MP FILTRI
CONTAMINATION CONTROL

Operators Guide LPA2

Portable Particle Counter

PRODUCT OVERVIEW

LPA2 - Portable Particle Counter

The LPA2 is a highly precise, lightweight & fully portable instrument suitable for on-site and laboratory applications. It can automatically measure and display particulate contamination, moisture and temperature levels in various hydraulic fluids. The LPA2 can be connected to the MP range of bottle sampler products to enable laboratory based particle counting.

The LPA2 is a solution for online monitoring of contamination in your hydraulic fluid, providing an immediate hydraulic health check. It employs predictive maintenance procedures to help reduce downtime and in turn costs.

Features & Benefits

- LPA2 saves time: online/realtime monitoring
- Immediate hydraulic health check
- Predictive maintenance procedures can be employed
- Reduced downtime for industrial and mobile plants
- Reduced costs associated with downtime
- Fully portable
- Precision Instrument
- Full Calibration using ISO Medium Dust Test (MTD) based on ISO11171 on test equipment certified to ISO 11943
- Measures and displays the following international standard formats; ISO 4406, NAS 1638, AS 4059E Tables 1 & 2
- Moisture and temperature sensing
- Data logging and 600 test result memory
- Manual and remote control flexibility
- LPA View software (included)
- Full size QWERTY keyboard
- Various test programme settings
- Full accessories kit included
- Internal rechargeable battery capable of performing 100 tests between charges

Product Presentation

The LPA2 is designed to measure and quantify the numbers of solid contaminants in Hydraulic, Lubrication and Transmission applications. The LPA2 is designed to be a laboratory accurate instrument suitable for “on-site” applications utilising hydraulic fluid as the operating medium. Please contact your local sales office for other operating fluid options.

The instrument uses the light extinction principle whereby two laser light systems shine through the fluid and land on photodiodes. When a particle passes through the beam it reduces the amount of light received by the photodiode, and from this change in condition, the size of the particle can be deduced.

Hydraulic and Lubricating Systems consists of sets of continuously moving metal parts, which use hydraulic fluid as the power medium. Hydraulic fluid is also used to create a lubrication film to keep the precision parts separated and it is also used as a cooling medium. The very nature of a hydraulic system is that it produces solid particulate contamination and these are ever present in all hydraulic systems. There are various standards that quantify/ arrange/tabulate the amount of particle contamination in specific volumes of fluids and it is these levels that the particle counter is designed to measure.

Product features

Moisture sensor

LPA2-W models measure water content using a capacitive RH (relative humidity) sensor. The result is expressed as percentage saturation. 100% RH corresponds to the point at which free water exists in the fluid, i.e. the fluid is no longer able to hold the water in a dissolved solution. This is also normally the point at which significant damage occurs in a hydraulic system, so is an ideal measurement scale that is independent of the fluid characteristics.

The water saturation point (100% RH) is temperature dependent, so the temperature is measured at the same time. This enables results to be compared meaningfully.

The temperature measured is that of the fluid passing through the unit.

Note: this may differ from that of the hydraulic system, depending on flow rate, pipe length and ambient temperature.
It is not intended to be an accurate indication of system temperature, but to provide a reference for the RH measurement at the point of sample. Nevertheless, experience has shown the temperature measured is within a few degrees of that of the hydraulic system, in most applications.

PRODUCT OVERVIEW

Data logger

The LPA2 includes a built-in data logger, which adds the facility to log and timestamp test results locally within an internal memory, even when not connected to a computer.

- Test logging is determined by the log settings
- Each log entry is time-stamped and contains the LPA2 serial number, so that it can be identified later.
- The LPA2 memory has space for around 600 log entries. When full, the oldest log entry is overwritten.

Optional built-in pressure transducer

LPA20P & LPA2WP models measure system pressure at inlet of the unit via a built in 0-600 bar pressure transducer with a sensor accuracy of +/-0.5% Full scale.

Optional on-board thermal printer

All LPA2 products come with an on-board printer.

Fluid compatibility product versions

Options within the product code allow for a tailored product to suit and be compatible for a range of fluids.
M and MW version: Mineral and synthetic oils, plus diesel fluids *
N version: Offshore/Subsea and water-based fluids *
S version: Phosphate ester and aggressive fluids. Contact local MP Filtri branch or distributor.

** Please note: a suitable flushing procedure should be followed when switch from mineral based to water based fluids and vice versa. See document # 200.093 on supplied USB data stick.*
Please note: a bottle sampling unit will be required to carry out the flushing procedure.
https://www.mpfiltri.co.uk/particle-counters/bs110-bs500/

Disclaimer

As a policy of continual improvement, MP Filtri reserves the right to alter the specification without prior notice.

DECLARATION OF CONFORMITY

EC Declaration of Conformity

The products included in this Declaration are all variants of the following:

- With or without moisture sensor
- Compatible with mineral oil/ synthetic fluids, offshore fluids and phosphate esters.
- With printer
- With/without pressure transducer

For part codes see the Designation & Ordering Code (section 4.7 on page 20).

Product Manufacturer:
MP Filtri UK
Bourton Industrial Estate
Bourton on the Water
Cheltenham
Gloucestershire
GL54 2HQ
+44 (0)1451 822522
sales@mpfiltri.co.uk

The products described are in conformity with the following directives:

2014/30/EU Electromagnetic Conformity

Certification Testing that has been carried out is in accordance with:

- DEF STAN 00-35 Part 3 issue 4 Environmental Test Methods
- BS EN 60068 range of standards covering environmental conditions
- BS EN 60529: 1992 + A2:2013 Degrees of Protection provided by enclosures (IP Code)
- BS EN 62262:2002 Degrees of Protection Provided for Electrical Equipment against External Mechanical Impacts (IK Code)
- BS EN 60721-3-4: 1995 Part 3: Classification of Groups of Environmental Parameters and their severities, Section 3.4

Date: July 2020

Signed:
Phil Keep (Managing Director) on behalf of MP Filtri UK Ltd

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What this guide is for

This guide will take you through the installation and instructions for making the most out of your LPA2.
It contains detailed information to enable you to master the full functionality of the device, as well as key information on safety, waranty, maintenance and accessories.

At MP Filtri we are commited to customer service and hope this manual will help you to fully master the LPA2.

Disclaimer

As a policy of continual improvement, MP Filtri reserves the right to alter the specification without prior notice.

OPERATOR'S GUIDE

1 General warnings and information for the Operator

1.1 General Safety Warnings

Do not operate, maintain or carry out any procedure before reading this manual. Any individual operating the unit shall wear the following Personal Protective Equipment:

- Protective eyewear
- Safety shoes
- Gloves
- Overalls (or other suitable protective clothing)

Before carrying out any machine installation procedures and/or before use, one should scrupulously follow the in- structions listed in this manual. Moreover, it is necessary to comply with the current regulations related to occupational accident prevention and safety in the workplace.

Notices aimed at the prevention of health hazards for personnel operating the machine are highlighted in this document with signs having the following meaning:

It relates to important information concerning the product, its use or part of this documentation to which special attention must be paid

It means that failure to comply with the relevant safety regulations may result in mild injury or property damage.

It means that failure to comply with the relevant safety regulations may result in death, serious injury or serious property damage.

Failure to comply with the relevant safety regulations may result in death, serious injury or serious property damage.

GENERAL WARNINGS

To allow rapid identification of the employees who must read this manual, definitions have been used with the following meaning:

OPERATOR	This is any individual whose task is to use the machine for production purposes. The operator is aware of all the measures taken by the machine manufacturer in order to eliminate any source of injury risk in the workplace and takes into account the operational constraints.
PERSONNEL INVOLVED IN SLINGING AND HOISTING OPERATIONS	This is any individual whose task is to handle the machine or parts of it. Personnel involved in slinging and hoisting operations are aware of the issues regarding the safe transfer of machinery or parts of it and, therefore, uses appropriate lifting equipment, following the instructions provided by the product manufacturer.
MACHINE SETTER	This is any individual whose task is to set up the machine for its operation. The machine setter is aware of the measures taken to eliminate all sources of injury risks in the workplace and takes into account the operational constraints. The machine setter takes all the appropriate precautions in order to operate in utmost safety conditions.
MAINTENANCE TECHNICIAN	This is any individual whose task is to carry out maintenance activities on the machine. The maintenance technician is aware of the possible danger situations that may arise and takes the appropriate precautions in order to eliminate the risks of accidents in the workplace.
ELECTRICIAN	This is any individual whose task is to carry out maintenance activities on the electrical wiring of the machine. The electrician is aware of the possible danger situations that may arise and takes the appropriate precautions in order to eliminate the risks of accidents in the workplace.

