K16203 / K16273
Pensky-Martens Closed Cup Flash Tester

Operation and Instruction Manual

REV D

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CERTIFICATE OF CONFORMANCE

Manual Pensky-Martens Closed Cup Flash Point Tester
K162XX

This certificate verifies that part number K162XX, Manual Pensky-Martens Closed Cup Flash Point Tester, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:	**ASTM D93**
	IP 34
	ISO 2719
	AASHTO T73-811
	DIN 51758
	FTM 791-1102
	NF M 07-019

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

CE

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: K16273 Pensky Martens Closed Cup Flash Point Tester with Electric Heating and Stirrer Motor
Model Number(s): K16273 with K16229 or K16228

Qualifications:

This product may only to 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
EN 55011:2007	Conducted Emissions Test for Group 1 Class A as detailed in the product's technical documentation.

James R. Ball
Dir. Research & Development

1595 Sycamore Av.
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United States of America
March 21, 2014

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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

Koehler Model K16273 Pensky-Martens Closed Cup Flash Point Tester determines the flash points of fuels, lubricating oils, liquid containing suspended solids and liquids that tend to form a surface film during testing. It determines the flash points of a wide range of products by a closed cup method with a flow speed stirring of the sample.

This manual provides operating instructions for the K16273 Pensky-Martens Closed Cup Flash Point Testers, and should be used in conjunction with applicable standard test methods. The following sources are recommended:

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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Tel: +1 631 589 3800
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1.2 Recommended Publications

1. American Society for Testing and Materials (ASTM)
   100 Barr Harbor Drive
   West Conshohocken, Pennsylvania 19428-2959, USA
   Tel: +1 610 832 9500
   Fax: +1 610 832 9555
   http://www.astm.org
   email: service@astm.org

   ASTM Publication:
   - ASTM D93: Flash Point by Pensky-Martens Closed-Cup Tester

2. 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 2719

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 34: Closed Flash Point: Pensky-Martens Method

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

   DIN Publication:
   - DIN 51758:

5. Federal Test Method (FTM)

   FTM Publication:
   - FTM 791-1102

6. American Association of State Highway and Transportation Officials (AASHTO)

   AASHTO Publication:
   - AASHTO T73-811

1.3 Electrical Requirements

Model No	Voltage	Frequency	Amps
K16203	115V	60Hz	6.5A
K16273	220-240V	50/60 HZ	3.4 A

2 Safety Information and Warnings

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

Equipment Modifications and Replacement Parts. Any modification or alteration of this equipment from that of factory specifications is not recommended and 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.

IMPORTANT SAFETY INFORMATION:

- As an important safety precaution, **NEVER** use unregulated gas with the Pensky-Martens Closed Cup Flash Point Tester!
- Use in an area that is adequately ventilated, preferably with an exhaust hood to remove any fumes that may be emitted during the test.
- Conduct tests behind a safety shield especially if you are not sure of the flash point or the ignition temperature. Also wear safety glasses during tests.
- At all times refrain from bending over the cup when the test is being carried out. Unexpected flash can cause serious injury to exposed body parts in close proximity to the cup.
- Exercise caution in removing and replacing the cup in the furnace. Hot surfaces and substances may cause injury if they come in contact with the operator.
- All hose connections should be properly clamped and tested for leaks prior to carrying out the tests.
- The gas source should be equipped with a proper safety regulator capable of delivering 1 psi of pressure to the test flame assembly.

