

LPA2 & PML2

SERIES 30

TWIN LASER PARTICLE COUNTERS

- Online and inline options available.
- Complete range of test options.
- Automatic on-line continuous test facility.
- Variable time & test programmes.
- Remote operating capability.



- Phosphate ester compatible product available.
- Optional bottle sampling package.
- Windows® based software package included.

LPA2 & PML2

The experience of designers and users of hydraulic and lubrication systems is that 75% of system failures are as a direct result of contamination. Knowing the cleanliness level of the fluid is the basis for contamination control.

Exclusive MP Filtri technology.

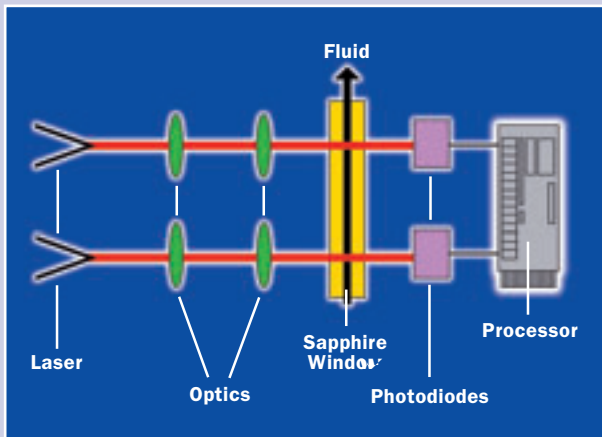
The combination of the two lasers with the unique optics and photodiode package enables the LPA2 & PML2 to give ultra accuracy combined with excellent repeatability.

Laser 1

A single point high accuracy laser measures particles of contamination at 4µm(c) and 6µm(c) giving ultra accuracy with excellent repeatability.

Laser 2

Standard accuracy laser specifically designed for system contaminants between 6µm(c) and 68µm(c).



The LPA2 gives accurate results of the amounts and sizes of contaminants - instant results. LPA2 is calibrated with ISO Medium Test Dust (MTD) based on ISO 11171:1999 calibration standard. The new MTD has a certified distribution standard verified by NIST (National Institute of Standard and Technology), USA. The LPA2 is designed to meet the new ISO 4406 cleanliness classification code which is a 3-part code, 4µm(c), 6µm(c) and 14µm(c). The LPA2 also provides results in the NAS 1638 code.

Hydraulic System Component Cleanliness Levels

System component	Typical Cleanliness Specification									
Servo valve			●	●	●					
Proportional valve				●	●	●				
Variable pump					●	●	●			
Cartridge valve						●	●	●		
Gear pump						●	●	●		
Vane pump							●	●	●	
Pressure/flow control valve							●	●	●	
Solenoid valve							●	●	●	
ISO cleanliness	12/10/7	13/11/8	14/12/9	15/13/10	16/14/11	17/15/12	18/16/13	19/17/14	20/18/15	
NAS cleanliness	1	2	3	4	5	6	7	8	9	

LPA2

- On line, continuous, & automatic test options
- Portable
- Lightweight
- Strong single case
- "QWERTY" Keyboard
- External alarm socket
- ISO 4406
- NAS 1638
- SAE 4059



PML2



LPA2 PARTICLE COUNTER SERIES 30 Twin Laser System.

**A unique high accuracy, fully portable product.
For users of hydraulic, lubrication and transmission systems.**

The LPA2 is a highly accurate, portable laser particle analyser that counts and sizes particles of solid contaminants in fluid power systems - on-line to 400 bar, typical test times from 1 minute.



LPA2 & PML2

Features

- **The LPA2 is a single case, lightweight product.**

The LPA2 is a robust and rugged, fully portable user friendly instrument, particularly useful in field applications where "ease of use" is fundamental.



Extendable feet allows easy viewing of display screen

- **External alarm socket.**

A plug in adaptor (supplied) which allows an external alarm/indicator to be attached.

- **Language options as standard.**

The LPA2 offers 4 language options as standard (English, Italian, French & German).

- **Monitor + keyboard**

The LPA2 features a large LCD screen with a full size QWERTY keyboard, displaying both ISO 4406, NAS 1638 and SAE 4059 code results.



- **On-line Testing to 400 bar pressure.**

- **Phosphate ester compatible products available.**

- **Thermal printer + RS 232.**

The LPA2 provides a complete printout of results, reporting either in ISO, NAS and SAE codes. These results can be downloaded by RS 232 computer connection.