1.2 Operator Position and Dangerous Areas

The operator should be trained to use this equipment. Care should be taken when connecting to live systems. Always connect to the LPA2 unit first then connect to a system. The waste should always be to atmosphere, failure to do so may result in damage to the unit and leakage of fluid.

The unit shall be taken out of service and/or dismantled in accordance with the current regulations in force in the country where the machinery is installed

NOTE

The machinery is not suitable for outdoor use and all the electrical devices have a protection class starting from IP 55 upwards.

CAUTION

1.3 Dangers and Hazards that cannot be eliminated

- Burn risk because of high temperatures
- Accidental oil leaks with consequent risk of slipping
- Hose breakage and resulting lubricant loss
- With oil temperatures exceeding 40/45°C, it is vital to be extremely careful when connecting to live systems and when moving the unit. Avoid direct contact with hot oil.

ALL EQUIPMENT SHOULD BE ALLOWED TO COOL PRIOR TO HANDLING, AFTER IT HAS BEEN IN USE

1.4 Personal Protective Equipment

When operating the unit, personnel must be wearing safety shoes, gloves and goggles. In general, the PPEs to be used according to the activities on the machinery are listed in the following table:

ACTIVITY	PPE
Ordinary operation	Shoes, gloves, goggles, overall 
Planned maintenance	Shoes, gloves, goggles, overall

GENERAL WARNINGS

1.5 Precautions related to product handling of the LPA2

Battery

- It is recommended that the LPA2 be charged for a minimum of 24 hours prior to first use, to fully charge the internal battery

Internal Cleaning

- Do NOT clean the LPA2 or Bottle Sampler with Acetone or similar solvents that are not compatible with the seals in the LPA2. The recommended cleaning fluid for internal flushing is Petroleum Ether
- The use of a 500µm coarse screen filter, screwed onto the HP connector, is recommended for heavily contaminated systems.

LCD Visibility

- If the LCD screen remains blank then refer to page 38 for recharging instruction. To improve the LCD screen visibility, the Analyser can be inclined by unlatching the two extension feet fitted to the bottom of the case.

2 Transportation and Storage

2.1 Transportation and handling Conditions

The unit is shipped in a cardboard box with appropriate protective packaging and these should be recycled accordingly where possible.
The packed weight of the LPA2 and accessories is 14 kg, the box dimensions are 60 x 50 x 40 cm.

2.2 Storage

The unit should be stored in a suitable location away from the production area when not in use. The unit should be stored with the caps provided on the ports. This location should not impede any other production or personnel.

3 Warranty, Limitations and Disclaimers

MP Filtri warrants that the products that it manufactures and sells will be free from defects in material, workmanship & performance for a period of 12 months from the date of shipment.

Hardware/Firmware

Should the hardware prove defective during the warranty period, MP Filtri, at its discretion, will either repair the defective product or replace it with an equivalent product in exchange for the defective unit without charge for parts, labour, carriage and insurance.

Software

MP Filtri warrants that software will operate substantially in accordance with its functional specification for 12 months from date of shipment provided that the integrity of the operating environment has not been compromised through misuse, inappropriate handling, abnormal operating conditions, neglect or damage (unintentional or otherwise) or the introduction of third party product (software or hardware) that in any way conflicts with the MP Filtri product.

Eligibility

This warranty extends to the original purchaser only or to the end-user client of a MP Filtri authorised affiliate.

How to obtain service?

To obtain service under the terms of this warranty, the customer is required to notify MP Filtri before the expiration of the warranty period and to return the item in accordance with MP Filtri product return policy. Any product returned for warranty repair must be accompanied by a full fault report specifying the symptoms and the conditions under which the fault occurs. Should MP Filtri incur additional cost as a result of a failure to complete the appropriate paperwork, an administrative charge may be levied.

Exclusions

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate care. MP Filtri shall not be obligated to provide service under this warranty if:

a) Damage has been caused by a failure to make a full and proper inspection of the product (as described by the documentation enclosed with the product at the time of shipment) on initial receipt of the product following shipment;

b) Damage has been caused by the attempts of individuals, other than MP Filtri staff to repair or service the product;

c) Damage has been caused by the improper use or a connection with incompatible equipment or product including software applications.

Charges

Under cover of this warranty, MP Filtri will pay the carriage and insurance charges for the shipment of defective product back to site of manufacture and for its return to the client's original site of despatch except when:
a) MP Filtri product return policy has not been followed.

b) Product failure is caused by any of the exclusions described above, when the customer will be liable for the full cost of the repair (parts and labour) plus all carriage and insurance costs to and from MP Filtri premises.

c) The product is damaged in transit and a contributory cause is inadequate packaging. It is the customer's responsibility to ensure that the packaging used to return equipment to MP Filtri is the same, or has equivalent protective qualities, to that used to ship the product to the customer in the first instance. Any damage resulting from the use of inadequate packaging will nullify MP Filtri

obligations under this warranty. Should the customer's product be damaged in transit following a repair at MP Filtri site, a full photographic record of the damage must be obtained (packaging and the product) to support any claim for recompense. Failure to present this evidence may limit MP Filtri obligations under this warranty.

THIS WARRANTY IS GIVEN BY MP FILTRI IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. MP FILTRI LTD SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES (INCLUDING LOSS OF DATA), WE SPECIFICALLY DISCLAIM ANY AND ALL WARRANTIES TO CUSTOMERS OF THE CUSTOMER. THE CUSTOMER'S SOLE REMEDY FOR ANY BREACH OF WARRANTY IS THE REPAIR OR REPLACEMENT, AT MP FILTRI DISCRETION, OF THE FAILED PRODUCT.

MP Filtri Ltd maintains a policy of product improvement and reserves the right to modify the specifications without prior notice.

3.1 Warranty on Recalibration

The LPA2 is guaranteed for 12 months upon receipt of the LPA2, subject to it being used for the purpose intended and operated in accordance with this User Guide.
MP Filtri will only verify the accuracy of the LPA2 if the unit is recalibrated every 12 months.

Please ensure that the test results in the Log are downloaded to LPA-View before the LPA2 is despatched, in case action taken by MP Filtri during the service / recalibration causes the Log to be cleared.

NOTE

It is requested that only the LPA2, not the support case or any other ancilliaries, be returned for recalibration.
MP Filtri will not be held responsible for any items returned as such.
Ensure that the LPA2 is packed appropriately for transportation.

4.Technical Specification

4.1 Performance

Technology	Twin laser and twin optical diode detectors Based Light Extinction Automatic Optical Particle Analyser
Particle Sizing	>4, 6,14, 21, 25, 38, 50, 70 µm(c) to ISO 4406 Standard
Analysis range	ISO 4406 Code 8 to 24 NAS 1638 Class 2 to 12 AS4059 Rev.E. Table 1 Size Codes 2-12 AS4059 Rev.E, Table 2 Size Codes, A:000 to 12, B:00 to 12, C:00 to 12, D:2to12, E:4to12, F:7to12
Calibration	Each unit individually calibrated with ISO Medium Test Dust (MTD) based on ISO 11171, on equipment certified by I.F.T.S. To ISO 11943
Moisture Sensing	% RH (Relative Humidity) ±3%
Temperature Measurement	±3%°C
Accuracy	±1 ISO code for 4, 6, 14, 21, 25, 38, 50, 70 µm ±3°C (± 5.4F) ±3%RH

4.2 Electrical interface

Supply Voltage	9-36V DC
Supply Current	2A Max
Power Consumption	Charging state: ~40W max Idle State: 3W max Note: Power consumption level can vary dependant on fluid properties
Test Time	8 ml. (short): 2:50 15 ml. (normal): 5:00 30 ml. (dynamic): 10:00 24 ml. (bottle sampler): 8:00 15 ml. (continuous): 5:00
Data Storage	Approximately 600 timestamped tests in the integral LPA2 memory
Keypad & LCD	Full size QWERTY keyboard and backlit graphical LCD
Communication Options	9 pin D type RS232 serial port for direct connection to PC and software