3 Getting Started

3.1 Packing List

- K162X3 Pensky-Martens Closed Cup Flash Point Tester
- K16020 PM Test Cup with Handle
- K16010 Cover Assembly
- K145-8 Thermometer Holder
- K160-1-21A Set of Latex Tubing
- K162X3-Manual Pensky-Martens Closed Cup Flash Point Tester Operation and Instruction Manual

3.2 Required Accessories

Catalog No.	Accessory
K16220	Stirrer Motor, 115V 60Hz
K16228	Stirrer Motor, 220-240V, 60Hz
K16229	Stirrer Motor, 220-240V, 50Hz
250-000-09F	ASTM 9F Thermometer Range 20 to 230°F
250-000-09C	ASTM 9C Thermometer Range: -5 to +110°C
250-000-10F	ASTM 10F Thermometer Range: 200 to 700°F
250-000-10C	ASTM 10C Thermometer Range: 90 to 370°C

3.3 Unpacking

This unit comes packed partially disassembled to fit into a pre-formed carton for shipping.

1. Remove the partially disassembled unit and place on a firm, level table in a room free from excessive drafts where there are no corrosive fumes, excessive moisture, high room temperatures or excessive heat.

2. 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 in 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 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.

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. 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.

3.5 Re-assembly

The following components have been disassembled for shipping:

- K16010 Cover Assembly
- K16020 Cup
- K160-3-11 Cup Holder
- K160-1-21A Latex Tubing

1. Place the Cover Assembly into the Cup and place inside the air bath. Align the cup into the screw holes on top of the brass bell.

2. Place the Cup Holder on the motor mounting rod at a convenient height and tighten the thumb screw.

3. Install the stirrer motor on the support rod. Only position the stirrer motor as shown:

After approximately 100 hours of use, remove the motor cover and locate the two drive shafts. Place a few drops of light lubricating oil such as **3 in 1** into the bottom of each shaft and re-install the motor cover.

4. 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. Connect two rubber hoses from the cover assembly to main gas pipe outlets.

5. With the unit on a firm, level table, connect the line cord to a properly fused and grounded receptacle of the correct voltage as indicated in Section 1.3. **Be sure the Power switch is off before connecting the line cord**. To double check the electrical requirements, refer to the information plate on the side of the instrument. The unit is now ready for operation. Proceed to Operating Instruction.

4 Descriptions

4.1 Instrument Description

1. **Main 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 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. **Heater Control Knob.** 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. **Test Flame Gas Adjustment (A).** 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. **Pilot Flame Gas Adjustment (B).** Turn to adjust the size of the pilot 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.

7. **Pilot Flame Gas Outlet (B).** Connect latex tube to Pilot Flame Inlet on Cover Assembly

8. **Test Flame Gas Outlet (A).** Connect latex tube to Test Flame Inlet on Cover Assembly

9. **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.

10. **Thermometer Port.** Designed to accommodate ASTM 9C and 10C thermometer and hold a desired height in test cup.

11. **Test Cup Holder.** For holding test cup after completion of test to cool.

12. **Motor.** Mount Motor on Vertical motor rod. Motor is designed to rotate flexible stirrer shaft at two prescribed speeds as per ASTM D93.

13. **Flexible Stirrer Shaft.** Connects from Stirrer Motor to Stirring blade. Stirrer Shaft can easily be removed from Stirrer motor by loosening motor coupling.

14. **Shutter Arm.** Rotate shutter arm to open and close cover assembly at prescribed intervals during testing.

15. **Cover Assembly.** Comprised of Gas and Pilot Flame tubes, Flame Indicator bead, Stirrer Blade and coupling, Shutter and Shutter Arm, and thermometer holder.

16. **Brass Test Cup and Handle.** The brass test cup contains the test specimen and is built with a heat resistant handle. An indicator line is engraved inside the test cup for proper sample level.

17. **Motor Support Rod Adjustment Screw**. For tightening and securing motor support rod to base assembly.

18. **Stirrer Motor Power Receptacle.** For plugging in stirrer motor power cord.

5 Operation

Be sure to read the safety and hazard warnings, the installation procedure and any of the standard test methods mentioned in the Introduction of this manual before operating this instrument.