- **Power (100 + test).**

The LPA2 incorporates a large capacity rechargeable battery, which can be recharged with 12/24 volt power supply. The LPA2 will perform in excess of 100 tests before recharging is required.

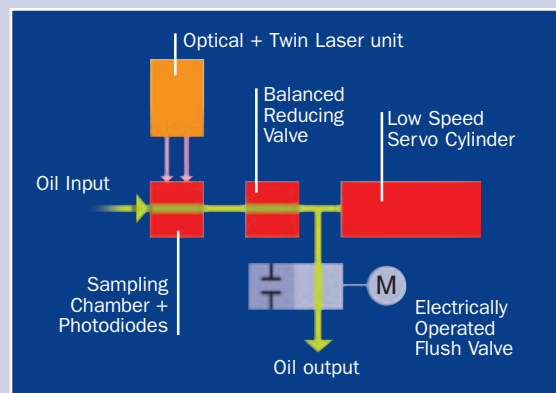
- **Data storage 600 test.**

- **Minimess connections.**

The LPA2 uses standard minimess connections (M16 x 2) to the hydraulic system.

- **Electrically operated flush valve.**

The LPA2 features an inbuilt flush valve to ensure that each test is a representative sample of the fluid, and that no cross-contamination between tests occurs. With the LPA2 in the continuous mode the flushing cycle is programmed to commence prior to the test, providing an in-line system test condition.



LPA2 - operation.

Features

• **Technology. The LPA2 uses a revolutionary design**

The patented fluid handling concept enables it to be use on hydraulic systems up to 400 bar working pressure, however the product has a single action constant low pressure pumping unit to ensure that steady state flow is achieved for every test.

The LPA2 & PML2 is calibrated with ISO MTD based on ISO 11171.

The correlation between particle sizes of ACFTD (old standard) to ISO MTD (new standard) is a follows:

ACFTD (old standard)	ISO MTD (new standard)
1	4
5	6
15	14
25	21
30	25
50*	38
75*	50
100*	68

* Yet to be confirmed by NIST.

• **The LPA2 incorporates various test options.**

• **ON-LINE (to 400 bar)**

1 - Short test

Test result in 1.5 min., total test time 2.5 min.

2 - Normal

Test result in 2.5 min., total test time 4.5 min.

3 - Dynamic

3 test with result average, total test time 9.5 min.

4 - Continuous

User definable test times and target cleanliness, levels can be set in accordance with requirements. Shortest continuous test time 5 min.

5 - An electrical plug socket is provided for external alarm signal applications.

• **BOTTLE SAMPLING**

3 test and results average, test results 4½ min.



• **Hard copy results.**



1 Online-normal
Single test result.
ISO 4406 code.



2 Online-dynamic
Three test & result average.
NAS 1638 code.



3 Online-dynamic
Three Test & Result Average.
ISO 4406 code.

LPA2 & PML2

Features

• Remote operation.

By RS 485 interface, please contact MP Filtri for full details.

• Accreditation.

The LPA2 is CE marked and supplied with an EMS acceptance certificate.

• Maximum protection against environmental hazards...

The LPA2 case has a special extrusion to take an environmentally sealed mounting panel providing protection against dust and moisture thus allowing safe operation in the field.



• Carry Bag accessory.

A strong lightweight carry bag is available which allows the LPA2 with accessories to be carried easily on-site.



• Optional screen filter.



Recommended for heavily contaminated systems.

• Bottle Sample Kit Contents:

- Case
- Bottle sampler unit
- Power Supply
- Vacuum Cap
- Sampling Hose 400 mm
- Pressure Hose 1500 mm
- Samples Bottles x 3
- Disposable Tubes x 50
- Hand Pump and Hose x 10 metre
- Waste Bottle and Hose x 2 metre
- Printer paper x 2 Rolls
- Test point Adaptor



• Standard Sampling Kit Contents:

- Case
- Pressure Hose 1500 mm
- Power Adaptor
- Waste Bottle and Hose x 2 metre
- Printer paper x 2 Rolls
- Test point Adaptor



Bottle sampling 110 ml and 250 ml options



110 ml standard bottle sampler unit incorporates de-aeration facility. Suitable for mineral oil applications only.



250 ml laboratory bottle sampler unit incorporates de-aeration facility. Suitable for both mineral oil and phosphate ester applications.



View of 110 ml bottle sampler

A simple selection of the correct switch will enable the user to choose between **Vacuum** for de-aeration or **Sample** to carry out analysis of the bottle sample.