TECHNICAL SPECIFICATION

4.3 Physical attributes

Dimensions	430 mm / 16.9” (W) x 260 mm / 10.2”(D) x 210 mm / 8.2” (H)
Weight	9.8 kg / 31 lbs
Hydraulics Connections	INLET M16x2 test point OUTLET Quick release coupling
Seal Material	M/N version: static seals - FKM, dynamic seals: NBR S version: FFKM

4.4 Fluid characteristics

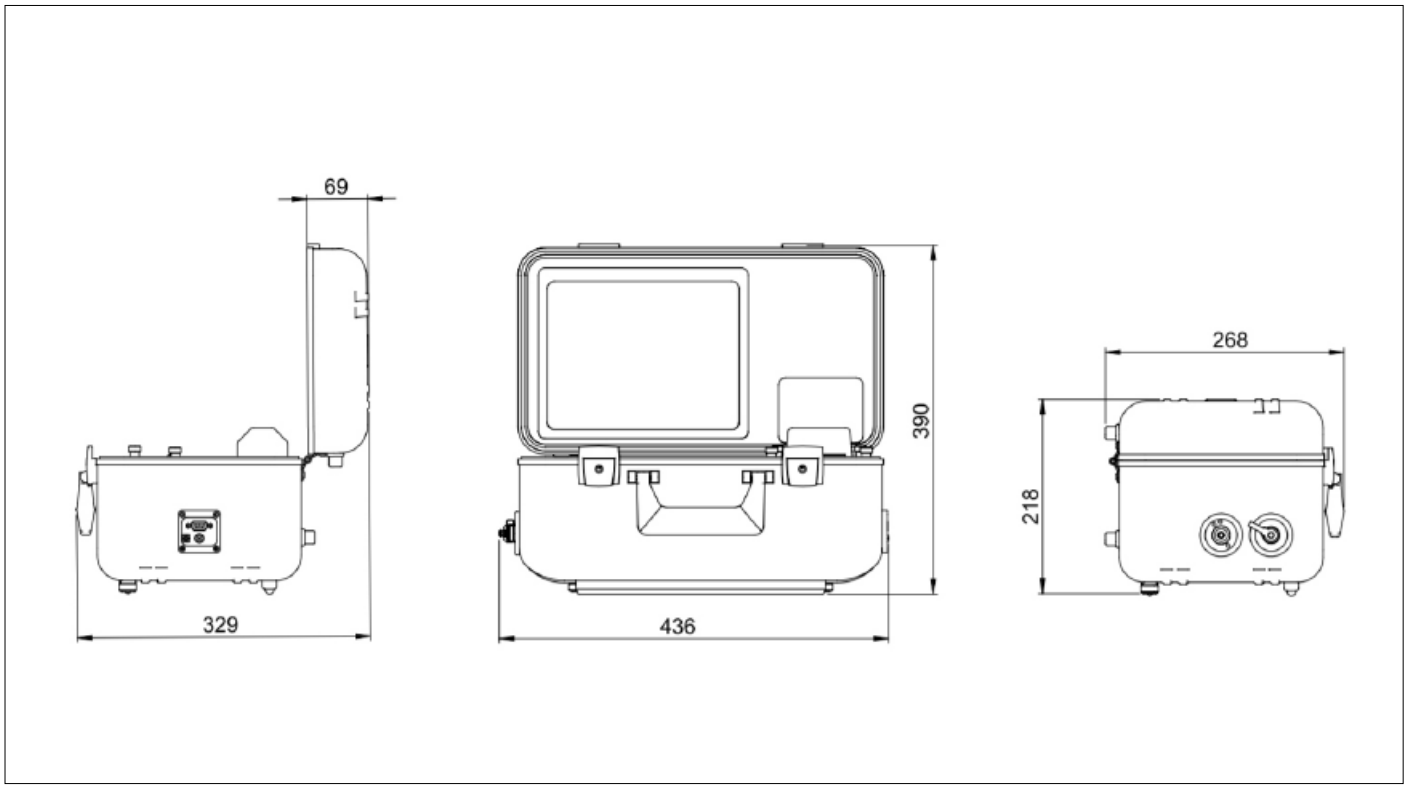
Fluid compatibility	M version - mineral oils, synthetic fluids and diesel N version - Offshore water based/subsea fluids plus M version fluids S Version - Aerospace phosphate esters plus N & M version fluids
Viscosity	≤ 400 cSt
Fluid temperature	+5°C (41°F) to +80°C (+176°F)
Sample volume	Maximum 24 ml / 0.81 fl oz per pump stroke
Minimum pressure	2 bar / 29 psi
Maximum pressure	400 bar / 5801 psi static

4.5 Environment

Ambient working temperature	-10°C (+14°F) to +80°C (+176°F)
IP Rating	IP51
Wetted Parts	M Version - Brass, Carbon Steel, FPM(static)/NBR(dynamic), FR4, sapphire N Version - 316 stainless steel, Nickel plated Brass, FPM(static)/NBR(dynamic), sapphire S Version - Brass, 316 stainless steel, FFKM, sapphire

TECHNICAL SPECIFICATION

4.6 Dimensions



4.7 Designation & Ordering code

AUTOMATIC PARTICLE COUNTER LPA2

Configuration example: LPA2 | W | P | M | S | X | 30

Series
LPA2 Twin Laser Particle Analyser

Moisture Sensor
0 Without moisture and temperature sensor
W With moisture and temperature sensor

Pressure Sensor
0 Without on-screen inlet pressure display
P With on-screen inlet pressure display

Fluid compatibility
M Mineral oil and synthetic fluid
N Subsea fluids and water based fluids (*)
S Phosphate ester and aggressive fluids (*) (**)

Accessories
S Standard Unit with Carry Bag
T Standard Unit with Travel Case

Bottle Sampling Options
X Without Bottle Sampling

Design Ref
30

(*) **N** and **S** version, moisture sensor (W) not available

5. Product Installation and General Operation

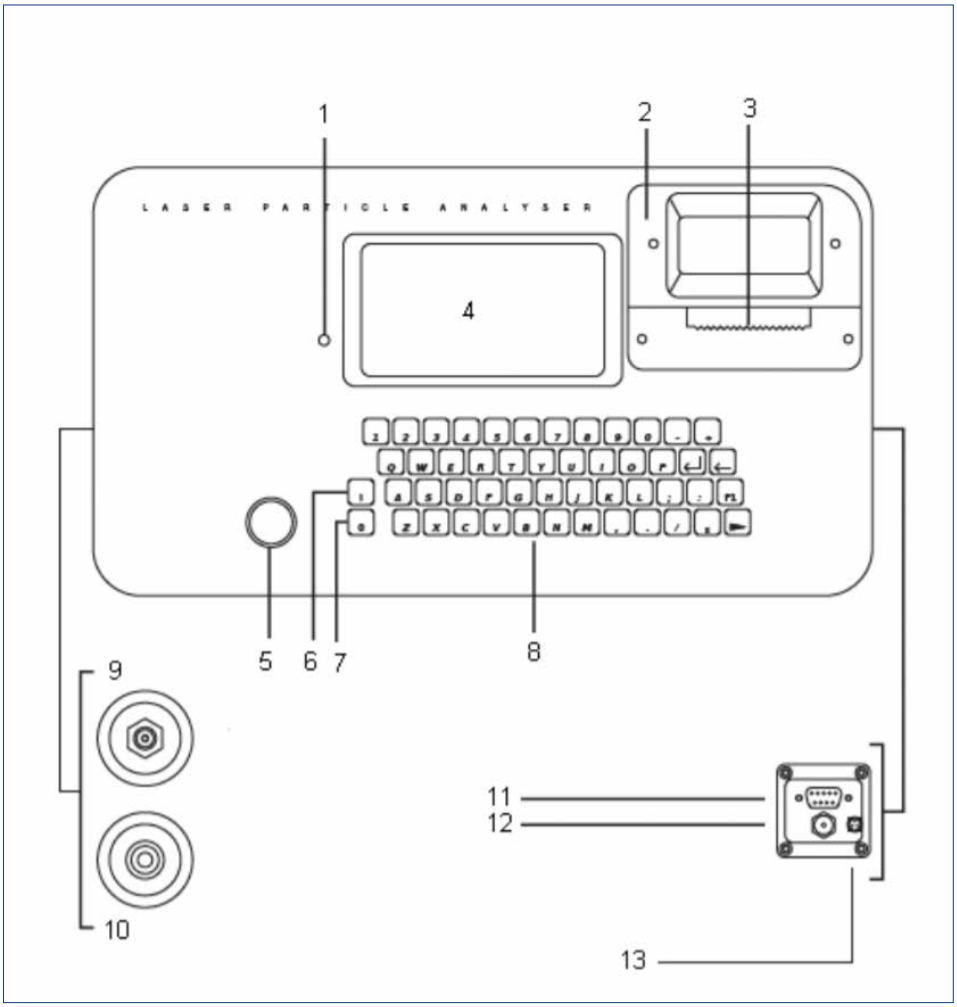
5.1 Installation

Each LPA2 supplied consists of the following:

- 1 x LPA2 (*) Specific model will be as per ordered item.
- 1 x M16x2 microbore pressure hose, 1500mm long
- 1 x 2000mm quick release waste hose for LPA2
- 1 x 1L waste receptacle
- 1 x 12V, 2A power adapter c/w UK/EU/US/AUS/CN heads
- 1 x 9 pin serial cable
- 1 x USB to serial converter
- 1 x 3 pin socket for external signals
- 1 x Digital copy of user guides/software/drivers
- 2 x Hard copy of calibration certificate
- 2 x Thermal printer paper
- 1 x Carry bag

Feature map

1. Battery Charging Indicator
2. Printer
3. Serrated Paper Cutter
4. Display Screen
5. Flush Valve Push Button
6. On
7. Off
8. Keyboard
9. HP Connector M16x2
10. Waste Connector - Quick Coupling
11. RS232 Connector
12. DC Power Input Socket
13. Plug to External Circuits



5.2 Online Operation

NOTE: Unit features are turned off as factory standard. This includes the automatic print, moisture sensor test (if applicable). Should any of these be required they MUST be switch on prior to performing an analysis, please consult the relevant section of the operators guide on how to action this.

- Insert WASTE FLUID HOSE in to the waste disposal bottle provided

Important! Do not connect Waste Fluid Hose to a pressurised system, as this will cause the Analyser to malfunction and could cause internal leakage. The Waste Fluid Hose must be discharged into the waste disposal bottle provided, or into a tank/vessel vented to atmosphere.
Do not tamper with this device.

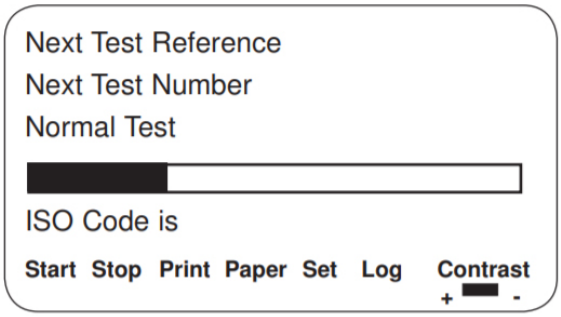
- Connect WASTE FLUID HOSE to Analyser (waste connector). Push back quick coupling outer ring before connecting / disconnecting hose end.
- Connect FLUID SAMPLING HOSE to Analyser (HP connector)
- Connect FLUID SAMPLING HOSE to the system by means of the M16x2 connector.

The system to be monitored must not exceed 400 bar or be less than 2 bar

- Press GREEN BUTTON to switch on Analyser the “Main / test progress screen” will be displayed.

To prolong battery life it is advisable to switch off the Analyser when not in use.

5.3 Main Test / Progress Screen



Button 1 - Main Test Screen START - Starts sampling and emptying cycle

Button 2 - STOP - Stops test at any point in the sampling/ emptying cycle. Next test will start with an emptying cycle before the test commences

Button 3 - PRINT - Prints test results. If AUTO PRINT mode has been turned off, a copy of the results is obtained by pressing PRINT button.

Button 4 - PAPER - Ejects printer paper by three blank lines.

Button 5 - SET - Selects settings screen – see section 5.4

Button 6 - LOG - Selects Data Logging screen – see section 5.4.6

- Transfer log – downloads memory to software package[1]
- Clear log – Clears memory
- Clear last – Clears last result[2]
- Recall – Recalls results from memory
- Print – Prints recalled results

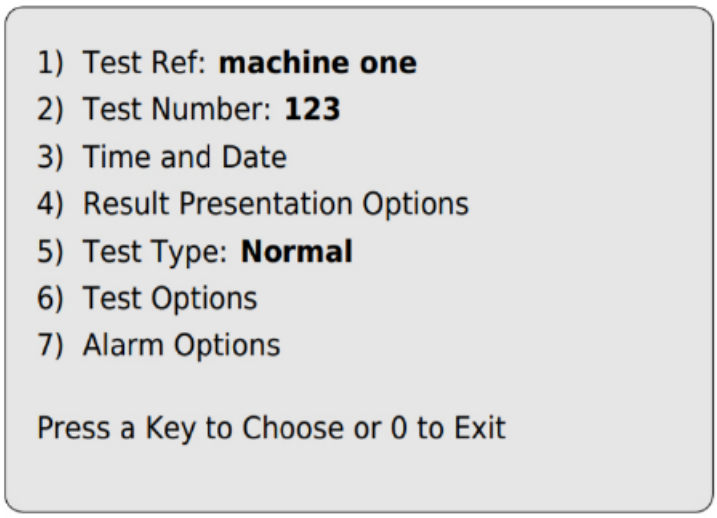
Buttons 7 and 8 - CONTRAST +/-: Adjusts the screen contrast. Darker or Lighter.

LOW BATTERY INDICATOR – see section 5.16

[1] This is not needed on new units
[2] Provided unit has not been switched off

5.4 Analyser Settings

Press the SET button **(Button 5)** to program the Analyser to your requirements. The main “Settings Screen” will be displayed. To alter the Analyser settings progress through the following routine from this screen



5.4.1 Test Ref

Press 1 , then input your reference details e.g. “MACHINE 1” The press return the **RETURN** key. 15 characters maximum

5.4.2 Test Number

Press 2 , then input the required test number e.g. “123” The press return the **RETURN** key. The Test Number will automatically increment for each successive test.

5.4.3 Time and Date

Press 3 , then use the keypad to set the time and date. Cycle Count
A cumulative cycle count is also displayed on the Time & Date screen. This count automatically increases by 1 each time a test is taken. It is not possible to adjust/ reset this value.

5.4.4 Result Presentation Options

Press 4 to bring up the Presentation Options screen. Then press the relevant key to switch between the option selections.
1 - Cycles between the various available formats for the test result. These are ISO, NAS, AS4059E-2 and AS4059E-1.[1]
2 - Turns on and off the printing of detailed counts with the test result.
3 - Turns on and off the printing of the user Test Reference.
4 - Turns on and off automatic result printing.
5 - Turns on and off the printing of an additional space for hand-written notes on the printout.
6 - Selects the display language.

[1] AS4059E-1 and AS4059E-2 denotes Table1 and Table2 of the AS4059E standard respectively

Note the Analyser has 5 language options:

0. English (Default)
1. Italian
2. French
3. German
4. Chinese

For selection of language proceed as follows:
- Press 6.
- Enter chosen value (e.g. 1 then press the return button for Italian).
- Press key 0 (zero)
- Press key 0 (zero)
- Wait 5 seconds
- Switch OFF the unit
- RESTART the unit.
- The main screen will then be displayed in the language selected.

5.4.5 Test Type

Button 5 is used from the Settings Screen to cycle between the available test types.
These are “Normal”, “Dynamic”, “Triple/Bottle” “Continuous” and “Short Sample”.
The selection will be displayed on the Main test progression screen

Normal – Single Test: 15ml sample volume

Dynamic – A comprehensive triple test[1] with results average: 30 ml sample volume comprised of three 10ml sampling and emptying cycles. Allows the effect of system fluctuations to be measured over a longer period of time. Unit is flushed in between tests to ensure each sample is representative of its point in time.

