

Laser Particle Counter - Type LasPaC II



Fluid analysis is a crucial component of any oil management program. Early detection of potential problems can prevent costly repairs and downtime. The LasPaC II makes it possible to detect the ISO Cleanness levels of the hydraulic media.

Characteristics

The LasPaC II devices feature a twin laser system and eight channels for different particle sizes in order to guarantee high accuracy and repeatability. These compact units are easy to handle for mobile and inline applications for systems with pressures up to 400 bar / 5801 PSI.

The LasPaC II is available in three different versions:

LasPaC II-P: Portable Laser Particle Counter

The LasPaC II-P is a fully equipped portable laser particle counter.

The LasPaC II-P features a complete QWERTY keyboard, an integrated thermal printer, an internal rechargeable battery and a large LCD display.

LasPaC II-M: Mobile Laser Particle Counter

The LasPaC II-M is a highly accurate laser particle counter. With a competitive price, the LasPaC II-M is the best compromise between lower cost and brilliant accuracy/reliability.

LasPaC II-I: Inline Laser Particle Counter

The LasPaC II-I is a laser particle counter, which is suitable for all applications where continuous monitoring is required.

All LasPaC II devices have an internal data memory and are available within the accompanying Windows® based software package for reports and data downloads.

Overview

Options	LasPaC II-P (Portable)	LasPaC II-M (Mobile)	LasPaC II-I (Inline)	Bottle Sampler 110	Bottle Sampler 250
Laser Type	Twin-Laser	Twin-Laser	Twin-Laser	-	-
Analysis Range	8 channels (4,6,14,21,25,38,50,68 µm _φ)	8 channels (4,6,14,21,25,38,50,68 µm _φ)	8 channels (4,6,14,21,25,38,50,68 µm _φ)	-	-
Power Supply	External	External	External	-	-
Battery Option	Internal	Internal (optional)	-	-	-
Display	Integrated (large)	Integrated (small)	External (optional)	-	-
Keyboard	Integrated	-	-	-	-
Printer	Integrated	-	-	-	-
Data Storage	Internal (for approximately 600 tests)	Internal (for approximately 600 tests)	Internal (for approximately 600 tests)	-	-
Computer Interface	RS-232	RS-232	RS-232 (RS 485 on request)	-	-
Fluid Preparation	-	-	-	Integrated vacuum/pressure pump	Integrated vacuum/pressure pump
Maximal Bottle Size	-	-	-	110 ml	250 ml
Compatible with	-	-	-	Mineral oil and petroleum based fluids	Mineral oil and petroleum based fluids or phosphate ester
Sample-taking Equipment	-	-	-	Fluid sample pump with hoses	-

Laser Particle Counter - Type LasPaC II

Features & Options: LasPaC II (General)

Mobile - Compact and Convenient

The LasPaC II-P (Portable), the LasPaC II-M (Mobile) and all its accessories are supplied in a light-weight rugged industrial case.

This user-friendly portable case is waterproof and resistant against all common fluids.

Accuracy - Twin-laser, 100% Coverage

In all STAUFF laser particle counting devices, the fluid passes through the measuring cell and through a laser beam. The light from the laser is evaluated by a photo diode.

As the fluid passes through the laser beam the amount of light changes. These changes are directly proportional to size of the particles, and the total volume of particles. In many other particle counters only part of the measuring cell is lighted by the laser, thus only a part of the total amount of particles are registered, and the result is projected.

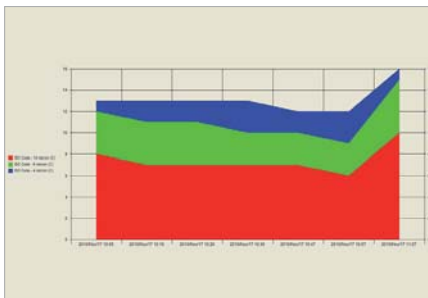
In contrast, the measuring cell of the LasPaC II is completely examined, and all particles are registered. In addition to this, a second laser is used to analyze all particles sizes smaller than $6 \mu\text{m}_{(0)}$.