A highly aerated fluid may lead to inaccurate result when analysed, therefore a de-aeration facility has been incorporated into the bottle sampling units. By evacuating the sampling chamber aeration within the fluid is removed and the fluid is conditioned prior to sampling. Any entrained or free air in the oil media at time of bottle Sampling may be shown as part of the particle count. This would lead to inaccuracies of the cleanliness results. As air can be seen as a contaminant. An example of the difference between an aerated sample and a non aerated sample can be seen in this picture.



It is essential that only sample bottles which have been cleaned to ISO 3722 standard are used. Modern hydraulic systems featuring highly effective filters have fluid cleanliness levels that approach that of the sample bottle itself. The use of un-cleaned bottle can greatly increase the particle counts. (Please note sterilisation kills bacteria but does not remove particles). Perhaps of even greater concern is the variability in their levels of cleanliness. A sudden increase in contamination could be caused by the sample bottle. This apparent increase could instigate unnecessary corrective action.

Information taken from BFP/A/P5 paragraph 7.6.2 Sample bottles.

MP Filtri UK can supply laboratory standard sample bottles. Part No: .P. 02. These have been cleaned in accordance with DIN/ISO 5884.

The degree of cleanliness has been verified to ISO 3722 with a NAS 1638 cleanliness certification of between Class 00 and Class 0.

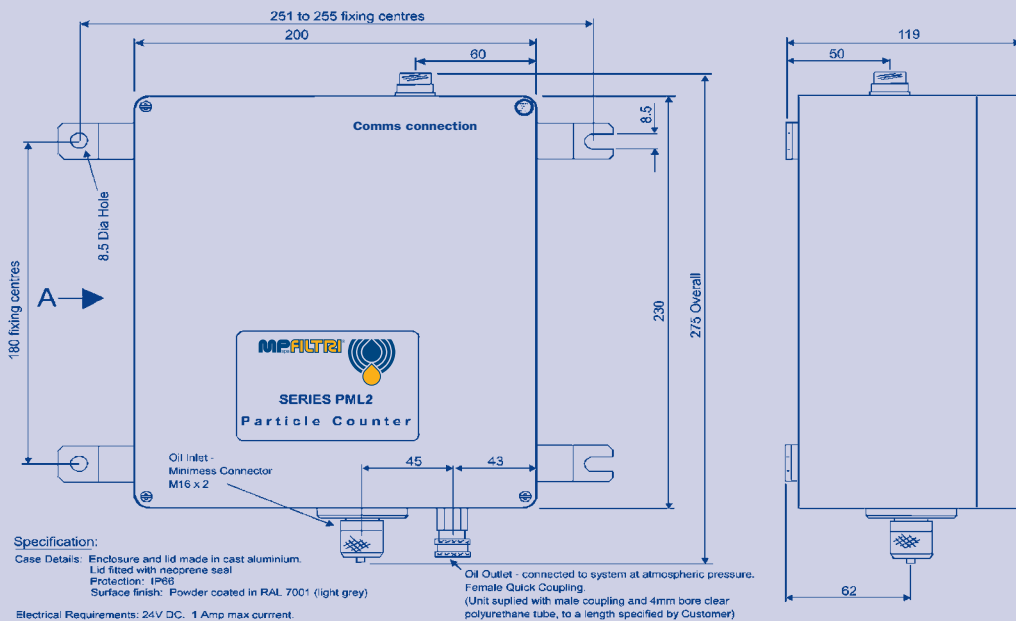
PML2 Series 30

• In-line particle counter Series 30.

The permanent in-line twin laser particle counter is designed for all hydraulic applications, where continuous monitoring is essential. The PML2 incorporates the LPA2 technology and is designed to work continuously and automatically in most hydraulic industries and applications:

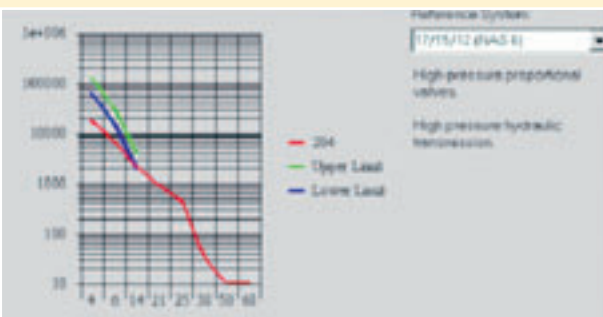
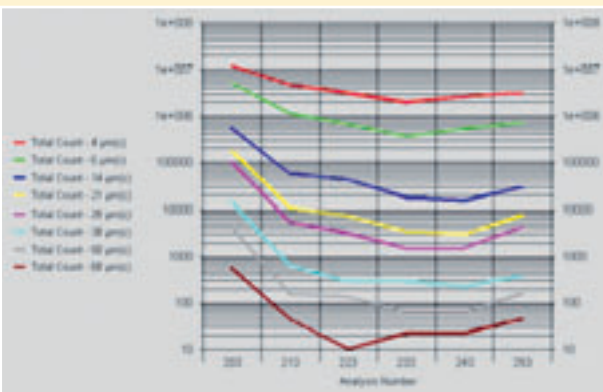
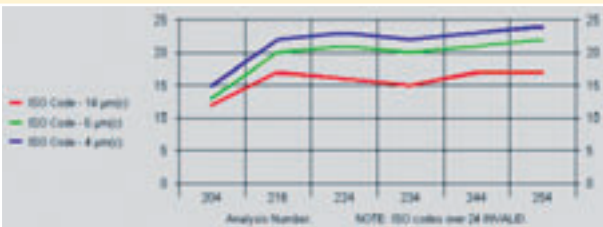
• PML2 Features

- Cast aluminium powdered coated case
- Continuous self diagnostics
- Standard RS 232
- Eight channel analysis
- ISO 4406, NAS 1638, SAE 4059
- Test time flexibility
- Operation by laptop or specified customers protocol
- Permanently installed

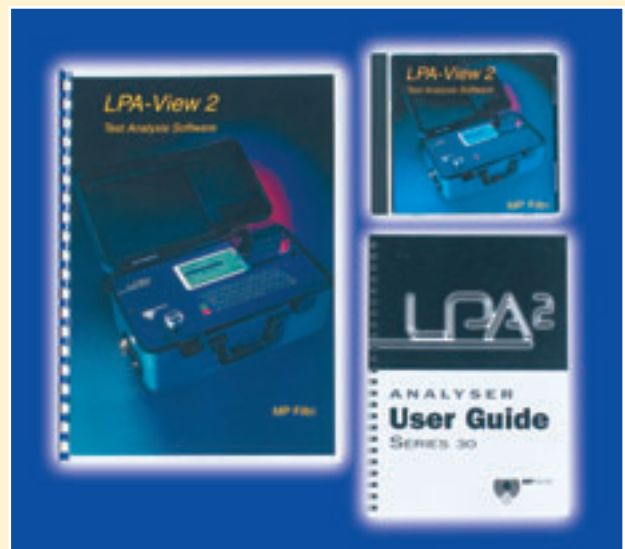


• **Software.**

Full system trend analysis is available within the accompanying Windows® based software package.



- CD and interface supplied with LPA & PML for downloading of data to PC.
- Data can be exported to other windows based programmes.
- Long term service records and trend analysis can be monitored.
- Quick and simple filter-keys for easy-to-read selected data.
- Comprehensive contamination analysis report generator.
- Comparison graphs for selected cleanliness codes reference and actual readings taken.
- Other protocols available on request.



Specification LPA2

Technology	Automatic optical particle analyser
Laser package	Twin laser and twin optical diode detectors
LCD display	(back lit)
Sensitivity	>4,6,14,21,25,38,50,68,µm(c), micron range to revised ISO 4406 Standard
Accuracy/repeatability	Better than 3% typical
Calibration	Each unit is individually calibrated with ISO Medium Test Dust (MTD) as based on ISO 11171:1999.
Analysis range	ISO 8 to ISO 24, ISO 4406 Code. (NAS 1638 Code - 2 to 12) (SAE AS 4059- Code 2 to 12)
Report/print format	ISO and NAS codes, with optional individual particle counts
Printer	Fixed head thermal printer 384 dots per line.
LPA2 sample volume	8 ml. (short), 15 ml. (normal), 30 ml. (dynamic), 24 ml. (bottle sampler), 15 ml. (continuous)
Operation	Max. system working pressure - 400 bar. Min. working pressure - 2 bar.
Viscosity range	to 400 centistokes
Operating temperature	+ 5 to + 80°C
Fluid compatibility	Mineral oil & petroleum based fluids, and Skydrol® (consult MP FILTRI for other fluids)
Typical test time	2 mins.
Power	Internal rechargeable battery (mains charger) or external 12/24 volt DC power supply.
Data storage	600 tests
Computer interface	RS 232 communication port
Hose connections	Microbore pressure hose 1.5 m long with minimes fittings (5 m & 10 m lengths available). Quick coupling waste hoses.
Dimensions	Height 210 mm. Depth 260 mm. Width 430 mm. Weight 7.6 kilos
Optional Product	In line coarse screen unit minimes fitting. 500 micron st. steel cleanable mesh 400bar filter pressure.