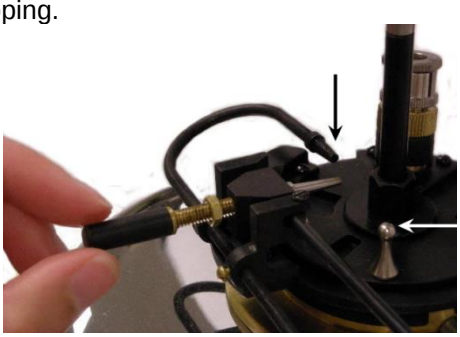
1. Thoroughly clean and dry all parts of the cup and its accessories before starting the test. Particular care should be taken to avoid the presence of any flammable products used to clean the apparatus.

2. Fill the cup with the sample being tested up to the level indicated by the filling mark.

3. Place the lid on the cup and set the cup inside the stove. Be sure to have the locating grooves properly aligned.

4. Insert the thermometer into the thermometer port. If it is known that the sample will flash above 220°F or 122°C, the ASTM 10F or 10C Thermometer may be used. Otherwise, it is preferable to begin testing with either the ASTM 9F or 9C Thermometer.

5. Light the test flame with an external ignition source. Adjust the flame using the coarse adjustment screw. Use the valve screw (shown in the picture, top right) to adjust the flame so that it is 5/32" diameter, the same size as the bead provided for comparison (indicated by white arrow). The pilot flame (indicated by black arrow) is provided in case the test flame extinguishes upon dipping.



6. Adjust the dial on the variable heat control until the temperature reading on the thermometer increases to no less than 9°F, or more than 11°F per minute. Turn the dial fully clockwise and back counterclockwise to set the temperature. The dial is non-linear.

7. Connect the stirrer to the stirrer motor by turning the placement screw (shown below) counterclockwise and inserting the flexible stirrer. Turn the placement screw clockwise to tighten. Make sure the flexible stirrer has a smooth curve when inserting into the motor. If it is too tight or too loose, the shear stress will break it.

   NOTE: The motor coupling on the right side of the motor (closest to the mounting rod) rotates at a higher RPM in accordance to ASTM D93 Procedure B. The motor coupling on the opposite side rotates at a lower RPM in accordance to ASTM D93 Procedure A.

8. **Shut off the stirrer motor during the application of the test flame.** Apply the test flame at each temperature reading by turning the fiber knob clockwise. The cover assembly will open and the test flame will dip into the sample cup. Apply the test flame burner so that the test flame is lowered in one-half second, left in its lowered position for one second, and quickly raised to it's high position. Dip the test flame every 2°F, up to 220°F. For temperature ranges above 220°F, apply the test flame at each temperature reading of 5°F.

9. Record the temperature when the flash point occurs.

10. For full details on the testing procedure, refer to standard test methods listed in section 1.2.

6 Troubleshooting

6.1 Test Cover (Shutter) Jams

Solution:

- Disassemble cover assembly and clean parts with appropriate solvent.
- Check for smooth operation

6.2 Gas Lines on Test Cover Break

Solution:

- **Pilot flame gas line:** Replace by loosening the set screw and inserting a new ignitor tube and nozzle assembly.
- **Test flame gas line:** Replace the entire pivot block and jet tube assembly (K160-1-8A) which is held in place by two screws.

6.3 Stirrer Shaft in the Cover Assembly Does Not Rotate

Solution:

- Remove the propellers from shaft (screws)
- Remove shaft from cover assembly and clean. Replace if needed.
- Return shaft to the cover assembly and check for smooth operation.
- Replace propellers in proper order.

6.4 Gas Leaks and Shooting Flames

Solution:

- Check for delivery pressure of the supply gas (1 psi max)
- Close valve all the way and check for leakage. Replace valve and/or latex tubing if need be.

6.5 Heater Does Not Operate

Solution:

- Access heater by loosening the screws in the back support and swing bell assembly out of the way.
- Check heater for continuity. If open, replace heater.
- Replace variable control. Access via bottom of heater unit housing.

