

Flash-Point with Closed Cup - Pensky-Martens Method - PMA 4 (automatic)

ASTM D 93-A, ASTM D 93-B, ASTM D 6751, ISO 2719-A, ISO 2719-B, ISO 15267, DIN 51758 (obs.), EN 22719 (obs.), FTM 141-4293, FTM 791-1102, IP 34-A, IP 34-B, JIS K2265, NF M07-019 (obs.), AASHTO T73 , AASHTO T172 , BS 684-1.17, BS 2839 (obs.)

Product group(s): Flash Point

User group(s): Biodiesel, Biofuel, Bitumen, Engine Oil, Fuel, Jet Fuel, Lube Oil, Mastics, Paint, Power Plant, Regulatory Authorities, Solvent, Turbine Fuel, Turbine Oil, Varnish

Scope: The flash-point determination of petroleum products is using:

Method A:

for distillate fuels (diesel, kerosene, heating oil, turbine fuels), new lubricating oils, paints, vanishes and other homogeneous liquids.

Method B:

for residual fuel oils, cutback residual, used lubricating oils, non-homogeneous materials like mixtures of petroleum liquids & solids, surface-film building petroleum liquids or liquids with a viscosity above 5.5 cSt at +40°C. Used in shipping & safety regulations to define flammable and combustible materials.

Easy to Operate

The PMA 4 is equipped with a large LC-display visible up to 10 m distance and the multifunction-head - ONE-TWIST.

All the operator has to do is:

- insert the filled test cup, complete with the lid and shutter assembly, plug-in the multi-detector
- swing the multi-function-head - ONE-TWIST into its test position and all electrical connections and the coupling of the stirring motor
- select one of the 14 test methods
- set the expected flash-point
- if desired, enter a sample ID

If the last 3 characters of a sample ID are digits, the PMA 4 will automatically count forward in the series for the following measured samples.

Further the PMA 4 has an internal memory, where the last 4 tests with its parameters and 99 measured values are stored.

Even better:

use PMACon software, which allows remote control of the PMA 4 and test data storage capability on a PC

Versatility

In addition to the ASTM D 93 and ISO 2719, with their modifications for methods A and B or for samples with high or low viscosity, PMA 4 provides two test programs which can be fully customized by the user.

Together with the wide measuring range (approximately +20°C up to +360°C) this offers a great versatility:

The user of the PMA 4 is not bound to the standardized test methods only but can adapt the instrument to individual requirements.

Such a problem exists, for instance, when measuring the flash-point of bitumen.

For example flash point measurements of Bitumen:

One of the two user definable programs can be used to define the temperature where the stirrer begins to rotate or to which temperature the PMA 4 cools down (e.g. +180°C) after the test is finished. This prevents solidification of the test substance in the test cup and also saves time to warm up the sample to its melting-point.

Reliable and Precise

The operator of the PMA 4 has the choice to either apply a gas flame or an electrical igniter for each flash test, as the PMA 4 is equipped with both as a standard feature.

Un-interrupted burning of the gas flame is controlled and if necessary a blown off flame is automatically re-lit.

Since the flash-point temperature is dependent upon the local barometric pressure, PMA 4 measures the barometric pressure during the flash and makes an automatic correction.

To be sure that the Pt-100 probe for sample temperature measures and displays correctly, the PMA 4 temperature indication can be checked using a special probe verification program, in conjunction with a special test lid and a certified thermometer (available accessories).

Time Saving and Economical to Operate

For samples with a high flash-point the RAPID-heating program heats at an accelerated rate of 8.5 K/min, until 30 K below the expected flash-point, when the heating rate is reduced to the standardized rate of 5 to 6 K/min.

Another time saving feature is the SEARCH program, which enables a quick determination of fully unknown samples. The approximate flashpoint of a sample must be known to perform standardized flash-point measurements correctly. In the search mode the PMA 4 heats the sample at 8.5 K/min and the igniter is automatically applied every 5 K.

Compact Design

The PMA 4 occupies a bench-top area of only 23 cm wide and 47 cm in depth. Effectively using the the work bench depth and not wasting the width.

pPM - Cup

This is a special test insert with a volume of approx. 15 ml for cases, where a small sample volume is available only (Milli-Test-Insert).

Although this cup does not comply with the official standards, experiments have shown that in many cases and even with a sample volume of only 2 ml, good reproducibility and test results can be achieved which agree well with those measuring strictly according to the standards.

The pPM - cup extends the application of the PMA 4 to a domain where only small sample quantities are available, e.g. cosmetics industry with very expensive perfume oils.

Automatic Sample Changer

As an exceptionally time and cost saving alternative, the PMA 4 is available with an automatic sample changing device. This sample changer carrousel can carrying a maximum of 12 test cups. The device is controlled by the PMA 4, still the use of a PC is highly recommended.

The PMA 4 is supplied with a Windows-software-package "Quick Run". Under full compliance with the standards this software is able to increase the performance of this instrument by up to 50 % compared with conventional automated testers.

The instrument is small enough to fit into a fume-hood.