Additionally, the integrated booster cylinder allows very precisely dosage of the test fluids. This ensures a very high accuracy with excellent repeatability.

Functional - Calibration to ISO 11 171

The LasPaC II devices are calibrated with ISO Medium Test Dust (MTD) based on the ISO 11 171:1999 calibration standard.

STAUFF particle counters meet the new ISO 4406 cleanliness classification codes and provide results in the NAS 1638 and the SAE 4059 codes.

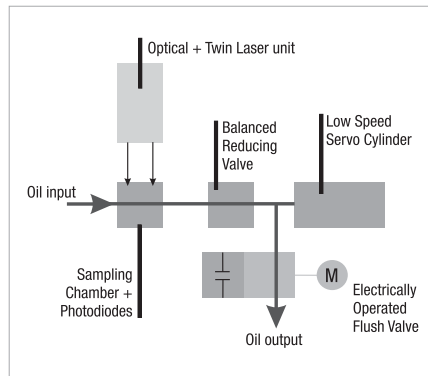


For any Type of Application - Large Pressure Range

A big advantage of the LasPaC II devices is the wide pressure range: Low pressure measurements starting with 2 bar / 29 PSI and high pressure tests up to 400 bar / 5801 PSI result in reliable readings. Many other products available today require special add-on devices or pressure cartridges which need to be recharged for this.

The test hoses, which are provided with the device, allow an easy connection to common test couplings M16 x 2 (STAUFF TEST 20 or comparable).

These units are also available for use with Phosphate Ester (e.g. Skydrol®) and Water Glycol fluids. Please contact STAUFF for details.



Global Use - Variable Voltage Supply

The external power supply unit provides most variable voltage ranges of 110 ... 240 V AC. European, UK and US plug adapters ensure a worldwide applicability of the LasPaC II.

Always Secure - External Alarms

The LasPaC II-P and LasPaC II-I devices offer the opportunity to define different alarm levels.

It is possible to configure two separate contamination alarm levels (e.g. clean alarm level and dirt alarm level). When set, an alarm indicator is given to external devices (e.g. indicator light, offline-filter) if the alarm level is reached.

Making the Connection -

Downloading with RS-232 Interface and USB Adaptor

The measured data can be downloaded onto any PC or laptop computer via the RS-232 interface or alternatively via a USB adaptor.

The LasPaC II software supports an easy download for data processing of the recorded measurements.

Several diagrams are available and are automatically generated to offer a very clear arrangement of all data for analysis. Data can also be easily exported to Microsoft Excel®.

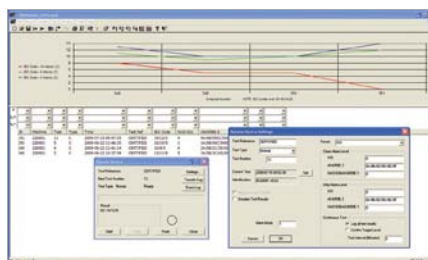
Always up-to-date - Integrated Clock

An integrated rechargeable battery-operated clock provides the exact date and time which are shown on every printout.

In addition, every download of measured data is marked with date and time as well. The precise time of measurement is documented on all printouts and for all data stored.

Adaptable - Software Updates

The RS-232 (or USB) interface ensures flexibility for future developments in terms of calibration, evaluation and output. Software updates can easily be installed onto the LasPaC II devices.



Cleanliness - High-Speed Flush Valve

To ensure an accurate measurement is taken, the sensor must be cleaned before each test.

The LasPaC II achieves this by means of an electric operated flush valve. This valve can be opened on demand and between tests by simply depressing the flushing valve push button. The optimized design of the flush valve reduces the rinsing process to the minimum requirement, and ensures a quick restart of the next measurement.

For all Applications - High Compatibility

The LasPaC II units are compatible with all Mineral Oil and Petroleum based fluids. Phosphate Ester (e.g. Skydrol®) and Water Glycol compatible devices are available upon request. Please contact STAUFF for details.

More Oil Information - The Moisture/ Temperature Sensor

The LasPaC II also offers the option of adding an integral moisture / temperature sensor.