6.6 Stirrer Motor Does Not Operate

Solution:

- Ensure the power cord is plugged into the receptacle.
- While unplugged, remove cover from motor housing and check drive belt. Replace if needed.
- Remove back cover of housing and check for clearance between the cover and the fan.

6.7 Stirrer Motor Runs Hot

Solution:

- Check electrical service for compatibility.
- It is normal for the stirrer housing to be warm.

6.8 Flexible Motor Coupling Breaks

Solution

- Replace the flexible stirrer coupling assembly (K160-9) by inserting the end receptacle into the drive motor and cover assembly.
- To prevent premature breakage of the motor spring:

- Check the stirrer shaft in cover assembly for unrestricted motion.
- Position the drive motor as high as possible on the support rod and ensure that the coupling is a gentle arc between the drive motor and cover assembly.

7 Replacement Parts

Part Number	Replacement Part
K16010	Cover Assembly
K16020	Pensky-Martens Test Cup
K160-3-3	Brass Bell
K160-3-2	Cast Iron Bell
K160-1-14	Thermometer Ferrule Adapter
K145-8	Thermometer Ferrule
K160-9	Flexible Shaft and Coupling
K16220	Stirrer Motor, 115V, 60 Hz
225-115-002	Brick Heater, 115V, 1000W †
K16228	Stirrer Motor, 220-240V 60 Hz
K16229	Stirrer Motor, 220-240V, 50 Hz
225-230-002	Brick Heater, 220-240V, 1000W ‡
K160-1-8A	Pivot, Block and Jet Tube Assembly
K160-3-12	Main Gas Pipe Assembly