Triple / Bottle Sampling – A triple test with results average and quicker than the Dynamic Test: 24ml sample volume comprised of three individual 8 ml samples tested consecutively. For Bottle Sampling refer to separate User Guide.

Continuous – for detailed instructions refer to Continuous Sampling, section 5.9.

Short – Single Test: 8 ml sample volume. This provides results in less time than the Normal Test. It is not recommended for oil samples cleaner than ISO 17/15/12 (NAS 6), as the accuracy of the result might be compromised by the ‘small’ sample volume
Press 5 repeatedly to select desired test type.

[1]Results will be displayed upon completion of three tests - including emptying cycle

5.4.6 Test Options

Press 6 . The Test Options Screen will be displayed.
(The RH Test setting is not displayed if the option is not fitted).
This mainly applies to the continuous test mode. Option 3 only applies to the Continuous Test, alarm mode 1. For detailed instructions refer to Continuous Sampling, Section 5.9.

For Alarm Options - refer to section 5.11 and 5.13

5.5 Preparing Analyser For Test

Taking sample – Normal, Dynamic, Triple/ Bottle, Short Press flush valve push button to open flush valve – push button illuminates to indicate valve is open. Leave valve open for at least one minute or 200ml of fluid, to remove any entrapped air and fluid from the previous test ensuring no cross-contamination between samples.

Press flush valve push button to close flush valve - push button illumination is cancelled. Alternatively, proceed to the step below - the action of pressing Start button automatically closes the Flush valve before sampling commences.

Press START button: The analyser will now commence the sampling cycle.
The completion progress bar indicated the status of the sample.

- Results will be automatically displayed on the screen.
- Results will be automatically printed at the end of the sampling cycle, if the Auto Print mode has been turned ON.
- If the Auto Print mode has been turned OFF, then press Print key to obtain printed results.

Following the sampling results the Analyser automatically discharges the sample fluid to waste. Test status is shown as Emptying.

When the Sampling and Emptying cycle has been completed the test status is shown as Idle.
Results are automatically stored to memory. To download results follow instructions, section 5.18.2

5.6 Interpreting Results

Please refer to MP Filtri's Fluid Condition Handbook for hydraulic component manufacturers' recommendations on standard cleanliness requirements for various applications. ISO4406 and NAS1638 cannot be directly compared.

PRODUCT OPERATION

Examples of the print out details for the various test options:

TEST NUMBER 39
TEST REF CALIBRATION
TEST TYPE: Normal
ISO CODE:-

19/18/13

NAS CODE 10
SAMPLE VOLUME 15ml

µm(c)	/100ml
4	451977
6	186068
14	5784
21	2064
25	1344
38	240
50	24
70	0

ONLINE – Normal
Particle count
and ISO to
ISO4406:1999 standard

TEST NUMBER 39
TEST REF CALIBRATION
TEST TYPE: Dynamic
ISO CODE:-

15/14/11

NAS CODE 6
SAMPLE VOLUME 24ml

µm(c)	/100ml	/100ml	/100ml	Average
4	29092	27370	34069	30177
6	11675	12058	17417	13716
14	1132	1274	1062	1156
21	283	389	424	365
25	177	318	212	235
38	35	35	70	46
50	0	0	0	0
70	0	0	0	0

ONLINE – Dynamic
ISO and NAS Code complete
with average analysis

TEST NUMBER 39
TEST REF CALIBRATION
TEST TYPE: Normal
NAS CODE:-

7

µm	5-15	15-25	25-50	50-100	100+
NAS	6	5	7	7	00

ISO CODE 16/15/12
SAMPLE VOLUME 15ml

µm	/100ml
5-15	15860
15-25	1239
25-50	952
50-100	132
100+	0

ONLINE – Normal
Particle counts displayed –
NAS code 1638 standard

TEST NUMBER 39
TEST REF CALIBRATION
TEST TYPE: Normal
ISO CODE:-

//*

NAS CODE **
SAMPLE VOLUME 15ml

µm(c)	/100ml
4	XXXXXXXXX
6	XXXXXXXXX
14	XXXXXXXXX
21	XXXXXXXXX
25	XXXXXXXXX
38	XXXXXXXXX
50	XXXXXXXXX
70	XXXXXXXXX

The Analyser upper operating limit is set at 24/22/20. Tests that result in particle counts exceeding any scale number in the three part ISO code upper limit has the scale number replaced by an asterisk.

Also, the associated particle counts on the printout are replaced by X's. Refer to the example on the left.

5.7 Further Tests

5.7.1 Same Sampling Point

To repeat a test on the same sample point press START button 1 . Note that the test number will automatically increment.

5.7.2 Different Sampling Point/ Same System

To carry out this new test repeat steps laid out in section 5.5

To change test reference/ test mode data, repeat steps laid out in section 5.3

5.7.3 New System

To carry out this test repeat steps laid out in section 5.3

5.8 Shutting Down

- Disconnect the Fluid Sampling Hose from the system by means of the M16x2 connector. This isolates the fluid supply.
- Operate the Flush Valve to release the pressure. Once pressure has decayed (no further fluid dispensing form the waste hose), operate the flush valve to close the circuit.
- Switch off the Analyser by Pressing the Red Button.
- Remove the Fluid Sampling Hose from the Analyser
- Remove the Waste Fluid Hose from the Analyser
- Replace the Hose End Caps on sampling hose, wipe clean and store
- Connect the Waste Fluid Hose quick coupling end fittings together, wipe clean and store. All waste fluid should be disposed of in accordance with local authorities guidelines.

5.9 Continuous Sampling

The LPA2 can be selected for continuous testing at set time intervals.
Once continuous sampling has started the LPA2's flush valve automatically opens and closes before each test. This allows representative fluid to reach the sensing arrangement before the 15ml sampling test commences.

The flush valve automatically opens at the end of the sampling cycle and remains open whilst the LPA2 is emptying to waste the sample fluid from the previous test. Additionally, depending on the time set for Minutes Between Tests, the flush valve operates as follows:

• Time set to 0:
At the end of the Analyser's emptying cycle the Flush valve automatically closes and the next sampling test immediately starts.

• Time set to between 1 and 5:
After the Analyser's emptying cycle has finished the Flush valve remains open for the time set, then automatically closes before the next sampling test.

• Time set to between 6 and 30000:
Flush valve automatically closes after the emptying cycle has finished and remains closed until 5 minutes before the next sample test is programmed to start.

The Flush valve status is indicated by the push button illumination. Not illuminated means valve closed, illuminated means valve open.

The servo motor operating the Flush valve exhibits a slight 'ticking' noise, both when it is open and closed. This is normal.

Important! Do not connect Waste Fluid Hose to a pressurised system, as this will cause the LPA2 to malfunction and could cause internal leakage. The Waste Fluid Hose must be discharged into a tank/ vessel vented to atmosphere.

NOTE

To conserve battery life, the LPA2 should be permanently connected to the power adaptor when it is operated in the continuous sampling mode.

5.10 Continuous Sampling - Basic Operation

Step 1
On the Settings Screen, press 5 repeatedly until CONTINUOUS is selected.

Step 2
Test Option - Press 6: Then press the relevant key to switch between option selections:

1 - Sets the MINUTES BETWEEN TESTS
Press 1 then input the time in minutes that is required between the end of a test and the beginning of a new test. Input a value between 1 and 30000 followed by RETURN.

2 - selects between LOG EVERY TEST: ON and LOG EVERY TEST: OFF
Selecting LOG EVERY TEST: OFF will store none of the test results in the LPA2's memory.

4 - used to input the Clean Alarm Level (ISO). Enter a value of 0 (zero) if not used.

5 - used to input the Clean Alarm Level when using the NAS1638 / AS4059E-1 format. Enter 0 if not used.

6 - used to enter the Clean Alarm Level when using the AS4059E-2 format. Enter 0 if not used. (This Alarm Level will now be displayed as *A/*B/*C/*D/*E/*F).

Step 3
Press the flush valve push button to open the flush valve. The push button illuminates to indicate that the valve is open. Leave valve open for at least 1 minute or 200ml of fluid, or more if the HP sampling hose is greater than 1.5m long.