The Sample Changer is available as a standard-version (12-2770/1) and with Fire-Extinguisher (12-2772/3).

The Sample Changer with Sample-Cooling:

It is equipped like the standard-version, but with insulating cover and coolant circulator.

The carrousel is made out of a two-layer metal block with internal heat exchanger coil to stabilize the temperature to a level deviating from the ambient temperature.

An acrylic-glass cover is designed to reduce the loss of cooling energy. A coolant circulator is supplied with insulates hoses and connected to the sample changer to keep the temperature in the samples at approx. +4°C (ambient not exceeding +24°C).

The Sample Changer is available as a standard-version with cooling (12-2776/7) and with Fire-Extinguisher (12-2778/9).

Operational Safety

The PMA 4 is equipped with multiple sensors which monitor the proper functioning of this instrument. One sensor continually checks the performance of the electric igniter. Outside of control limits, possibly due to excessive ageing or damage, a "Change Igniter" warning is displayed.

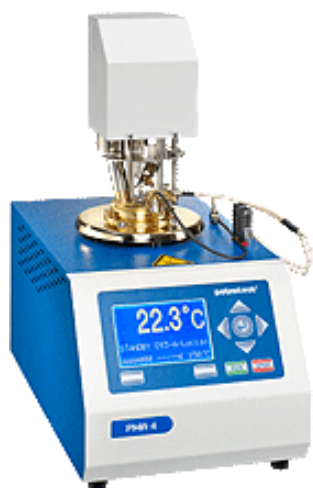
The PMA 4 also displays error messages if the first application of the igniter results in a flash-point being detected, or when no flash-point is detected at the end of a test program.

There are substances which do not have a flash-point in a closed cup. Their gases burn outside the sample cup. This will be detected and signaled, preventing an accident or damage.

A fire extinguishing option is available with the PMA 4.

Multi-function-head - ONE-TWIST with its quick-coupling widely avoids touching not surfaces.

- automatic Barometric Pressure Correction
- 2 User Definable Test Programs
- Milli-test insert with a volume of approx. 15 ml
- swivel-around Multi-Function-Head - ONE- TWIST
- Software Windows compatible



Flash-Point Pensky-Martens Test Equipment

- Flash-Point Tester - PMA 4
(with or without Fire-Extinguishing Device)

Technical Data


<u>Temperature Range:</u>	+40 to +360 °C (+104 to +680 °F)
<u>Programs:</u>	(acc. to international standards) 4x ASTM-Standards 4x ISO-Standards 2x Rapid-Heating 2x Search Run 2x User Defined
<u>Ignition Type:</u>	gas and electric (included)
<u>Stirring speeds:</u>	60 to 250 rpm (adjustable)
<u>Sensing System:</u>	Differential-Thermocouple
<u>Barometric Pressure Sensor:</u>	automatic correction of the measured values
<u>Safety:</u>	overheat protection, automatic shut-off
<u>Hardware Clock:</u>	included
<u>Interface:</u>	RS-232 for printer RS-232 for computer download (USB-converter available)
<u>Gas Connection:</u>	for propane/butane or natural gas (max. 0.05 bar)
<u>Display:</u>	°C or °F (selectable)
- Dimension:	Width 90 mm, Height 56 mm
- Digit Size:	Height 25 mm
<u>Dimensions:</u>	Width 230 mm Depth 470 mm, plus wall clearance Height 460 mm Weight 12 kg
<u>Power Consumption:</u>	900 Watts
<u>Power Supply:</u>	230/115 V, 50/60 Hz (selectable)




Main Unit

12-1770	PMA 4 - Automatic Flash-Point Tester Pensky-Martens Method
	<p><u>Pensky-Martens Method:</u> ASTM D 93 A+B - JIS K2265 - AASHTO T73 - AASHTO T172 - (EN 22 719) - FTM 791-1102 - FTM 141-4293 - IP 34 A+B (BS 2839) - ISO 2719 A+B - (DIN 51758, NF M07-019)</p> <p><u>Biodiesel Method:</u> ASTM D 6751</p> <p><u>Limit Test (eatable oils & fats):</u> ISO 15 267 - BS 684-1.17</p> <p><u>Consisting of:</u> high-grade stainless steel housing with two-color powder coated, touch-key panel with large LC-display visible up to 10 m distance, swivel-mounted Multi-Function-Head - ONE-TWIST, two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and software upgrading through bi-directional interface, automatic barometric pressure control (correction), automatic overheat protection, power controlled/monitored electric igniter, gas igniter with auto-relighting and safety shut-off, re-cooling fan</p> <p><u>PC-Software "PMACon" (Windows®):</u> for easy handling and storing of data as well as transfer of program from the PC-Memory into the PMA 4. Easy to read tableau. Results can be stored in the memory. Numerous programs can easily be set, copied from the memory and modified. Permanent indication of test status. Due to the most comfortable properties of this software to display and modify actual and future test sequences, it is most recommendable for samples of permanently changing characteristics.</p> <p><u>Supplied with:</u> 1 cup "PM" 1 cover "PM" 1 multi-detector "PM" 1 gas igniter 1 electric igniter 1 tong for cup 1 tray for cup and multi-detector 1 PC-software "PMACon"</p> <p><u>Temperature Range:</u> +40 ... +360 °C (+104 ... +680 °F)</p> <p>Power supply: 115/230 V, 50/60 Hz (user selectable)</p>