This sensor measures the moisture content of the test fluids (displayed as relative humidity in RH %) and also indicates the current fluid temperature (in °C).

Please note that the moisture/ temperature sensor is not compatible with Phosphate Ester (e.g. Skydrol®) and Water Glycol fluids. Please contact STAUFF for details.

Optional - Bottle Sampling Unit

Highly aerated fluids may lead to inaccurate results.

Therefore a de-aeration facility has been incorporated into the optional bottle sampling units.

Both sizes (110 ml and 250 ml) of the bottle sampling unit are delivered with an external power supply, and allow the user to properly condition the sample fluid prior to any measurements taken.

Please note that the moisture/ temperature sensor as mentioned above does not work in conjunction with the bottle sampling unit.

Scope of Delivery

Each kit of a laser particle counter STAUFF LasPaC II includes:

- 1x Laser particle counter STAUFF LasPaC II
- 1x LasPaC II-M / LasPaC II-P: Waste hose 2 m / 3.65 ft
LasPaC II-I: Waste hose 1,5 m / 2.67 ft
- 1x Pressure hose: 1,5 m / 2.67 ft
- 1x Waste bottle (not with LasPaC II-I)
- 1x External power supply including cable with European, UK and USA plug adaptors
- 1x RS-232 connecting cable, 1 m / 1.78 ft including RS-232 to USB converter
- 1x Software CD "LasPaC II View"
- 1x User guide LasPaC II
- 1x User guide LasPaC II View
- 3x Thermal printer paper (only with LasPaC II-P)

Laser Particle Counter - Type LasPaC II-P (Portable)



Light-Weight Rugged Industrial Case



Integrated Printer

Product Description

The LasPaC II-P (Portable) is the most complete way to measure the contamination level of your system. With the LasPaC II-P you have the ability to measure, analyze and document your results immediately without the need of any additional equipment.

Features

Quick Results - Fast Results and Easy Operation

The integrated complete QWERTY keyboard, a large LCD display and intuitive handling all lead to the easy and quick operation of the LasPaC II Portable. The optimized flushing process of the LasPaC II-P is quick and effective, and allows for continuously accurate measurements.

Black and White - Integrated Printer

The integrated printer in the LasPaC II-P supports print-outs in the field, thus providing immediate documentation. Every printout confirms date and time of your measurement.

Independent Use - Rechargeable Battery Mode

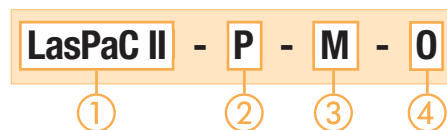
The integrated rechargeable battery of the LasPaC II-P allows the use of on site measurements, even in the event where access of an external power source is not available. The measurement data is stored in the internal memory of the unit and can be transferred to a computer when required.

Once charged the LasPaC II-P can run approximately 100 tests before recharging is needed again.

Options

- Moisture results as relative humidity (RH %), temperatures in °C
- Phosphate Ester (e.g. Skydrol®) or specific Water Glycol fluids units on request

Order Codes



① Series and Types

Laser Particle Counter	LasPaC II
------------------------	-----------

② Version

Portable	P
----------	---

③ Fluid Compatibility

Mineral Oil, Petroleum based fluids (standard option)	M
Phosphate Ester (e.g. Skydrol®)	E
Specific Water Glycol fluids	G

④ Moisture/ Temperature Sensor

Without moisture/ temperature sensor	O
With moisture/ temperature sensor	W

Please note: The moisture/ temperature sensor is not suitable for Phosphate Ester (e.g. Skydrol®) and Water Glycol fluids.

