



# Operators Guide

## LPA2 - Aviation Edition

### Portable Particle Counter





# PRODUCT OVERVIEW

## LPA2 - Aviation Edition - Portable Particle Counter

The LPA2 - Aviation Edition is a highly precise, lightweight & fully portable instrument designed exclusively for the Aviation Industry.

It can automatically measure and display particulate contamination, moisture and temperature levels in various hydraulic fluids. The LPA2 - Aviation Edition can be connected to the MP range of bottle sampler products to enable laboratory based particle counting.

Approved by Airbus, the LPA2- Aviation Edition is a solution for online monitoring of contamination in hydraulic fluid, providing an immediate hydraulic health check. It employs predictive maintenance procedures to help reduce downtime and in turn costs.

### Features and benefits

- Approved by Airbus
- Specialist Airbus sampling valve adaptor\* and C spanner
- LPA2 - Aviation Edition 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 based on ISO11171
- Measures and displays the following international standard formats; ISO 4406:2017, NAS 1638, AS 4059E
- Data logging and 600 test result memory
- Manual and remote control flexibility
- LPA View software (included)
- Full size QWERTY keyboard
- Normal test 50ml sample volume for Airbus application
- Full accessories kit included
- Internal rechargeable battery capable of performing 100 tests between charges



## Product Presentation

The LPA2 - Aviation Edition is designed to measure and quantify the numbers of solid contaminants in Hydraulic, Lubrication and Transmission applications. The LPA2 - Aviation Edition is designed to be a laboratory accurate instrument suitable for “on-site” applications utilising mineral oil as the operating fluid. Please contact 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 lands on photodiodes. When a particle passes through the beam it reduces the amount of light received by the diode, and from this change in condition, the size of the particle can be deduced.

Hydraulic and lubricating systems consist 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 contaminants and these are ever present in all hydraulic systems. There is a revised standard ISO cleanliness code ISO 4406 which classifies the numbers of particles that can be tolerated within the system and it is these levels of contaminants that the particle counter is designed to measure.

# PRODUCT OVERVIEW

## Disclaimer

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



# DECLARATION OF CONFORMITY



Product Manufacturer:  
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Bourton on the Water  
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Product: LPA20PSTA30 - Laser Particle Analyser

The products described are in conformity with the following directives:

BS EN 61326-1:1997 Electrical equipment for measurement, control and laboratory use – EMC requirements

BS EN 61010-1:1993 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

Date: July 2020

Signed:



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

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# 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 instructions 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



NOTE

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



CAUTION

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



DANGER

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

No operator is required for operating the unit. However, the following areas are to be considered dangerous: The ones close to the electric motor because of live equipment with potentially hot surfaces.

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

- Electric shock risk on the electric motor; in case of motor malfunction
- 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 handling the metal lances/the hoses and when moving the unit. Avoid direct contact with hot oil and with the filter body.

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 - Aviation Edition

### Battery

- It is recommended that the LPA2 - Aviation Edition 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 - Aviation Edition or Bottle Sampler with Acetone or similar solvents that are not compatible with the seals in the LPA2 - Aviation Edition. The recommended cleaning fluid for internal flushing is Petroleum Ether - see also Fault Finding, page 44.
- Note: it is not always necessary to clean the unit between uses. The 30 second automatic pre flush is sufficient to purge any previously sampled fluid from the unit and its associated accessory hoses.
- The use of a 500µm coarse screen filter, screwed onto the HP connector, is recommended for heavily contaminated systems. Refer to section 8.1 for the part number.

### LCD visibility

- If the LCD screen remains blank then refer to page 34 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.



# TRANSPORT / STORAGE

## 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 - Aviation Edition, travel case and accessories is 18.5 kg.

### 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



# WARRANTY

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 - Aviation Edition is guaranteed for 12 months upon receipt of goods, subject to it being used for the purpose intended and operated in accordance with this User Guide.

MP Filtri UK will only verify the accuracy of the LPA2- Aviation Edition 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 - Aviation Edition is despatched, in case action taken by MP Filtri UK during the service / recalibration causes the Log to be cleared.



**NOTE**

It is requested that only the LPA2 - Aviation Edition and adaptor, (not the support case or any other ancillaries), be returned for recalibration.

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

Ensure that the LPA2 - Aviation Edition 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<br>NAS 1638 Class 2 to 12<br>AS4059 Rev.E. Table 1 Size Codes 2-12<br>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  |
| Accuracy        | Better than 3% typical   |

### 4.2 Electrical interface

|   |  |   |
|---|--|---|
| Supply Voltage  | 9-36V DC   |   |
| Supply Current  | 2A Max   |   |
| Power Consumption   | Charging state: ~40W max<br>Idle State: 3W max<br>Note: Power consumption level can vary dependant on fluid properties   |   |
| Test Time: (Defined as total time to sample and empty the sample) | <b>Time for result to be presented (min)</b><br>8 ml. (short): 2:15<br>50 ml. (normal): 3:30<br>30 ml. (dynamic): 2:30<br>24 ml. (bottle sampler): 1:45<br>15 ml. (continuous): 1:15 | <b>Total test time inc emptying cycle (min)</b><br>8 ml. (short): 4:00<br>50 ml. (normal): 6:30<br>30 ml. (dynamic): 4:30<br>24 ml. (bottle sampler): 3:00<br>15 ml. (continuous): 2:30 |
| Data Storage  | Approximately 600 time-stamped tests in the integral LPA2 - Aviation Edition 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             | LPA2 - Aviation Edition only<br>Height 210mm (8.2 inches), Depth 260mm (10.2 inches), Width 430mm (16.9 inches)<br>LPA2 - Aviation Edition with travel case - boxed<br>Height 400mm (15.7 inches), Depth 500mm (19.7 inches), Width 600mm (23.6 inches) |
| Weight                 | 9.8 kg / 31 lbs (Packed weight: 18.5kg / 41lbs)   |
| Hydraulics Connections | INLET M16x2 test point<br>OUTLET Quick release coupling   |
| Seal Material          | S version: FFKM   |

## 4.4 Fluid characteristics

|                             |  |
|-----------------------------|--|
| Fluid compatibility         | S Version - Aviation phosphate esters and mineral oils |
| Viscosity                   | ≤ 400 cSt  |
| Fluid temperature           | +5°C (41°F) to +80°C (+176°F)                          |
| Sample volume               | 50ml (normal): 6 mins 30 secs approx                   |
| Minimum pressure            | 2 bar / 29 psi   |
| Maximum pressure            | 400 bar / 5801 psi static                              |
| System pressure measurement | +/- 0.5% Full scale accuracy min 10 bar                |