12-1767	PMA 4 - Automatic Flash-Point Tester Pensky-Martens Method
	<p><u>Consisting of:</u> see 12-1770, but with automatic fire-suppression system for connection to external Nitrogen- or Carbon Dioxide supply.</p> <p><u>Software (Windows®):</u> see 12-1770</p> <p><u>Supplied with:</u> see 12-1770</p> <p>Power supply: 115/230 V, 50/60 Hz (user selectable)</p>

Options & Accessories

12-0777	Standard Test Insert "PM"
	<p><u>Consisting of:</u> 1 cup and 1 cover (standard dimensions, made of brass)</p>
12-0785	Standard Cup "PM"
	approx. 75 ml (with filling mark), made of brass
12-0786	Standard Cover "PM"
	for standard cup with shutter assembly, made of brass

12-0787	Standard Multi-Detector "PM" with flash-point detector (thermocouple) and temperature probe (made of glass)
12-1790	Test Insert "PM-NIRO" <u>Consisting of:</u> 1 cup and 1 cover (standard dimensions, made of stainless steel)
	
12-1791	Cup "PM-NIRO" approx. 75 ml (with filling mark), made of stainless steel
12-1792	Cover "PM-NIRO" for test cup with shutter assembly, made of stainless steel
12-0784	Multi-Detector "PM-NIRO" with flash-point detector and temperature probe (made of stainless steel)
12-1777	Milli Test Insert "pPM" <u>Consisting of:</u> 1 cup and 1 cover for sample quantity between 2...15 ml, ideal 7 ml, made of brass
	
12-1785	Milli Cup "pPM" approx. 15 ml, made of brass
12-1786	Milli Cover "pPM" for test cup with shutter assembly, made of brass
12-1787	Milli Multi-Detector "pPM" with flash-point detector (thermocouple) and temperature probe (made of stainless steel)
12-0782	Calibration Set - PMA/PM <u>Consisting of:</u> 1 calibration cover, 1 thermometer ASTM 9C/IP 15C, 1 thermometer ASTM 10C/IP 16C
	
12-1762	Calibration-Adapter for Pt-100 in multi-detector
12-0793	Handle for permanent fixing at the cup
12-1508	Draft Deflector (recommended for gas ignition tests)
12-1509	Stand to hold 12 multi-detectors
12-1763	Storage Box for spare parts and tools
50-9110	Reference Liquid, Flash-Point - ASTM D 93 (Pensky-Martens) Flash Point: approx. +65°C Content: 255 ml <u>Note:</u> Requires special shipment as hazardous goods.

50-9112 Reference Liquid, Flash-Point - ASTM D 93
(Pensky-Martens)

Flash Point: +213°C
Content: 250 ml

50-9113 Reference Liquid, Flash-Point - ASTM D 93
(Pensky-Martens)



Flash Point: approx. +60.8 °C
Content: 250 ml
Note: Requires special shipment as hazardous goods.

50-9024 MTVM - Reference Liquid (Gas Oil)
with certificate (ISO 9001), 500 ml

25-0804 Computer with Monitor
(detailed specifications upon request)
Power supply: 230 V, 50 Hz

11-0599 USB/RS232-Converter (verified for petrotest®-units)
with 2 m cable connecting 1 serial port with the USB-port of a PC or Hub



25-0282 Serial Impact Printer
for single sheets & continuous paper, with USB-interface
to record data like test results, duration of test, etc. (instead of a PC)



Supplied with: 1 data transmission cable, 1 ink ribbon (black)

Technical Data:

Line spacing: 80 characters per line (10 cpi)
Page size : 257 x 364 mm (sheet), 254 x 558.8 mm (roll)
Ports: serial, USB (1.1) & parallel
Dimensions: 37 x 28 x 16 cm (WxDxH)
Weight: 5 kg
Power supply: 220/240 V, 50/60 Hz

25-0283 Serial Impact Printer
Like 25-0282 but:
Power supply: 110/130 V, 50/60 Hz

Spare Parts

12-0600 Tray for cup and multi-detector
Note! Available as an option for all units built before 05/2004.

12-0790 Tong for safe handling of hot handleless test cups

12-0778 Electric Igniter with connector cable and plugs

12-0779 Gas Igniter with 20 cm hose

12-0781 Gas Supply Tubing, 1 meter

12-0788 Safety Detector
to control gas igniter and external inflammation

12-0780 Stirrer Couplings for units built until 12/2001, pack of 10

12-1507 Stirrer Couplings , pack of 10

12-0791 Stopper, brass (Ø 18 mm)
to close the thermometer or multi-detector opening of the cover before use

Order Guideline

Minimum equipment:	1x 12-1770
Spares (approx. 1 year):	1x 12-0787, 2x 12-0778, 1x stirrer couplings
Additional requirements:	Gas & electrical supply