Laser Particle Counter - Type LasPaC II-P (Portable)



Highspeed Flush Valve



Computer Interfaces of the LasPaC II-P



Easy Connection to common Test Couplings

Technical Data

Dimensions and Weight

- L/W/H: 551 x 358 x 226 mm / 21.69 x 14.09 x 8.90 in
- Weight: 13 kg / 28.66 lbs

Keyboard / Printer

- Keyboard: QWERTY keyboard
- Printer: Integrated thermal printer (384 dots per line)

Power Supply

- Voltage range: 110 ... 240 V AC / 12 ... 24 V DC
- European, UK and US power plug adaptors included
- Number of tests before recharging is required: 100

Calibration

- Calibration: ISO Medium Test Dust (MTD) according to ISO 11 171:1999
- Analysis range: ISO 8-24, ISO 4406 Code, NAS 1638 Code 2-12, SAE AS 4059 Code 2-12

Pressure / Viscosity

- Pressure range: 2 ... 400 bar / 29 ... 5801 PSI
- Viscosity range: up to 400 cSt

Laser Sensors

- High accuracy laser: 4 ... 6 $\mu\text{m}_{(e)}$
- Standard accuracy laser: 6 ... 68 $\mu\text{m}_{(e)}$
- Measured channels: 4, 6, 14, 21, 25, 38, 50, 68 $\mu\text{m}_{(e)}$
- The orifice of the sensor has a cross section of 0,9 x 0,9 mm / .04 x .04 in
- The maximum concentration is ISO 4406 Code 24 (160.000 p/ml)

Accessories

- Bottle sampling unit: 110 ml version (only for Mineral Oil and Petroleum based fluids) / 250 ml version (for Mineral Oil and Petroleum based fluids; a Phosphate Ester (e.g. Skydrol®) compatible version of the 250 ml unit is available on request.) Please contact STAUFF for details
- Screen filter: Screen filter (500 μm)

Connections

- Hose connections: Test coupling STAUFF Test 20 or comparable (M16 x 2)

Sample Volume

- 8 ml (short)
- 15 ml (normal)
- 30 ml (dynamic)
- 24 ml (bottle sampler)
- 15 ml (continuous)

Permissible Temperature

- Operating: +5 °C ... +80 °C / +41 °F ... +176 °F

Data Output

- Cumulative particle counts, as well as cleanliness classes according to ISO 4406 (1999) / SAE AS 4059 Rev.D (2001) and ISO 4406 (1191) / NAS 1638 (1964)

Max. Concentration

- ISO 24

Accumulator

- Internal rechargeable battery

Data Storage

- 600 tests

Fluid Compatibility

- Mineral Oil, Petroleum based fluids
- Phosphate Ester and Water Glycol compatible devices on request

Computer Interface

- RS-232 communication port as standard
- USB adaptors included

External Alarm

- External alarm socket with switching outputs max. 24 V DC/AC, 1 A

Software

- Downloading and storage of the data with included "LasPaC II View" software. Further processing with Microsoft Excel® possible.

Laser Particle Counter - Type LasPaC II-M (Mobile)



LasPaC II-M with internal battery (standard option)

Product Description

The LasPaC II-M (Mobile) is designed for applications where it is necessary to have a small, light and robust service unit.

Features

Versatile - Lightweight and Convenient

In comparison to the LasPaC II-P, the LasPaC II-M is a more simplified particle counter.

The LasPaC II-M has an internal rechargeable battery (standard version) and offers the same measurement opportunities (excellent accuracy, repeatability and reliability) but does not include the integrated printer, the complete QWERTY keyboard, the large LCD display.

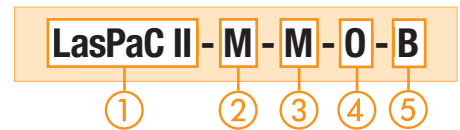
Low Cost - Same Functions for a Budget Price

Without losing the quality in measurement accuracy, reliability and repeatability the LasPaC II-M is a cost effective alternative to the fully equipped LasPaC II-P.

Options

- Moisture results as relative humidity (RH %), temperatures in °C
- Phosphate Ester (e.g. Skydrol®) or specific Water Glycol fluids units on request

Order Codes



① Type and Series

Laser Particle Counter	LasPaC II
------------------------	-----------

② Version

Mobile	M
--------	---

③ Fluid Compability

Mineral Oil, Petroleum based fluids (standard option)	M
Phosphate Ester (e.g. Skydrol®)	E
Specific Water Glycol fluids	G

④ Moisture/ Temperature Sensor

Without moisture/ temperature sensor	O
With moisture/ temperature sensor	W

Please note: The moisture/ temperature sensor is not suitable for Phosphate Ester (e.g. Skydrol®) and Water Glycol fluids.