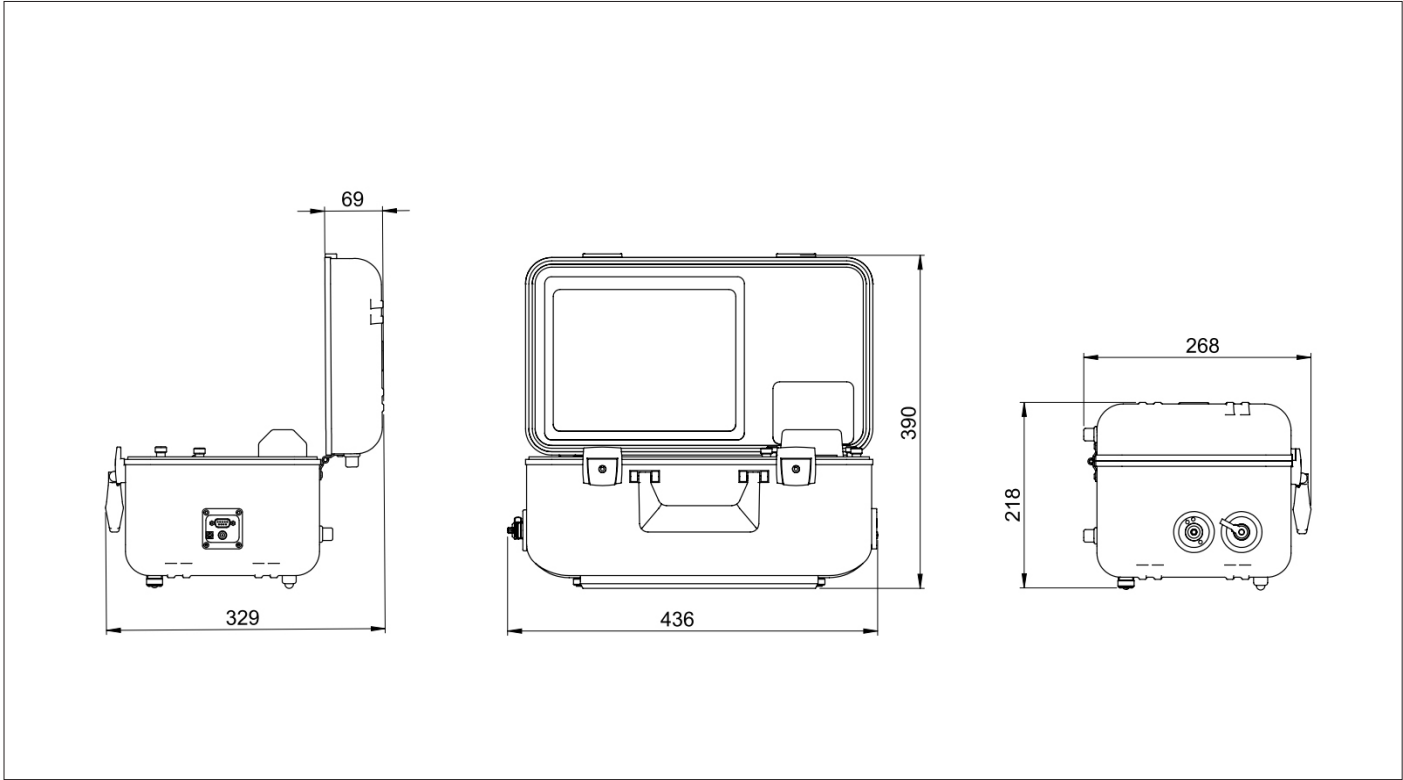
## 4.5 Environment

|                             |                                 |
|-----------------------------|---------------------------------|
| Ambient working temperature | -10°C (+14°F) to +80°C (+176°F) |
| IP Rating                   | IP51 (Lid open)                 |

## 4.6 Product Family

|                 |   |
|-----------------|---|
| Airbus Variants | A320 family, A330 and A340 family, A380, A350 |
|-----------------|---|

4.7 Dimensions



4.8 Designation and ordering code

| AUTOMATIC PARTICLE COUNTER LPA2 - AVIATION EDITION |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
| Series   | Configuration example: LPA2 0 P S T A 30       |  |  |  |  |  |  |  |  |
| LPA2   | Twin Laser Particle Analyser                   |  |  |  |  |  |  |  |  |
| Moisture Sensor                                    |  |  |  |  |  |  |  |  |  |
| 0  | Without moisture and temperature sensor        |  |  |  |  |  |  |  |  |
| Pressure Sensor                                    |  |  |  |  |  |  |  |  |  |
| P  | With on-screen inlet pressure display          |  |  |  |  |  |  |  |  |
| Fluid compatibility                                |  |  |  |  |  |  |  |  |  |
| S  | Phosphate ester and aggressive fluids (*) (**) |  |  |  |  |  |  |  |  |
| Accessories  |  |  |  |  |  |  |  |  |  |
| T  | Standard Unit with Travel Case                 |  |  |  |  |  |  |  |  |
| Bottle Sampling Options                            |  |  |  |  |  |  |  |  |  |
| A  | With Airbus Adaptor                            |  |  |  |  |  |  |  |  |
| Design Ref   |  |  |  |  |  |  |  |  |  |
| 30   |  |  |  |  |  |  |  |  |  |

# TECHNICAL SPECIFICATION

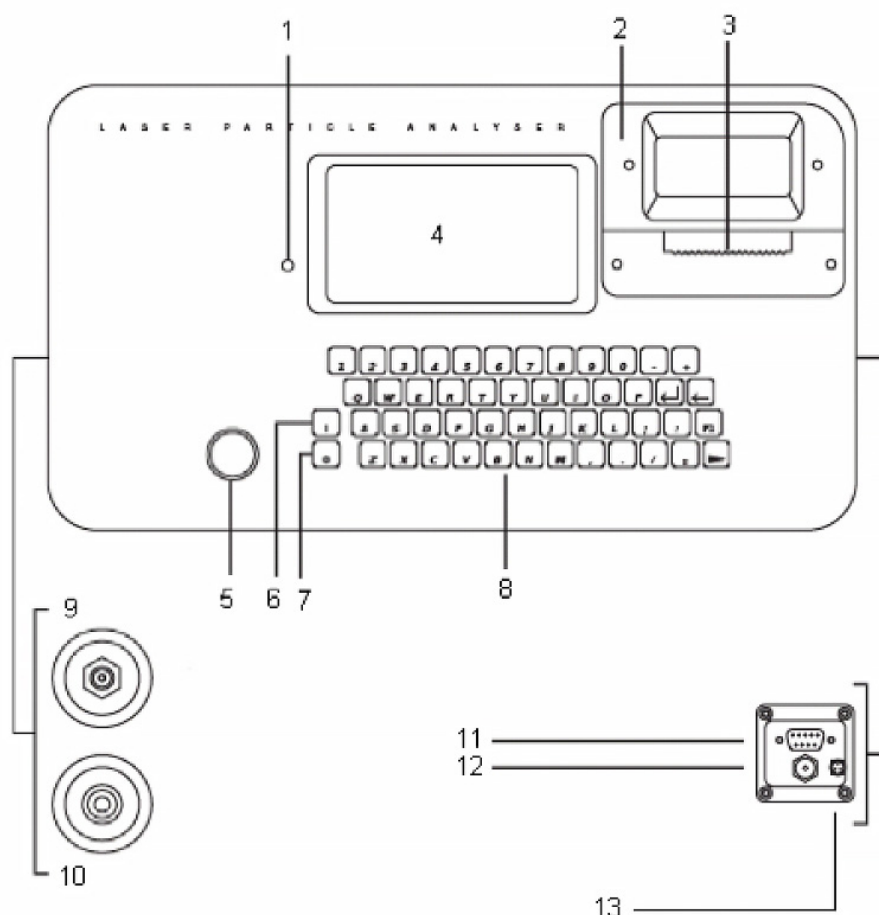
## 4.9 Scope of supply

Each LPA2 - Aviation Edition supplied consists of the following:

- 1 x LPA2 (Model: LPA20PSTA30)
- 1 x Airbus sampling valve adaptor\* and C spanner
- 1 x M16x2 microbore pressure hose, 2500mm long (For the Airbus Sampling Adaptor)
- 1 x EN6123-04 to M16x2 microbore pressure hose 2500mm long (compatible with A350 sampling valve)
- 1 x 2000mm quick release waste hose
- 1 x 1L waste receptacle
- 1 x 12V, 2A power adaptor 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 Hard copy of product user guide
- 1 x USB datatick with digital copy of user guides/software/drivers
- 1 x Travel Case

### 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



## 5.0 Online Operation

Use of the Sampling Valve Adaptor (MP item no. SKAA02)

Appropriate Personal Protective Equipment (PPE) should be employed during the operations described below. This is the responsibility of the end user. Suggested items:

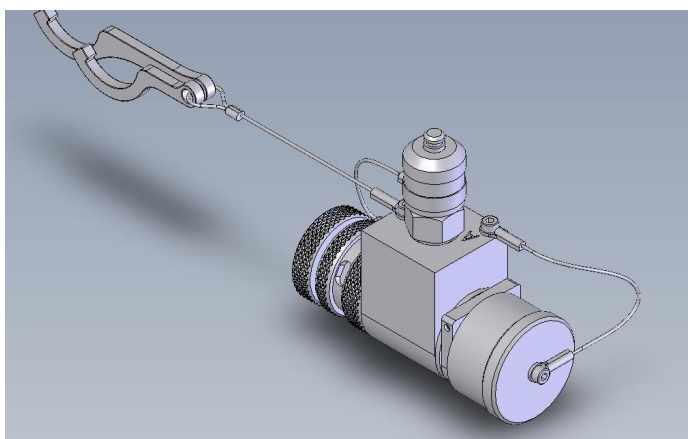
- Safety glasses
- Hard hat
- Suitable gloves
- High visibility jacket



NOTE

### 5.1 Connecting the sampling valve adaptor to the aircraft

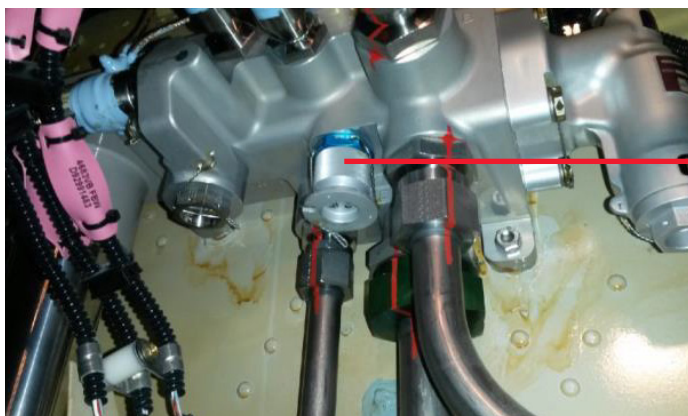
**5.1.1** Unpack the sampling valve adaptor from the LPA2 - Aviation Edition travel case.



**5.1.2** Check that the protective caps are sealed and secure.

**5.1.3** Locate the applicable aircraft sampling valve.

Remove and store safely the cap from the aircraft sampling valve (as per AMM)



Remove security wire and cap

# PRODUCT INSTALLATION



Check integrity of this seal. If it appears damaged in any way, this should be replaced prior to fitting the adaptor.

It is imperative that this seal is in 'NEW' condition.  
If in doubt, please replace the seal before continuing with this operation.

Note: A visual inspection should also be made to both the thread of the SOFRANCE valve and the adaptor to ensure no damage and / or wear is present.

If there are any signs of damage, the process should be stopped until this damage has been rectified.



NOTE

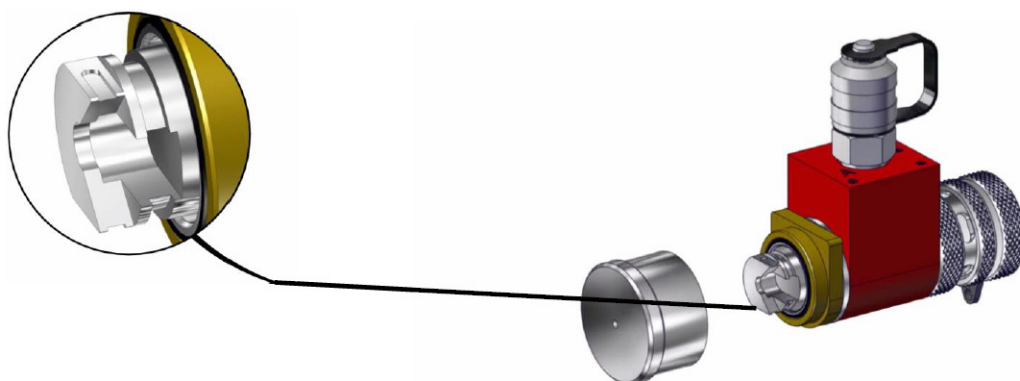
Follow the standard Airbus procedure (AMM) for cleaning the sampling valve

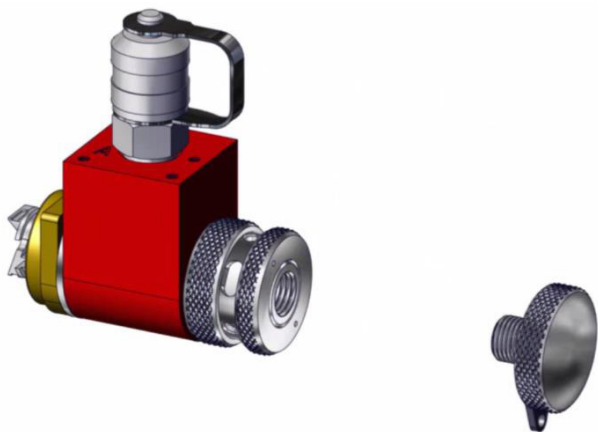
NOTE: An initial purge of the aircraft sampling valve should be performed prior to fitting the adaptor. This is to be carried out as per Airbus procedure 12-32-29 used when taking bottle samples from the aircraft valve - note this is not detailed in this manual



NOTE

## 5.1.4 Remove the protective caps from the adaptor.





Inspect the adaptor and check the integrity of the adapter seal (please refer to section 8.2, page 39) as well as the mating thread form of the adaptor.

If damaged, either replace the seal and/or the adaptor before connecting the adaptor to the aircraft sampling valve.

