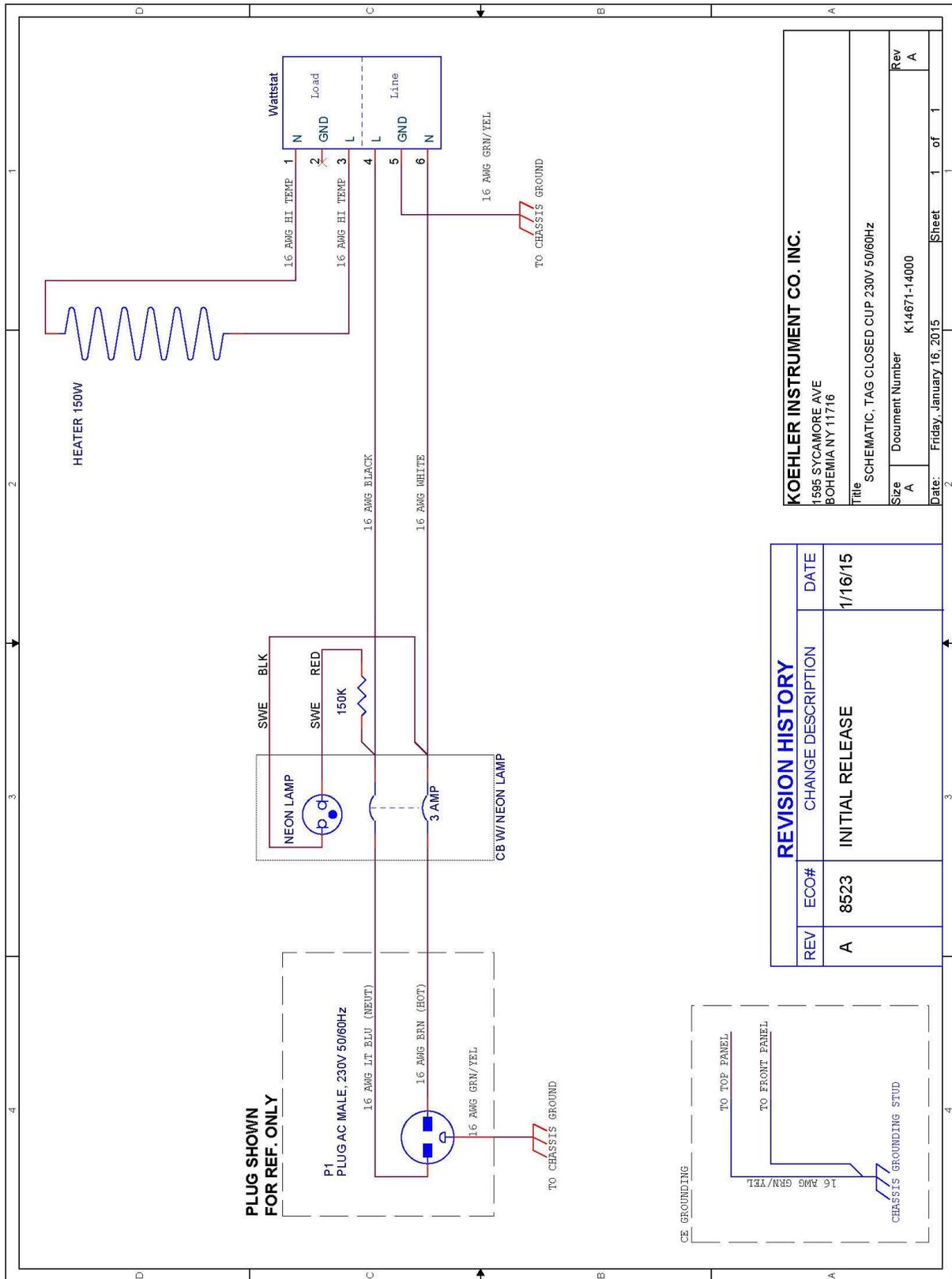
be advised in writing of the malfunction and authorize the return of the product to the factory. The sole responsibility of Koehler Instrument Company and the purchaser's exclusive remedy for any claim arising out of the purchase of any product is the repair or replacement of the product. In no event shall the cost of the purchaser's remedy exceed the purchase price, nor shall Koehler Instrument Company be liable for any special, indirect, incidental, consequential, or exemplary damages. KOEHLER INSTRUMENT COMPANY, INC. DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. Please save the shipping carton in the event the equipment needs to be returned to the factory for warranty repair. If the carton is discarded, it will be the purchaser's responsibility to provide an appropriate shipping carton.

## 11 Returned Goods Policy

To return products for credit or replacement, please contact Koehler Customer Service with your purchase order number, our packing list/invoice number, the item(s) to be returned and the reason for the return. You will be issued a Returned Authorization (RA) number, which must be prominently displayed on the shipping container when you return the material to our plant. Shipping containers without an RA number prominently displayed 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.

## 12 Wiring Diagrams





REV	ECO#	CHANGE DESCRIPTION	DATE
A	8523	INITIAL RELEASE	1/16/15

**KOEHLER INSTRUMENT CO. INC.**

4506 SYCAMORE AVE  
BOHEMIA NY 11716

Title SCHEMATIC, TAG CLOSED CUP 230V 50/60Hz

Size A Document Number K14671-14000

Date: Friday, January 16, 2015 Sheet 1 of 1