⑤ Battery

With internal rechargeable battery (standard option)	B
Without internal rechargeable battery	O

Laser Particle Counter - Type LasPaC II-M (Mobile)



LasPaC II-M with small Bottle Sampler



Display and Buttons

Technical Data

Dimensions and Weight

- L/W/H: 340 x 295 x 152 mm /
13.40 x 11.61 x 5.98 in
- Weight: 4,75 kg / 10.47 lbs

Power Supply

- Voltage range: 110 ... 240 V AC
12 ... 24 V DC
- European, UK and US power plug adaptors included
- Number of tests before recharging is required: 60

Calibration

- Calibration: ISO Medium Test Dust (MTD)
according to ISO 11 171:1999
- Analysis range: ISO 8-24, ISO 4406 Code,
NAS 1638 Code 2-12,
SAE AS 4059 Code 2-12

Pressure / Viscosity

- Pressure range: 2 ... 400 bar / 29 ... 5801 PSI
- Viscosity range: up to 400 cSt

Laser Sensors

- High accuracy laser: 4 ... 6 $\mu\text{m}_{(c)}$
- Standard accuracy laser: 6 ... 68 $\mu\text{m}_{(c)}$
- Measured channels: 4, 6, 14, 21, 25, 38, 50, 68 $\mu\text{m}_{(c)}$
- The orifice of the sensor has a cross section of
0,9 x 0,9 mm / .04 x .04 in
- The maximum concentration is ISO 4406 Code 24
(160.000 p/ml)

Accessories

- Bottle sampling unit: 110 ml version (only for Mineral
Oil and Petroleum based fluids)
250 ml version (for Mineral Oil
and Petroleum based fluids;
a Phosphate Ester (e.g. Skydrol®)
compatible version of the 250 ml
unit is available on request.)
Please contact STAUFF for details.
- Screen filter: Screen filter (500 μm)

Connections

- Hose connections: Test coupling STAUFF Test 20 or
comparable (M16 x 2)

Sample Volume

- 8 ml (short)
- 15 ml (normal)
- 30 ml (dynamic)
- 24 ml (bottle sampler)
- 15 ml (continuous)

Permissible Temperature

- Operating: +5 °C ... +80 °C / +41 °F ... +176 °F

Data Output

- Cumulative particle counts, as well as cleanliness classes
according to ISO 4406 (1999) / SAE AS 4059 Rev.D (2001)
and ISO 4406 (1191) / NAS 1638 (1964)

Max. Concentration

- ISO 24

Data Storage

- 600 tests

Fluid Compability

- Mineral Oil, Petroleum based fluids
- Phosphate Ester and Water Glycol compatible devices on
request

Computer Interface

- RS-232 communication port as standard
- USB adaptors included

Software

- Downloading and storage of the data with included "LasPaC
II View" software. Further processing with Microsoft Excel®
possible.

Internal Rechargeable Battery

- Standard option with internal rechargeable battery
- 60 measurements possible before recharging

Laser Particle Counter - Type LasPaC II-I (Inline)



Front / Bottom View of the STAUFF LasPaC II-I

Product Description

The LasPaC II-I (Inline) unit is designed for hydraulic applications, where continuous monitoring is essential. It is installed permanently in a hydraulic system.

Please note that the LasPaC II-I needs a minimum working pressure of 2 bar / 29 PSI for reliable particle counting.

The LasPaC II-I does not have the QWERTY keyboard, the LCD display, and an internal rechargeable battery.

All test results are saved in the integrated memory and can be downloaded to a PC or laptop computer with the RS-232 interface or USB adapter.

Also, the configuration of the LasPaC II-I has to be done with a PC or laptop computer.

Features

Accessory - Remote Display

For a direct display of the measured data an optional remote display is available for the LasPaC II-I.

This device also offers the opportunity to flush the LasPaC II-I and to start and stop the measurement by use of the three push buttons.

The standard cable length of the remote display is 2 m / 6.56 ft.