Engage adaptor with the Airbus sampling valve by completing the following step.

NOTE: Please refer to training video for full detailed method of engagement



WARNING: Once engaged, DO NOT allow the adaptor to pass any distance from the vertical. It is imperative that the adaptor is kept fully vertical.



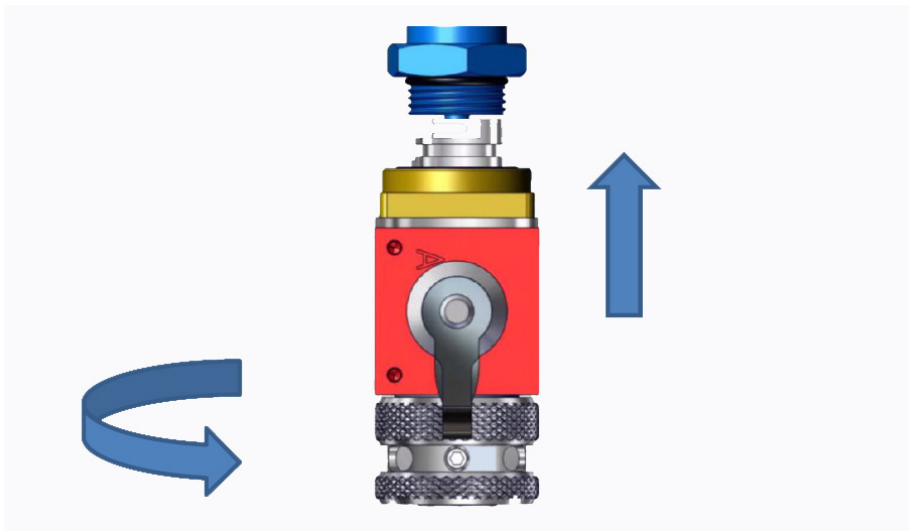


# PRODUCT OPERATION

WARNING: DO NOT pull the adaptor in a downwards direction.



**5.1.5** Push the sampling valve adaptor in an upwards vertical plane until the first thread is engaged. Rotate the bottom part of the adaptor in an anticlockwise direction. Ensuring that the adaptor face seals tightly with the sampling valve NOTE: whilst no physical value of torque can be applied, the adaptor should at a minimum be “two-finger” tight. If there is any doubt on tightness, ensure that the c spanner is used to fully tighten and is fully engaged.



WARNING: Once engaged, DO NOT allow the adaptor to pass any distance from the vertical. It is imperative that the adaptor is kept fully vertical.



WARNING: DO NOT pull the adaptor in a downwards direction as this could open the sampling valve



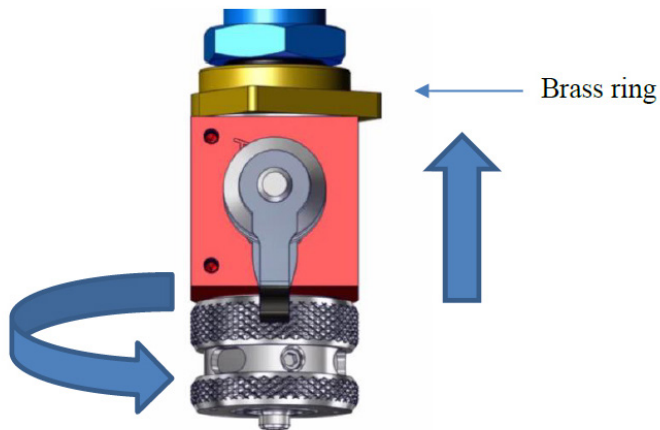
WARNING: DO NOT over tighten the sampling valve, hand tight is sufficient.  
WARNING: Ensure there is NO gap between the two metal faces



NOTE: Please refer to training video for full detailed method of engagement



### 5.1.6 Check if the adaptor is completely located.



NOTE: this operation should only be used as an initial check to ensure if the adaptor is fully tightened or not



NOTE

Check if the adaptor is completely located.

If there is any doubt that the adaptor is NOT fully engaged, the supplied tightening tool should be used to assist the rotation of the bottom part of the adaptor.

It is recommended that the C Spanner tightening tool be used to ensure full engagement of the adaptor.



NOTE: the adaptor seal on the aircraft should not be visible if the adaptor has been fully engaged

WARNING: Ensure there is NO gap between the two metal faces of the adaptor and the SOFRANCE valve. Please utilise the supplied tightening tool to ensure the two surfaces are fully mated



CAUTION

WARNING: Once engaged, DO NOT allow the adaptor to pass any distance from the vertical. It is imperative that the adaptor is kept fully vertical.



CAUTION

# PRODUCT OPERATION

WARNING: DO NOT pull the adaptor in a downwards direction.



WARNING: DO NOT over tighten the sampling valve, hand tight is sufficient.  
WARNING: Ensure there is NO gap between the two metal faces



NOTE: Please refer to training video for full detailed method of engagement



## 5.2 Connecting and performing an online particle analysis

For full user instruction please see LPA2 - Aviation Edition product user guide

**5.2.1** Unpack LPA2 - Aviation Edition contamination monitoring product and all accessories from the travel case.

**5.2.2** Insert waste fluid hose into the waste disposal bottle provided.

WARNING: Do not connect Waste Fluid Hose to a pressurized 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.



**5.2.3** Connect waste fluid hose to Analyser (waste connector). Push back quick coupling outer ring before connecting / disconnecting hose end.

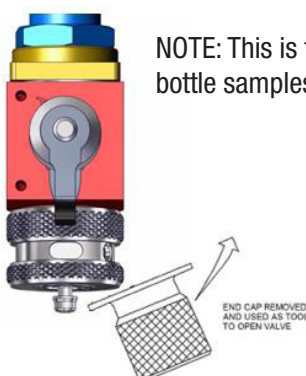
**5.2.4** Connect fluid sampling hose to Analyser (HP connector)

**5.2.5** Connect fluid sampling hose to the adaptor

WARNING: Please ensure that both of the M16x2 connectors are fully engaged to their relevant mating component. The system to be monitored must not exceed 350 bar or be less than 2 bar pressure



**5.2.6** Using the cap from the aircraft valve, gently pull on the nipple on the base of the adaptor.



NOTE: This is to be carried out as per the Airbus procedure 12-32-29 used when taking bottle samples from the aircraft valve

**WARNING:** The sampling valve adaptor is now under system pressure – This will be shown on the right hand side of the display. Working pressure is aircraft specific. Prior to testing, one should ensure that the correct pressure for the aircraft being tested is displayed on the LPA2- Aviation Edition



**WARNING:** DO NOT try to disconnect either the sampling valve adaptor or the LPA2 - Aviation Edition whilst they are under pressure.