Note:
† For 115V Unit (K16203) ONLY
‡ For 220-240V Unit (K16273) ONLY

8 Assembly Diagrams

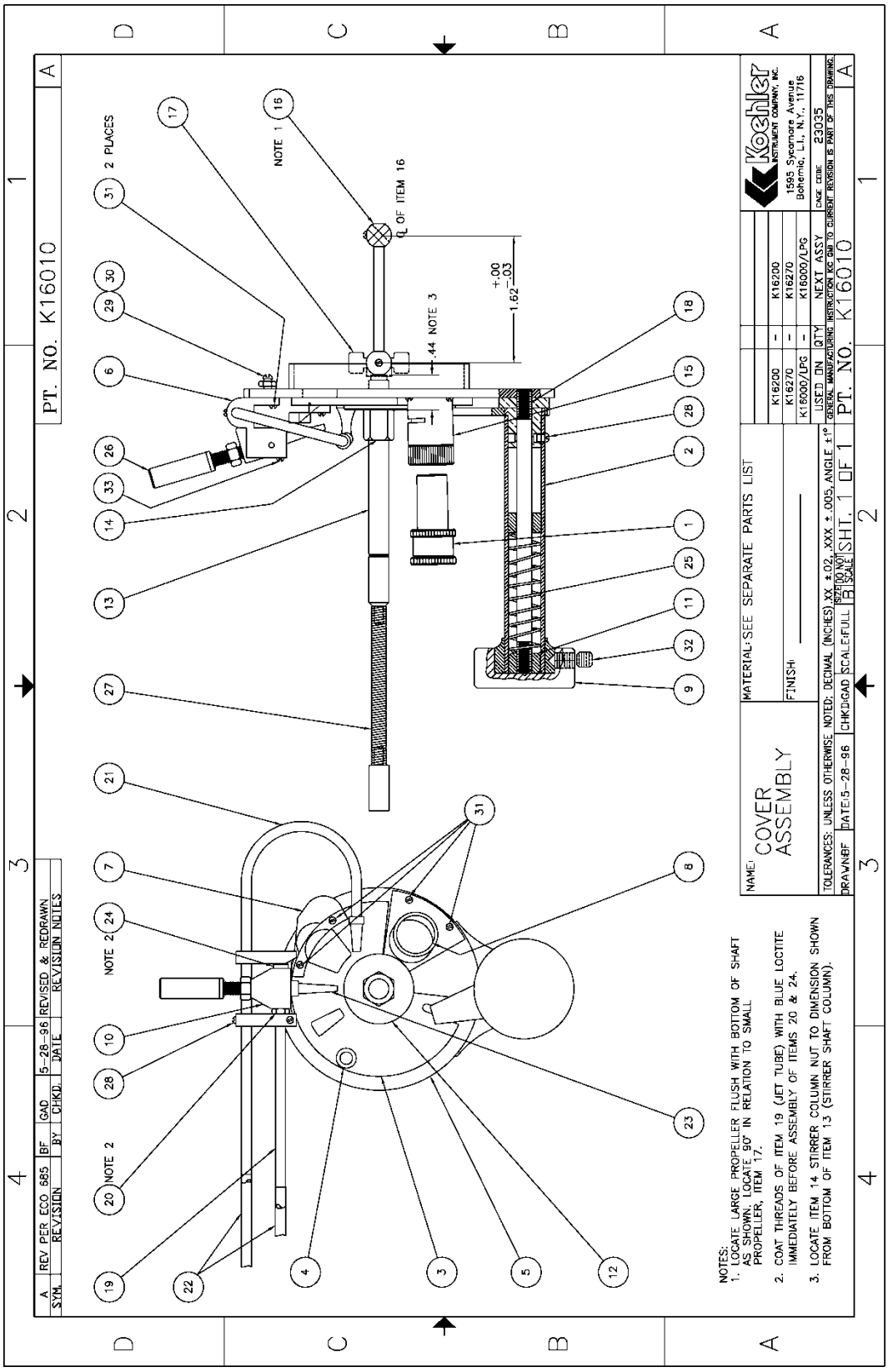
8.1 K16010 Cover Assembly

Parts List:

Item No	Description	Part Number
1	Thermometer Ferrule	K145-8-4
2	Operating Tube & Spring Anchor	K160-1-1E
3	Shutter	K160-1-2
4	Flame Guide	K160-1-2A
5	Shutter Base Plate	K160-1-3
6	Pivot & Tube Assembly	K160-1-4
7	Cam	K160-1-5A
8	Thermometer Tube Assembly	K160-1-6
9	Fiber Knob	K160-1-7
10	Pivot Block	K160-1-8
11	Operating Tube Upper Spring anchor	K160-1-10
12	Pivot, Shutter	K160-1-11
13	Stirrer Shaft Column	K160-1-12
14	Stirrer Column Nut	K160-1-13
15	Ferrule Adapter	K160-1-14
16	Large Propeller	K160-1-16
17	Small Propeller	K160-1-17
18	Shutter Tube Support Assembly	K160-1-18
19	Jet Tube	K160-1-19
20	Jet Tube Collar	K160-1-20
21	Igniter Tube and Nozzle Assembly	K16010-01000
22	Set, Tubing, Latex	K160-1-21A
23	Jet	K160-1-22
24	Pivot	K160-1-23
25	Torsion Spring	K160-1-25
26	Jet Needle	K160-1-27
27	Stirrer Shaft Assembly	K160-9
28	Screw, R.H., B.N.P., #2-56 x 1/8 Long	22B-108-00N
29	Screw, Fil Hd., B.N.P., #2-56 x 7/16 Long	22B-716-09X
30	Nut, Hex, Brass #2-56	22B-000-05X
31	Screw, R/H/. Brass #2-56 x 3/16 Long	22B-316-00X
32	Screw, Socket Set, #8-32 x ¼ Long	22G-104-104S
33	Screw, R.H. B.N.P, #2-56 x 5/16 Long	22B-516-00X

Item numbers correspond to the following drawing:

Cover Assembly Diagram:



9 Service

Under normal operating conditions and with routine maintenance, the K162X3 Manual Pensky-Martens Flash Point Tester 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: _____

10 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.

11 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.

12 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.

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