Step 4
Press flush valve push button to close flush valve - push button illuminates is cancelled. Alternatively, proceed to Step 5 below - the action of pressing Start button automatically closes the flush valve before sampling commenced.

Step 5
Press the START button 1.
The LPA2 will now commence the sampling procedure.

Step 6
The completion progress bar indicates the status of the test.
- Results will be automatically displayed on the screen after each test.
- Results will be automatically printed at the end of the emptying cycle, if the Auto Print mode has been turned ON

Step 7
The status is shown as Waiting between the ending of one test and the starting of the next

Step 8
Press Stop button 2 at any point in the cycle to end continuous sampling. The test status will show Idle.

5.11 Continuous Sampling - with Clean Alarm Levels - Alarm Mode 1

This operating mode is similar to the Basic Operation, but in this mode the LPA2 will stop testing when the specified clean alarm level is achieved.

A status of COMPLETED is shown on the LCD when the specified clean alarm level is achieved.
(For other Alarm Modes refer to Section 5.13).

Step 9
Follow the section “Analyser Settings” (Section 5.4) to select the appropriate LPA2 settings.

On the Settings Screen, press Button 5 repeatedly until CONTINUOUS is selected.

Step 10
Test Options Button 6
Press relevant key to switch between option selections.

1 Enter MINUTES BETWEEN TESTS
Press 1 then input the time in minutes that is required between the end of a test and the beginning of a new test. Input a value between 1 and 30000 followed by RETURN.

2 Selects between LOG EVERY TEST: ON and LOG EVERY TEST: OFF
Selecting Log Every Test: Off will only store the results of the test when the Clean alarm Level is achieved - this saves memory space.

3 Confirm Cleanliness Level
Press 3 to turn CONFIRM CLEANLINESS LEVEL On and Off.
Selecting CONFIRM CLEANLINESS LEVEL: ON instructs the Analyser to repeat the sampling cycle until the Clean alarm level has been achieved in two consecutive samples, before the Completed sta- tus is displayed. Selecting CONFIRM CLEANLINESS LEVEL: OFF permits the Clean alarm to be achieved only one time before the Completed status is displayed.

4 Clean Alarm Level (ISO)

Press 4 then input desired Clean Alarm Level in the Code format Number/ Number/ Number – any code number combination can be input, from code 5 to 24, example 10/9/5 RETURN
For continuous testing until the ISO Code is achieved, selected ISO Format, as described under “Analyser Settings” Section 5.4. Testing will automatically continue until each of the three numbers in the Code have been achieved (or better).

5 Clean Alarm Level (NAS1638 / AS4059E-1)

Press 5 then input desired Clean Alarm Level, as a single Class number in the range 2 to 12 inclusive, example 6 RETURN.
For continuous testing until the (NAS1638 / AS4059E-1) Class is achieved, select NAS Format or AS4059E Table 1, as de- scribed in “Analyser Settings” Section 5.4. Testing will automatically continue until the Class number has been achieved at each of the five micron size ranges covered by NAS 1638 & AS4059E Table 1. Note: AS4059E-1 denotes Table 1 of the AS4059E standard.

6 Clean Alarm Level (AS4059E-2)

Press 6 then input desired Clean Alarm Level in the format 1A/2B/3C/4D/5E/6F in the following range:

Size Code A: 000to 12 Size Code B: 00 to 12 Size Code C: 00 to 12 Size Code D: 2 to 12 Size Code E: 4 to 12 Size Code F: 7 to 12 Example, 4A/4B/5C/6D/6E/7F

For continuous testing until the AS4059E Table 2 size codes are achieved, select AS4059E TABLE 2 FORMAT, as described in “Analyser Settings” Section 5.4. Testing will automatically continue until the Class number has been achieved at each of the six Size Codes.

Also, the LPA2 will handle deviations from the above format intelligently. The size code can be out of order: 7F / 4A / 5C / 4B / 6E / 6D

If any sizes are missing, they will be assigned the “*” value.
The effect of this is a “don’t care” value when used as the cleanliness target. For example, 6B/6C/7D is translated as *A/6B/6C/ 7D/*E/*F. In this case, testing will continue until the B, C and D Classes are less than or equal to 6, 6, 7 respectively.

The A, E and F Classes are effectively ignored since they cannot ever be “ worse” than a “*” Class. Note: AS4059E-2 denotes Table 2 of the AS4059E standard

PRODUCT OPERATION

Step 11
Press flush valve push button to open flush valve – push button illuminates to indicate valve is open. Leave valve open for at least one minute or 200ml of fluid, to remove any entrapped air and fluid from the previous test ensuring no cross-contamination between samples.

Step 12
Press flush valve push button to close flush valve – push button illumination is cancelled. Alternatively, proceed to step 13 – the action of pressing Start button automatically closes the Flush valve before sampling commences.

Step 13
Press START button 1
The Analyser will now commence the sampling cycles

Step 14
The completion progress bar indicates the status of the test.
- Results will be automatically displayed on the screen after each test.
- Results will be automatically printed at the end of the emptying cycle, if the Auto Print mode has been turned ON.

Step 15
The status is shown as waiting between the ending of one test and the stating of the next test.

Step 16
Press Stop button (key 2) at any time in the cycle to end continuous sampling. The test status will show Idle.

5.12 Moisture Sensor

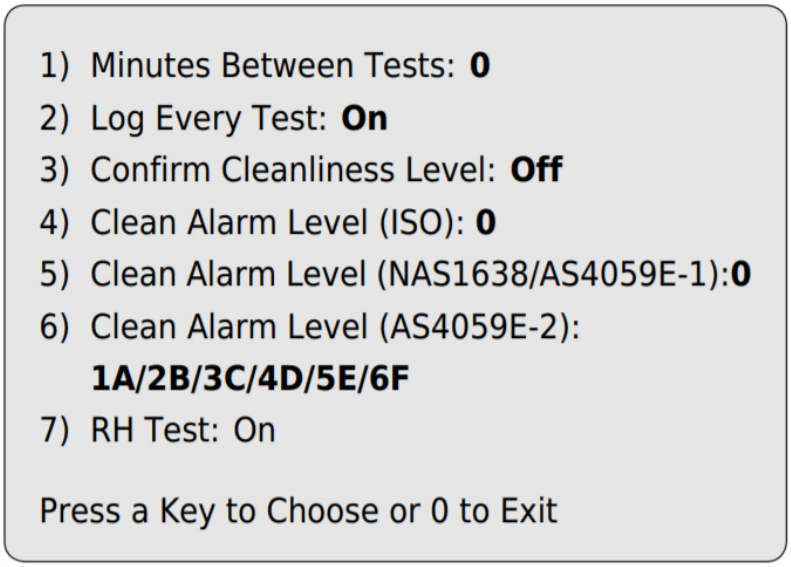
The LPA2 version fitted with the optional moisture sensor module allows both measurement of % saturation of water in oil (Relative Humidity) and temperature. These are displayed as RH % and °C on the main/test progress screen and on the printed results.

Temperature measurement provides a reference temperature for the RH reading.
Due to the temperature gradient existing between the system tapping point and the RH/temperature module, the tempera- ture reading can be 5°C to 10°C less than the actual system temperature, depending on operating conditions.

The LPA2 can be configured to do a test with or without the moisture sensor selected. If the moisture sensor has been selected, the flush valve will open automatically for a period of 3 minutes before the particle count test commences. This is to allow the moisture sensor to stabilise and give an accurate reading.

NOTE: Be aware of the volume of fluid that is flushed during this period. If necessary the waste can be returned direct to the reservoir (ATMOSHPERIC - no back pressure)

To switch the moisture sensor ON or OFF, select the Test Option Screen, as described in section 5.4.6 The Test Options Screen will be displayed.