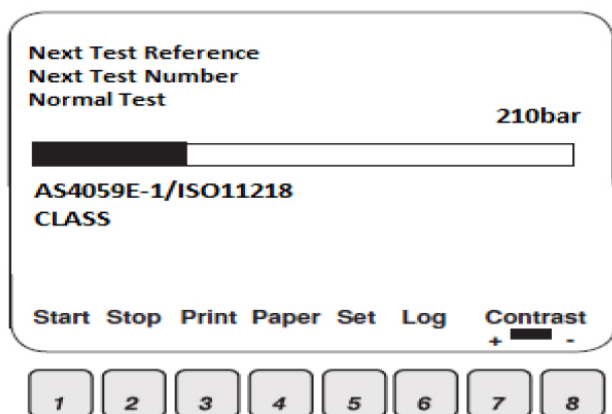


**Note:** a suitable flag/tag should be fitted to the adaptor so that one is aware that the adaptor is still fitted to the aircraft sampling valve



**5.2.7** 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.

# PRODUCT OPERATION



## Main test screen

START – Starts sampling and emptying cycle

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

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

PAPER – Ejects printer paper by three blank lines.

SET – Selects settings screen

LOG – Selects Data Logging screen

Transfer log – downloads memory to software package

Clear log – Clears memory2

Clear last – Clears last result3

2 This is not needed on new units

3 Provided unit has not been switched off Recall – Recalls results from memory Print – Prints recalled results 7, 8 contrast +/-: Adjusts the screen contrast. 7 = darker, 8 = lighter.

**5.2.8** Analyser settings - Press the set 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.

Test Ref: machine one  
Test Number: 123  
Time and Date  
Result Presentation Options  
Test Type: Normal  
Test Options  
Alarm Option  
Press a Key to Choose or 0 to Exit

#### **Test Ref**

Press 1, then input your reference details e.g. “MACHINE ONE (Enter)”. 15 characters maximum.

#### **Test Number**

Press 2, then input the required test number e.g. “123 (Enter)”. The Test Number will automatically increment for each successive test.

#### **Time and Date**

Press 3, and then use the keypad to set the time and date.

#### **Cycle Count**

A cumulative cycle count is also displayed on the Time and date screen. This count automatically increases by 1 each time a test is taken. It is not possible to adjust/reset this value.

#### **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 tests result. Please note: the default setting for LPA2 - Aviation Edition units is AS40591E-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

# PRODUCT OPERATION

The Analyser has five language options:

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

For selection of language proceed as follows:

Press 6

Enter chose value (e.g. 1(Enter) 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.

AS4059E-1 and AS4059E-2 denotes Table 1 and Table 2 of the AS4059E standard respectively.

## Test type

The default for Airbus application on your machine is:

Normal – Single Test: 50ml sample volume.

Note: this option should not be altered and is bespoke for the Airbus version of the LPA2 - Aviation Edition

### 5.2.9 Preparing analyser for test

a) Press START (1) button: The analyser will now commence a 30 second pre-flush; this will automatically be followed by the sampling and emptying cycles. Note: actual volume of fluid flushed to waste will vary according to system pressure, should be approximately 200-250ml during the 30-second flush period.

b) The completion progress bar indicated the status of the sample.

c) Following the sampling results the Analyser automatically discharges the sample fluid to waste, the test status is shown as Emptying – please note this test cycle is completed two times per test (total volume sampled of 50ml).

d) When the Sampling and Emptying cycles have been completed the test status is shown as Idle.

NOTE: The LPA2 - Aviation Edition is set up with 'Normal' test type and reports in AS4059E-1 format. The test type and reporting format should not be altered.

NOTE: The Test Reference and Test Number are programmable from the settings (5) menu

Results are automatically stored to memory.

To download results follow the instructions in section 4

TEST NUMBER 39  
TEST REF CALIBRATION  
TEST TYPE: Normal

AS4069E-1/ISO11218  
CLASS:-

9

| µm(c)         | 6-14 | 14-21 | 21-38 | 38-70 | >70 |
|---------------|------|-------|-------|-------|-----|
| Code          | 9    | 8     | 5     | 00    | 00  |
| SAMPLE VOLUME | 50mL |       |       |       |     |

| µm(c) | /100mL |
|-------|--------|
| 6-14  | 121607 |
| 14-21 | 11195  |
| 21-38 | 221    |
| 38-70 | 0      |
| >70   | 0      |

Further Tests From the Same Sampling Point

To repeat a test on the same sample point press START button

1. Note that the test number will automatically increment.

#### Different Sampling Point/Same system/ New system

Follow step 5.3 to disconnect from the system To carry out this new test repeat section 3 in its entirety

### 5.3 Disconnecting and shutting down the LPA2 - Aviation Edition and sampling valve adaptor

Note: this part of the procedure requires speed of operation so as to not purge excessive fluid to waste



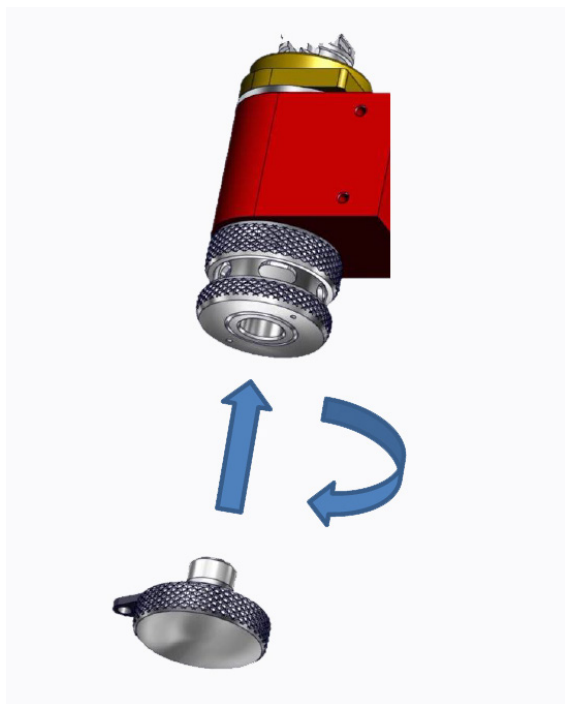
NOTE



## PRODUCT OPERATION

**5.3.1** Press the flush valve button (this will illuminate)

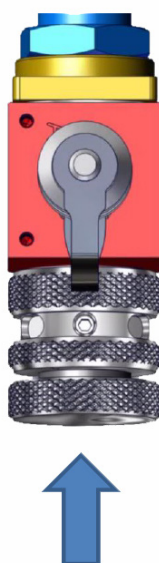
**5.3.2** Fit and rotate the cap on the adaptor in a clockwise direction



NOTE: Please refer to training video for full detailed method of disengagement. If required, the supplied tightening tool can be used to assist the rotation of the bottom part of the adaptor (see Spares section 7.1)



*Choose the appropriate tool to release your sampling valve*



WARNING: Keep winding until the pressure reading on the display screen of the LPA2 - Aviation Edition shows <10 Bar.