A cable with a length of 5 m / 16.40 ft is available on request.

Hazard Conditions - Rugged Aluminium Case

The LasPaC II-I inline unit has a rugged, powder coated Aluminum case which can be easily installed, even in hazardous conditions.

Options

- Moisture results as relative humidity (RH %), temperatures in °C
- Phosphate Ester (e.g. Skydrol®) or specific Water Glycol fluids units on request
- ATEX (Zone II Category 3G rating) is available. Contact STAUFF for more information.

Order Codes



① Series and Type

Laser Particle Counter	LasPaC II
------------------------	------------------

② Version

Inline	I
--------	----------

③ Fluid Compatibility

Mineral Oil, Petroleum based fluids (standard option)	M
Phosphate Ester (e.g. Skydrol®)	E
Specific Water Glycol fluids	G

④ Computer Interface

RS-232 computer interface (standard option)	232
RS-485 computer interface	485

⑤ Display Mode

PC driven (standard option)	D3
Remote module + PC driven	D2
Remote visual indicator (red/green) + PC driven	D5
Customer-specific display (e.g. Modbus)	X

⑥ Moisture/ Temperature Sensor

Without moisture/ temperature sensor	0
With moisture/ temperature sensor	W

Please note: The moisture/ temperature sensor is not suitable for Phosphate Ester (e.g. Skydrol®) and Water Glycol fluids.

⑦ Design Code

Inlet pressure: 2 ... 400 bar / 29 ... 5801 PSI	
Drain reservoir/system: Atmospheric, zero back pressure	30
Inlet pressure: 10 ... 400 bar / 145 ... 5801 PSI	
Drain reservoir/system: Back pressure not exceeding 1 bar / 14 PSI	31

Laser Particle Counter ▪ Type LasPaC II-I (Inline)



Rear / Top View of the STAUFF LasPaC II-I



Remote Display for the STAUFF LasPaC II-I

Technical Data
Dimensions and Weight

- LxWxH: 120 x 275 x 250 mm /
4.72 x 10.83 x 9.84 in
- Weight: 4,80 kg / 10.58 lbs

Power Supply

- Voltage range: 110 ... 240 V AC
12 ... 24 V DC
- European, UK and US power plug adaptors included

Calibration

- Calibration: ISO Medium Test Dust (MTD) according to ISO 11 171:1999
- Analysis range: ISO 8-24, ISO 4406 Code, NAS 1638 Code 2-12, SAE AS 4059 Code 2-12

Pressure / Viscosity

- Pressure range: Series 30: 2 ... 400 bar/
29 ... 5801 PSI
Series 31: 10 ... 400 bar/
145 ... 5801 PSI
- Viscosity range: up to 400 cSt

Laser Sensors

- High accuracy laser: 4 ... 6 $\mu\text{m}_{(0)}$
- Standard accuracy laser: 6 ... 68 $\mu\text{m}_{(0)}$
- Measured channels: 4, 6, 14, 21, 25, 38, 50, 68 $\mu\text{m}_{(0)}$
- The orifice of the sensor has a cross section of 0,9 x 0,9 mm / .04 x .04 in
- The maximum concentration is ISO 4406 Code 24 (160.000 p/ml)

Accessories

- Bottle sampling unit: 110 ml version (only for Mineral Oil and Petroleum based fluids)
250 ml version (for Mineral Oil and Petroleum based fluids; a Phosphate Ester (e.g. Skydrol®) compatible version of the 250 ml unit is available on request.)
Please contact STAUFF for details.
- Screen filter: Screen filter (500 μm)

Connections

- Hose connections: Test coupling STAUFF Test 20 or comparable (M16 x 2)

Sample Volume

- 8 ml (short)
- 15 ml (normal)
- 30 ml (dynamic)
- 24 ml (bottle sampler)
- 15 ml (continuous)

Permissible Temperature

- Operating: +5 °C ... +80 °C / +41 °F ... +176 °F

Data Output

- Cumulative particle counts, as well as cleanliness classes according to ISO 4406 (1999) / SAE AS 4059 Rev.D (2001) and ISO 4406 (1191) / NAS 1638 (1964)

Max. Concentration

- ISO 24

Data Storage

- 600 tests

Fluid Compatibility

- Mineral Oil / Petroleum based fluids
- Phosphate Ester and Water Glycol compatible devices on request

Computer Interface

- RS-232 communication port as standard
- RS-485 on request
- USB adaptors included

Software

- Downloading and storage of the data with included "LasPaC II View" software. Further processing with Microsoft Excel® possible.