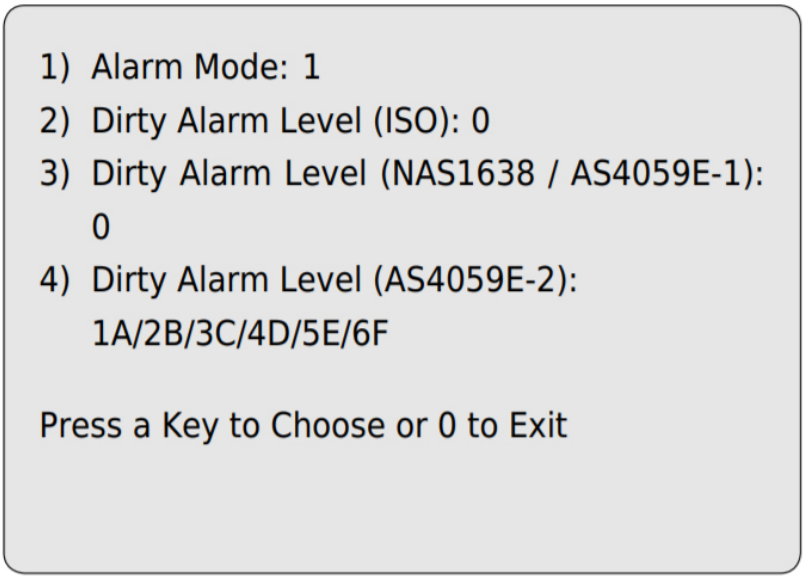


Press 7 to change RH Test status to ON or OFF.

5.13 Alarms

Access the Operations screen as described on page 11 and press 7 ALARM OPTIONS. The Alarm Options screen will be displayed.

PRODUCT OPERATION



The LPA2 includes two solid state relays for connections to an external circuit. These can be arranged to function as follows:

1 Alarm Mode: 0
Selecting option 0 switches relays 1 and 2 always off.

2 Alarm Mode: 1
Selecting option 1 will configure relays 1 and 2 as described on page 36 - refer to the examples given on the simple wiring diagrams.

Clean alarm levels are set in accordance with the instructions starting in Section 5.11. Alarm mode 1 is used in conjunction with the Continuous Sampling test type, enabling the Analyser to operate continuously until the specified clean alarm level is achieved.

3 Alarm Mode: 2

Selecting option 2 arranges the relays to operate when the Clean and Dirty alarm levels are reached/exceeded. Alarm mode 2 will normally be used in conjunction with the Continuous test type, but can be used with all other test types as well.

Set the Clean and Dirty alarm levels by inputting the desired levels in to both the Test options screen (section 5.4.6) and the Alarm options screen, also setting the appropriate result format to ISO, NAS or AS4059, as described in section 5.4.4
Both relays are initially off and remain off until an alarm level has been reached/exceeded.

The following illustrates the switching logic of the Relays:

Relay 1 (Dirty)		
NAS/AS4059E-1 single number	result > set limit	On
ISO/AS4059E-2 multi-part	result <= set limit	Off
	any result > corresponding set limit	On
	all results <=corresponding set limit	Off
Relay 2 (Clean)		
NAS/AS4059E-1 single number	result <= set limit	On
ISO/AS4059E-2 multi-part	result > set limit	Off
	all results <= corresponding set limit	On
	any result > corresponding set limit	Off

Alarm Modes: 3 and 4

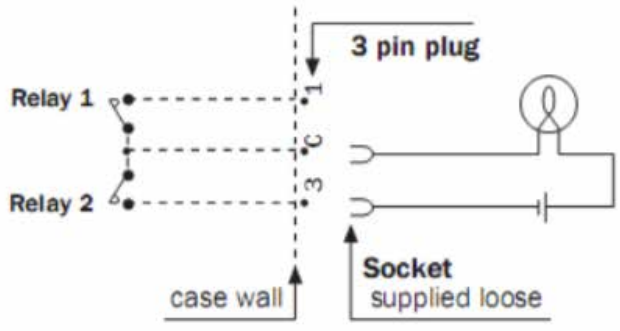
These are reserved for future development.

5.14 Wiring

The LPA2 contains two solid state relays which can be used to switch an external circuit, when using the Continuous Test mode. The function of these relays for Alarm Mode 1 is shown in the following simple wiring diagrams, using a battery and bulb circuit for illustrative purposes.

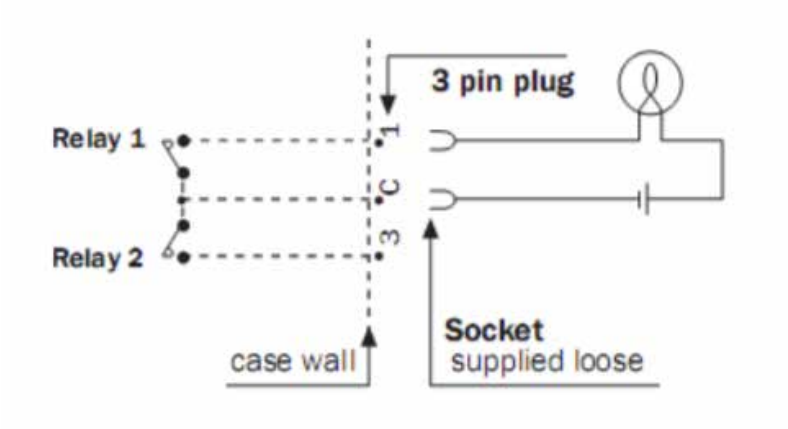
Each relay is designed for a maximum current of 1 amp at 24 volt nominal AC or DC (absolute maximum 60 volt peak). Operation above these limits will cause irreparable damage to the relays.

If the user needs to switch voltages/currents in excess of the above maximum limits, then separate higher rated interposing relays will need to be incorporated into the final electrical scheme designed by the user.



Example 1: Bulb illuminates when clean alarm level is achieved (completed status), and is off during sampling.

PRODUCT OPERATION



Example 2: Bulb illuminates during sampling and extinguishes when Clean alarm level is achieved (completed status is shown on LPA2).

(Relay 1 is also closed during Normal, Dynamic, Triple & Bottle and Short test types. Relay will open when stop button is pressed)

5.15 Bottle Sampling

Press the Log button 6 to access results stored within the LPA2's memory, the Log Screen will be displayed.

1) Transfer Log

2) Clear Log

3) Clear Last

4) Recall

5) Print

Press a Key to Choose or 0 to Exit

To view the contents of the LPA2's memory progress through the following routine

- Select 4 Recall and enter the number of the test to be retrieved.
- If the test number is not known enter the last test number and scroll through the memory, using + Next or - Previous to select the required result.
- To print the result press 0 EXIT, then 5 Print. A hard copy of the result will then be printed.[6]

[6] The result printed will be viewed in the Result Presentation Options format from the Set function.

5.16 Battery Charging

The LPA2 is equipped with an internal rechargeable battery capable of sustaining 8 hours continuous operation following an initial 24 hour charging period (approximately 100 tests).

To conserve battery power the LCD screen is illuminated at a reduced level when the LPA2 is operated without an external power supply connected.

When the Low battery level indicator is displayed the LPA2 requires recharging as soon as possible.

BEFORE COMMENCING RECHARGING always press RED button to switch off the Analyser. NOTE

To recharge, connect lead from power adaptor to the DC power input socket on the LPA2. Observe that the battery charging indicator illuminates on the LPA2.

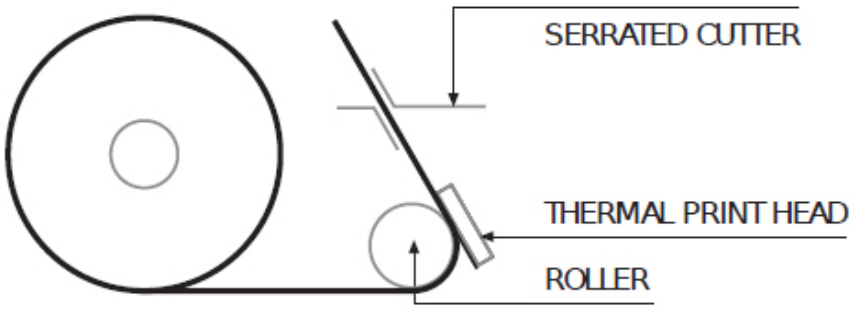
Battery power may be conserved by:
- Operating LPA2 whilst connected to power adaptor
- Switching LPA2 OFF between samples
- Turning Auto Print Mode OFF

Should the battery become completely discharged it is advisable to allow a minimum of 15 minutes charge time prior to commencing a test. The LPA2 must remain connected to the power adaptor during subsequent tests until the battery has had time to recharge.