WARNING: Note there could still be residual pressure in the hoses. Check the clear waste hose to ensure there is no longer any flow being expelled



WARNING: Do not remove adaptor until no flow is observed



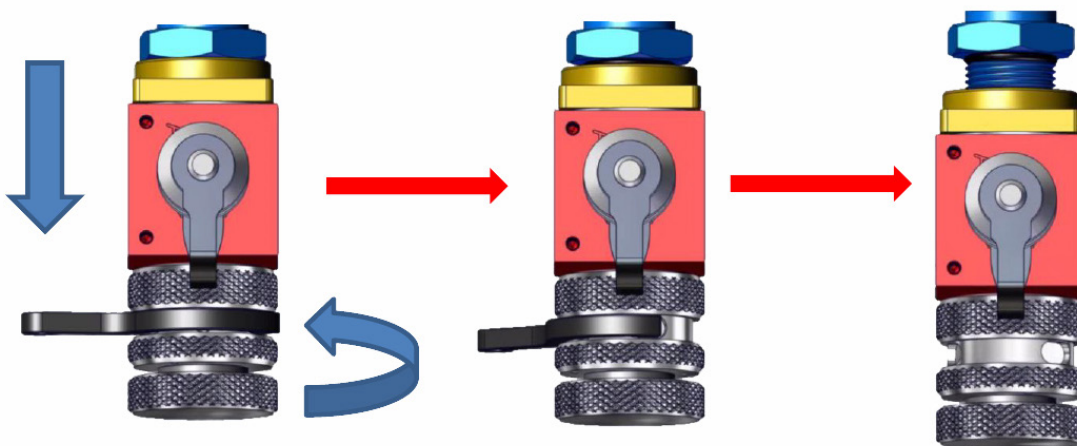
**5.3.3** Disconnect fluid sampling hose from the adaptor

**5.3.4** Disconnect fluid sampling hose from the analyser

**5.3.5** Disconnect waste fluid hose from analyser (waste connector). Push back quick coupling outer ring before connecting / disconnecting hose end.

**5.3.6** Press flush valve button to close flush cycle and turn off the LPA2- Aviation Edition

**5.3.7** Unwind the bottom part of the adaptor from the sampling valve (C Spanner can be used if required) NOTE: Please refer to training video for full detailed method of disengagement.



WARNING: During disengagement, DO NOT allow the adaptor to pass any distance from the vertical. It is imperative that the adaptor is kept fully vertical.



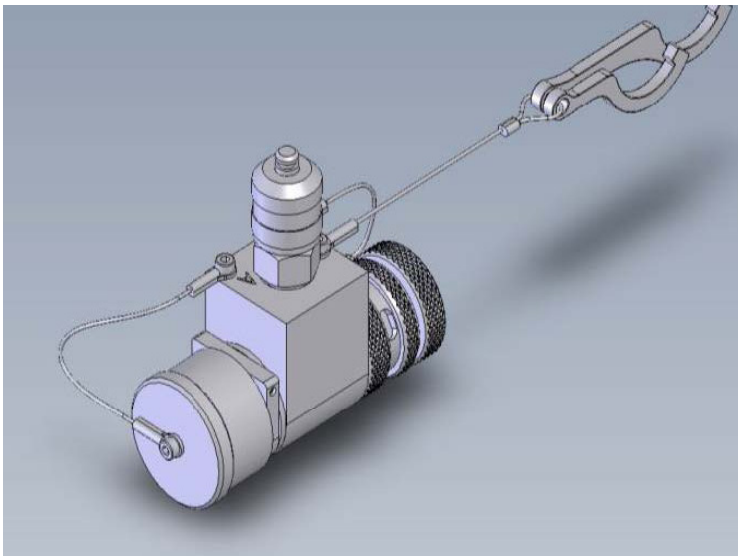
WARNING: DO NOT pull the adaptor in a downwards direction.



# PRODUCT OPERATION

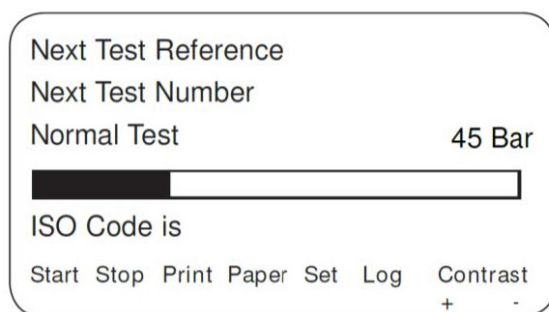
**5.3.8** Ensure that adaptor is thoroughly cleaned/wiped down and replace the protective caps on this and the Airbus sampling valve

- Drain all hoses from the LPA2 - Aviation Edition into a waste vessel
- Ensure all components are clean and dry
- Repack the LPA2 - Aviation Edition and adaptor with all accessories into the carry case.



## 5.4 Pressure Transducer

The LPA2- Aviation Edition when fitted with the optional pressure transducer displays the inlet pressure on the main operator screen. The pressure display is continuously updated.



## 5.5 Data logging

Press the Log button 6 to access results stored within the LPA2 - Aviation Edition'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- Aviation Edition'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 to EXIT, then press 5 Print. A hard copy of the result will then be printed.

The result printed will be viewed on the Result Presentation Options format from the Set function.

## 5.6. Battery changing

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

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

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

Before commencing recharging always press red button to switch off the analyser.

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 - Aviation Edition.

Battery power may be conserved by:

- Operating LPA2 - Aviation Edition whilst connected to power adaptor
- Switching LPA2 - Aviation Edition OFF between samples
- Turning Auto Print Mode OFF

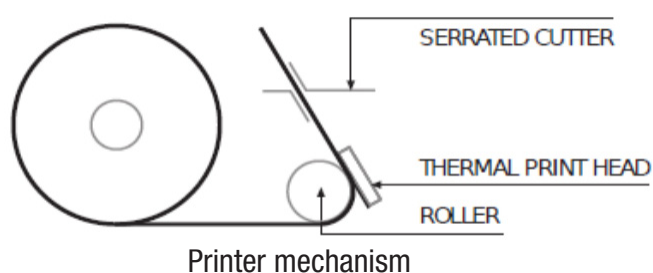
Should the battery become completely discharged it is advisable to allow a minimum of 15 minutes charge time prior to commencing a test. The LPA2 - Aviation Edition must remain connected to the power adaptor during subsequent tests until the battery has had time to recharge.

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

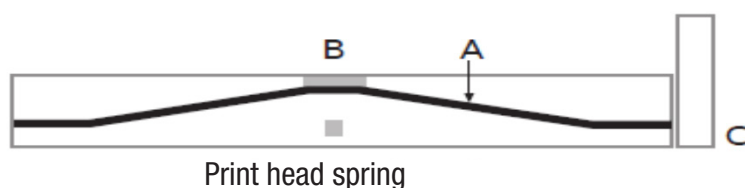
# PRODUCT OPERATION

## 5.7 Printer paper changing

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 show 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 roll” indication appears on the paper.

## 6.0 Computer Analysis

### 6.1 Software installation

Install software onto a suitable PC running Windows XP or later. Following instructions as detailed in the LPA View User Manual.

### 6.2 Results download

1. Connect the cable to LPA2 - Aviation Edition and PC via an appropriate port.
2. Switch ON the LPA2 - Aviation Edition
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.