Patent app. no. 9921154.2 - As a policy of continual improvement. MP FILTRI reserve the right to alter the specification without prior notice.

How to order

LPA2

M

S

X

30

UK

Product

M	Mineral oil	S	Phosphate ester
S	Standard unit cyl. case	C	Standard unit cyl. case carry bag
X	Without bottle sampling	1B	Bottle sampling unit 110ml cyl. case
		2B	Bottle sampling unit 250ml cyl. case

Design Ref.

UK	Power Supply	EU	Power Supply	US	Power Supply
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Example: **LPA2 - M - S - X - 30 - UK** (LPA2 Standard)
LPA2 is supplied with a full software package

	Optional Products
Bottle Sampling / De aeration Unit 110ml	BS - LPA - M - 110 - *
Bottle Sampling / De aeration Unit 250ml (Mineral Oil)	BS - LPA - M - 250 - *
Bottle Sampling / De aeration Unit 250ml (Skydrol)	BS - LPA - S - 250 - *
RS485 remote operating interface	SK0050
Software Package	LPA - W - 20
Carry Bag	CB0001
In line Coarse Screen filter	SK.0040

The LPA2 Analyser

Includes accessories package - hoses, waste bottle, printer paper and ribbon, M 16x2 to BSP adaptor.

* State either **UK**, **EU** or **US** power supply.

Specification PML2

Technology	Automatic optical particle analyser
Laser package	Twin laser and twin optical diode detectors
Sensitivity	>4,6,14,21,25,38,50,68,µm(c), micron range to revised ISO 4406 Standard
Accuracy/repeatability	Better than 3% typical
Calibration	Each unit is individually calibrated with ISO Medium Test Dust (MTD) as based on ISO 11171:1999.
Analysis range	ISO 8 to ISO 24, ISO 4406 Code. (NAS 1638 Code - 2 to 12) (SAE AS 4059- Code 2-12)
PML2 sample volume	15 ml.
Operation	Max. system working pressure - 400 bar. Min. working pressure - 2 bar.
Viscosity range	to 400 centistokes
Operating temperature	+ 5 to + 80°C
Fluid compatibility	Mineral oil & petroleum based fluids, and Skydrol® (consult MP FILTRI for other fluids)
Typical test time	2 mins.
Power	12/24 volt DC power supply.
Data storage	600 tests
Computer interface	RS 232 communication port (Standard)
Hose connections	Microbore pressure hose 1.5 m long with minimes fittings (5 m & 10 m lengths available). Quick coupling waste hoses.
Dimensions	Height 120 mm - Length 275 mm - Weight 4.8 kilos
Optional Product	In line coarse screen filter minimes fitting. 500 micron st.steel cleanable mesh 400bar filter pressure.

Patent app. no. 9921154.2 - As a policy of continual improvement. MP FILTRI reserve the right to alter the specification without prior notice.

How to order

PML2

M

X

1C

30

UK

Product

M	Mineral oil	S	Phosphate ester
D	Standard no display	X	Customer specified display
IC	RS 232	2C	RS 485
3C	Customer specified		

Design Ref.

UK	Power Supply	EU	Power Supply	US	Power Supply
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Example: **PML2-M-D-1C-30-UK** (PML2 Standard)
PML2 is supplied with a full software package

The PML2 Analyser

Includes accessories package - hoses.

Applications and testimonials



• The LPA2 Applications in Industry.

Service – Accurate monitoring of systems reduces costs attributed to manpower and material shortcomings.

Quality Control – Certifies products to a recognised cleanliness standard.

Condition Monitoring – Allows accurate monitoring of high cost processes & installations ensuring system reliability.

Maintenance Operations – Used in predictive & preventative maintenance routines to monitor and investigate equipment performance.

Military Applications – Accurate system monitoring and performance ensures confidence in a hostile environment.

Production Development – The ability to define a specified cleanliness code for manufactured products to customers of hydraulic systems.

• Typical Applications

- Steel Mills
- Paper Mills
- Injection moulding
- Automotive
- Wind Power
- Test Benches
- Lubrication
- Roll Off cleanliness
- Power packs



- The Lufthansa Technik AG hydraulic test centre located in Hamburg, uses the LPA2 for analysis of hydraulic fluids of its Skydrol test benches.



- Prior to completion, each Extec machine is flushed. The LPA2 is used to ensure that the hydraulic systems meet with the required standards



- The LPA2 has been selected as the preferred contamination monitor for all Vermeer divisions

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