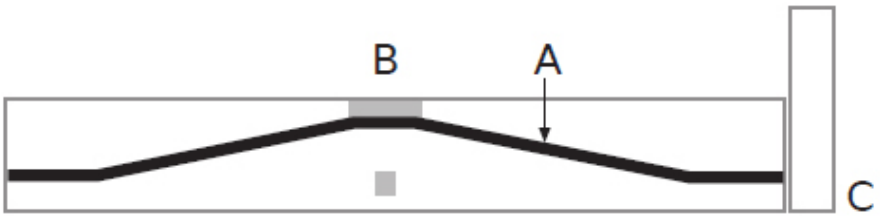
Total discharge will shorten the battery lifetime so should be avoided where possible.

5.17 Printer Paper

To access the thermal printer, remove the four thumbscrews securing the cover and serrated paper cutter. Thermal printer paper is sensitised on one side only and must be fed into the printer mechanism as shown below.



Using a finger, press down on the print head spring at position A and tilt the print head to the open position by pulling it back at point B.



Feed the paper under the roller and pull the paper end out of the mechanism. Return the print head back to its normal position by pressing on the green lever at point C. Ensure that the print head spring has returned to the position shown above.

IMPORTANT The thermal printer must not be operated without paper, as this will damage the printer. Therefore, replace the roll when the “end of the roll” indication appears on the paper.

NOTE

5.18 Computer Analysis

5.18.1 Software Installation

Install software on to a suitable PC running Windows XP or later.
Follow instructions as detailed in the LPA-View User Manual.

5.18.2 Results Download

Step 1
Connect the cable to LPA2 and PC via an appropriate port.

Step 2
Switch ON the LPA2.

Step 3
Switch ON the PC.
- Launch LPA-View software.
- From File select Upload.
- Data Transfer Screen will be displayed.
- Select appropriate COM Port.
- Select Transfer Data.

The Analyser will download all stored results from memory into the software package. Upon completion of upload the Analyser memory can be automatically deleted - if this option has been selected from the PC menu.

Step 4
When the transfer is complete switch OFF the Analyser.

PRODUCT OPERATION

6 Troubleshooting / FAQ

6.1 Misuse of Product

- The product should be connected to a power supply within the rating of the product and not wired directly to the mains.
- This product should be connected to a hydraulic line; this must be within the pressure range of the unit (minimum 2 bar maximum 400 bar) (29 - 5800 PSI)
- Connection hoses should never be allowed to lie along the floor when the LPA2 is installed and in use.
- The operator should follow all standard operating procedures previously set at the operating location as well as the procedures required by the manufacturer.
- The LPA2 is not suitable for use in an explosive environment or an ATEX zone.
- Over-tightening of test points/ hoses can damage threads causing the unit to fail.

6.2 Fault Finding

LCD Screen remains blank after switching on

Check that Analyser had been put on charge previously

Check that LED illuminates when power adaptor is connected to Analyser DC Power Input Socket

Unexpected results obtained from sample

Check that the fluid sampling hose has been fully connected at both the system and Analyser ends

Confirm that there is a free flow of fluid to the Analyser, by depressing the Flush Valve and observing fluid passing into the waste disposal bottle

High water/aeration levels.

If suspected contact MP Filtri for further advice

Other issues

If excessive system contamination is suspected, flush out the Analyser using a Bottle Sampling Unit in conjunction with a suitable flushing fluid. Please see document 200.093 on the supplied USB data stick.

The standard LPA2 and the standard Bottle Sampling units are both fitted with Nitrile seals, so Petroleum Ether may be used for this purpose.

Petroleum Ether is not compatible with seals manufactured from EPDM, which are used in the Phosphate Ester version of the 500 Bottle Sampling unit. Iso-propyl alcohol should be used as the flushing fluid. Please consult the website for other compatible fluids.

DO NOT USE ACETONE

6.3 Warranty

The LPA2 is guaranteed for 12 months upon receipt of the Analyser, subject to it being used for the purpose intended and operated in accordance with this user guide. Please fill in online.

6.4 Recalibration

MP Filtri will only verify the accuracy of the LPA2 if the unit is recalibrated every 12 months.

Please ensure that the test results in the Log are downloaded to LPA-View before the LPA2 is despatched, in case action taken by MP Filtri during the service / recalibration causes the Log to be cleared. Please go to mpfiltri.com to book a time slot for service and recalibration.

It is requested that only the LPA2, not the support case or any other ancilliaries, be returned for recalibration.

MP Filtri will not be held responsible for any items returned as such.

Ensure that the LPA2 is packed appropriately for transportation.

6.5 Clean Working Practices

The majority of hydraulic systems require cleanliness levels below 40 micron - the threshold of human eyesight. When analysing particles down to levels of 4um, 6um & 14um you are talking about objects of a cellular/bacterial size. This creates various challenges, and is starting to drive better and cleaner working practices in industry.

Our products are at the forefront of this challenge, and will help you to manage the quality and productivity of your systems.

Do

- Do use filter breathers on tank tops.
- Do use tank designs, which are self draining (sloped or conical).
- Do use tanks which can be sealed off from the surrounding environment.
- Do exercise care and use funnels when filling tanks with fluid.
- Do utilize stainless steel and methods such as electro-polishing in the design of system components upstream of your first filter set.
- Do perform off-line analysis in a controlled environment such as a laboratory which should contain fewer airborne contaminants that where the sample was taken from.
- Do use suitable, glass bottles (ideally certified clean) to take samples, along with a hand pump to reduce contamination ingress.
- Do filter your system thoroughly before using it in your production process.
- Do perform a statistically large enough sample of particle analysis results (25) to arrive at a base cleanliness level for your system.
- Do make sure that filters are correctly sized for your applications and cleanliness you are trying to achieve.

Don't

- Don't eat, drink or smoke around critical systems/processes.
- Don't leave tools, objects, clothing or other materials etc. on surfaces or tanks of critical systems.
- Don't use open tanks on critical systems.
- Don't take samples or perform on-line analysis from the top of a reservoir/tank.
- Don't design/use tanks which contain crevices (internal corners etc).
- Don't assume that if a sample looks clean, that it is. You wont be able to see the contaminants.
- Don't perform off-line analysis in an "uncontrolled" environment. E.g. workshop.
- Don't rely on a single test for a capable representation of your system.
- Don't start using your system/process until it has gone through a commissioning period whereby contamination levels are relatively stable.
- Don't mix fluids into the same system. They can emulsify and eliminate any chance of a reliable particle count.
- Don't use unsuitable containers to take a fluid sample.

TROUBLESHOOTING / FAQ

7 Reference

7.1 Spare Product / Part Numbers

For spares and part numbers please see the website: www.mpfiltri.com

7.2 Com Ports

The LPA2 uses the RS232 connection standard to interface with a computer. If the computer does not have a built-in RS232 ("COM") port, a USB:RS232 adaptor can be used.

7.2.1 Connection Using a USB Port

This is used when a built-in RS232 port is not available. When using a USB Adaptor provided with the LPA2:
- Install the Prolific driver from the file: PL2303_Prolific_DriverInstaller_v110.exe provided.
- You will need to accept any warnings about making changes to your computer.
- Follow the installer Wizard, accepting the defaults.
- When the installer has completed, plug in the USB to Serial Adaptor.
- A message should pop up indicating successful hardware installation. Note any COM port number indicated in the message.
- Connect the LPA2 to the computer using the Serial lead and the USB to Serial Converter.
- If neccessary, determine the COM port allocated by the computer for this device using the procedure following.

7.2.2 Determining the Com Port

To check the COM port number allocated by the computer for the Serial lead or the USB to Serial Connector:

Windows 2000, Windows XP, Windows Vista
- Right click on My Computer icon and then left click on Properties.
- Click on the Hardware tab and then click on the Device Manager Button.
- Click on the plus sign next to Ports (COM & LPT).

Windows 7
- View the installed devices using Start Button/Devices and Printers.
- You should see an icon representing the port.
- "Communications port"- if using the Serial lead.
- "ATEN USB to Serial Cable" or "Prolific USB-to-Serial Comm Port" if using an adaptor cable.
- Either of these will have a COM number after it. This is the number you should use when selecting the Com Port.

REFERENCE

WORLDWIDE NETWORK

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