4. When the transfer is complete switch OFF the analyser.

# COMPUTER ANALYSIS / SPARES

## 7.0 Spares

### 7.1 Product and part numbers

SKAA02 : Airbus adaptor with test point  
6.160 : Thermal paper roll  
6.123 : PC Download cable  
6.209 : 12V,2A Power adaptor  
SK0014S30S : Aerospace Phosphate Ester waste hose  
SK0026 : USB to serial adaptor  
SK0041 : In line coarse filter assembly for aerospace phosphate esters  
TC0005 : LPA2 - Aviation Edition travel case without foam  
6.300 : replacement foam insert for TC0005

For further information please visit the website:

[www.mpfiltri.com](http://www.mpfiltri.com)

## 8.0 APPENDICES

### 8.1 Appendix 1: NSA307110 (SAE AS4059 REV.E) Cleanliness classification for hydraulic fluids\*

This SAE Aerospace Standard (AS) defines cleanliness levels for particulate contamination of hydraulic fluids and includes methods of reporting data relating to the contamination levels. Tables 1 and 2 provide the maximum contamination limits (particles/100ml) of differential and cumulative particle counts respectively for counts obtained by an automatic particle counter, e.g. LPA2. Table 1 is detailed below: For further details and explanations refer to the full standard

**Table 1 — Maximum number of particles (differential count) in 100 mL of fluid**

| Size classes in $\mu\text{m}^1$  |    | $5 < d \leq 15$ | $15 < d \leq 25$ | $25 < d \leq 50$ | $50 < d \leq 100$ | More than 100 <sup>3)</sup> |
|--|----|-----------------|------------------|------------------|-------------------|-----------------------------|
| Size classes in $\mu\text{m}(c)^2$   |    | $6 < d \leq 14$ | $14 < d \leq 21$ | $21 < d \leq 38$ | $38 < d \leq 70$  | More than 70                |
| CONTAMINATION LEVEL  | 00 | 125             | 22               | 4                | 1                 | 0                           |
|  | 0  | 250             | 44               | 8                | 2                 | 0                           |
|  | 1  | 500             | 89               | 16               | 3                 | 1                           |
|  | 2  | 1 000           | 178              | 32               | 6                 | 1                           |
|  | 3  | 2 000           | 356              | 63               | 11                | 2                           |
|  | 4  | 4 000           | 712              | 126              | 22                | 4                           |
|  | 5  | 8 000           | 1 425            | 253              | 45                | 8                           |
|  | 6  | 16 000          | 2 850            | 506              | 90                | 16                          |
|  | 7  | 32 000          | 5 700            | 1 012            | 180               | 32                          |
|  | 8  | 64 000          | 11 400           | 2 025            | 360               | 64                          |
|  | 9  | 128 000         | 22 800           | 4 050            | 720               | 128                         |
|  | 10 | 256 000         | 45 600           | 8 100            | 1 440             | 256                         |
|  | 11 | 512 000         | 91 200           | 16 200           | 2 880             | 512                         |
|  | 12 | 1 024 000       | 182 400          | 32 400           | 5 760             | 1 024                       |
| <sup>1</sup> Measured by microscopy (manually, by image analysis or SEM) reporting the longest chord of particles and by APCs calibrated in compliance with ISO 4402.<br><sup>2</sup> Measured by microscopy (by image analysis or SEM) reporting the equivalent projected area of particles and by APCs calibrated in compliance with ISO 11171.<br><sup>3</sup> Including fibres: particles larger than 100 $\mu\text{m}$ the length of which is 10 times their width. |    |                 |                  |                  |                   |                             |

\* The information reproduced on this and the previous page is a brief extract from SAEAS4059 Rev E revised in May 2005.



# APPENDIX

## 8.2 Appendix 2: Replacement of the adapter seal

Upon inspection of the adaptor seal, it may be necessary to change this if damage has been determined.

Note: this part of the procedure requires speed of operation so as to not purge excessive fluid to waste



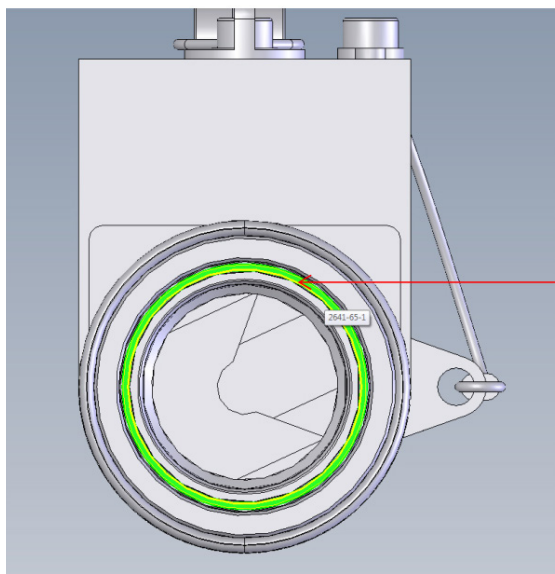
NOTE

Should the decision be made to attempt replacement of the seal by end user, instructions to do so are included below.

Please note: Any warranty period will subsequently become null and void and the liability associated with the fit, form and function of the modified product (by end user) now lie with the customer.

To remove and replace this seal, please follow the following steps

### 8.2.1 Remove protective cap from adapter

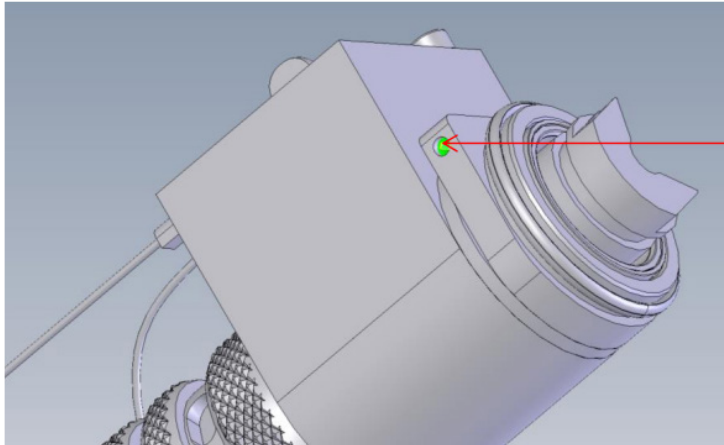


Seal to be inspected

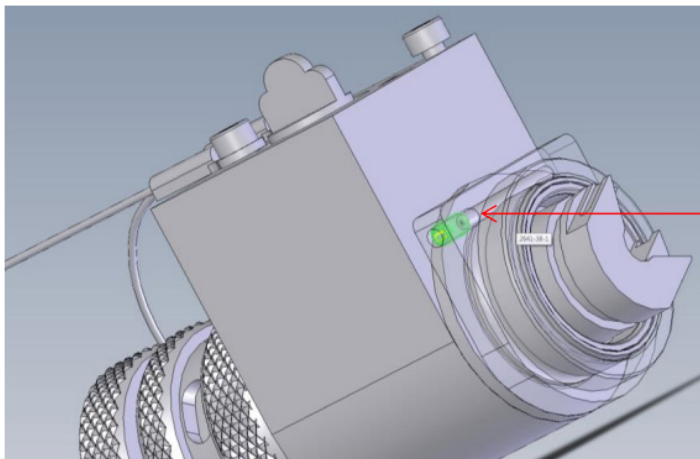
### 8.2.1 Carefully remove the collar to allow access to the seal

Note: there is an M3 grub screw that needs to be removed; this will allow access to the pin that holds the collar in place.

Note: all components should be stored carefully as will be required for reassembly

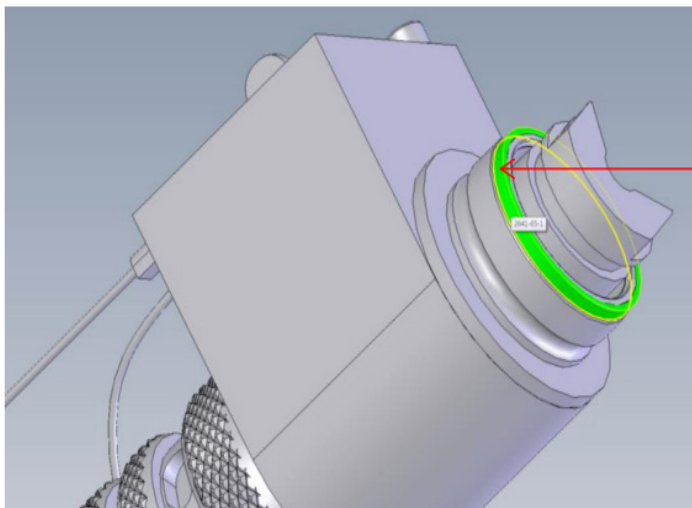


Remove grub screw



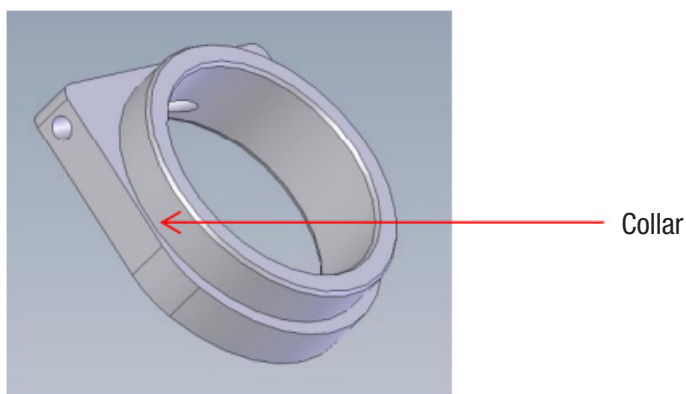
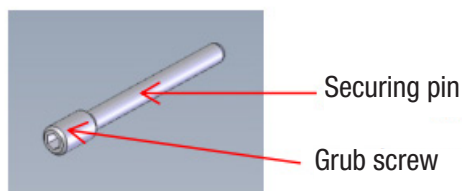
Pin is located behind grub screw

### 8.2.3 Remove the collar from the adapter. Store this and the pin in a safe place



Seal to remove if damaged

# APPENDIX



**8.2.4** Remove the damaged seal

**8.2.5** Replace with new seal

**8.2.6** Refit the collar

**8.2.7** Refit the pin and secure with the grub screw

Note: this must not sit proud and should be secured in place using an appropriate thread locking compound



**NOTE**

**8.2.8** Refit the protective cap and store the adaptor or use as necessary

## 8.3 Appendix 3: Adaptor tightening tool

From time to time it may be necessary to use the C spanner tightening tools supplied with the adaptor to assist in fitment of the adaptor.

Note: there are two spanners included with each adaptor:

- A short version for enclosed spaces
- A longer handle version to allow maximum rotation

**WARNING:** C spanners **MUST** not be used to apply excessive force to the adaptor but should be used to ensure all mating parts are fully tightened and engaged

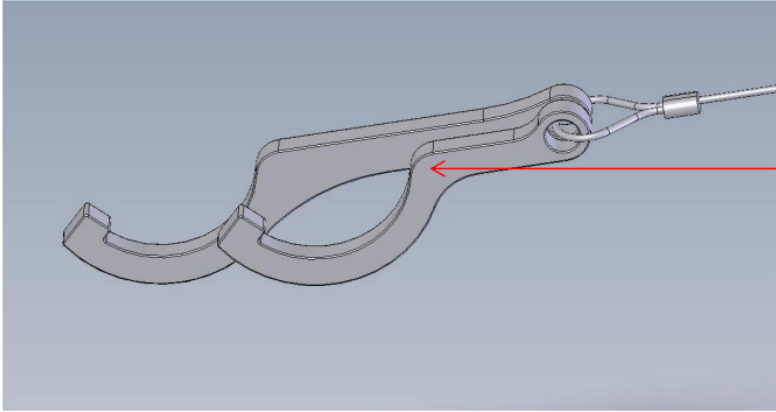


**CAUTION**

Possible reasons for this include but are not limited to:

- Insufficient space on the aircraft system
- Required force to rotate not possible

The C spanner is intended to be used only when hand tightening is not possible to fully engage the adaptor and aircraft sampling valve.



C Spanners

The C spanners can be used as per the below to aid tightening and untightening of the adaptor where space is limited/access by hand is not feasible



# APPENDIX

## 8.4 Appendix 4: Com ports

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

### Connection Using a USB port

This is used when a built in RS232 port is not available. When using a USB Adaptor provided with a LPA2 - Aviation Edition:

- Install the Prolific driver from the file: PL2303\_Prolific\_DriverInstaller\_v110.exe on the provided USB Datakey.
- You will need to accept any warnings about making changed 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 to the LPA2 - Aviation Edition to the computer using the Serial lead and the USB to Serial Converter.
- If necessary, determine the COM port allocated by the computer for this device using the procedure following.

### Determining the COM Port

The 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 the above will have a COM number after it. This is the number you should use when selecting the Com Port.

## 9 Reference

### 9.1 Fault finding

| Fault   | Check   |
|---|---|
| <i>LCD Screen remains blank after switching on</i>            | Check that Analyser had been put on charge previously.  |
|   | Check that LED illuminates when power adaptor is connected to Analyser DC Power Input Socket  |
| <i>Unexpected results obtained from sample e.g. ** result</i> | Check that the fluid sampling hose has been fully connected at both the system and Analyser ends.   |
|   | Check to see if fluid is aerated.<br>If the fluid shows signs of aeration, Ensure that system is at full working pressure during testing              |
|   | 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. |

### Language Settings

- To change the language setting to English:
- Press the green button to switch on LPA2 - Aviation Edition ON
- Wait for the character to appear on the LCD screen
- Press Key 5
- Press Key 4
- Press Key 6
- Press key 0 (Zero) for other languages press the required number as listed on the LPA2
- Press Enter key
- Press key 0 (Zero)
- Press key 0 (Zero)
- Wait 5 seconds
- Press the orange button to switch the LPA2 - Aviation Edition OFF
- Press the green button to switch on the LPA2 - Aviation Edition ON
- The LCD screen will now be displayed in the English language

# REFERENCE

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