External Alarm

- separate wires in connector cable (max. 24 V DC/AC, 1A)

Protection Rating

- IP 55 protection rating: Dust protected and protected against water jets

Laser Particle Counter - Type Bottle Sampler



Bottle Sampling Unit 250 ml



Bottle Sampling Unit 110 ml



Bottle Sampling Unit 110 ml and Accessories

Product Description

Analysis Everywhere - Bottle Sampling Unit

If a direct particle count on your system is not possible, the LasPaC II bottle sampler units allow you to take measurement samples for analysis at a later time.

Conditioning - The De-aeration Facility

A highly aerated fluid may lead to inaccurate results; therefore a de-aeration process has been incorporated into the bottle sampling units.

By evacuating the air from the sampling chamber, aeration within the fluid is removed, and the fluid is properly conditioned prior to sampling.

Your Choice - 110 ml or 250 ml Size

STAUFF offers two sizes of bottle sampling units for the LasPaC II devices: the 110 ml and the 250 ml units.

The 110 ml unit is supplied in an extra case including various accessories such as power supply, sampling hoses, pressure hoses, bottles (sample and waste) and adapters. It is designed for mobile applications and is only compatible with Mineral Oil and Petroleum based fluids.

The standard version of the 250 ml unit is compatible with Mineral Oil and Petroleum based fluids; a Phosphate Ester (e.g. Skydrol®) compatible version of the 250 ml unit is available on request. Please contact STAUFF for details.

The 250 ml bottle sampling unit is delivered with the required power supply.

Please note that the moisture / temperature sensor does not work in combination with bottle sampler devices.

Order Codes

LasPaC II - Bottle Sampler 110

①

②

① **Type and Series**

Laser Particle Counter **LasPaC II**

② **Bottle Sampling Unit**

110 ml Bottle Sampling Unit suitable for Mineral Oil and Petroleum based fluids only	Bottle Sampler 110
250 ml Bottle Sampling Unit suitable for Mineral Oil and Petroleum based fluids only	Bottle Sampler 250
250 ml Bottle Sampling Unit suitable Phosphate Ester (e.g. Skydrol®)	Bottle Sampler 250-E

Moisture / Temperature Sensor

Product Description

Saturation Levels

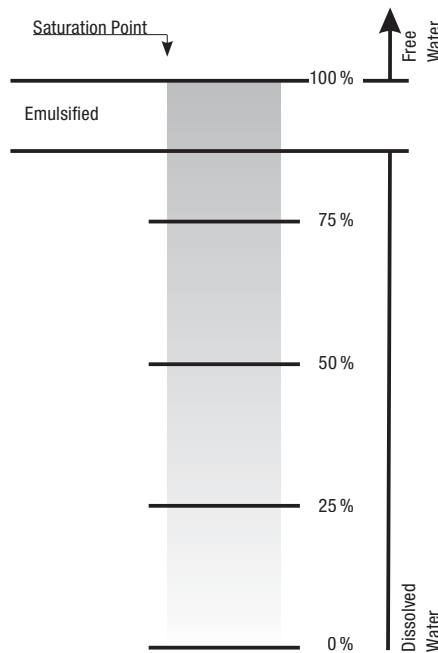
Since the effects of free (also emulsified) water are more harmful than those of dissolved water, water levels should remain always well below the saturation point.

However, even water in solution can cause damage, and therefore every reasonable effort should be made to keep saturation levels as low as possible.

There is no such thing as too little water. As a guideline, we recommend maintaining saturation levels below 50 % in all equipment.

Different oils have different saturation levels, and % saturation is the best and most practical measurement.

These results can be converted to ppm (parts per million), if the oil type saturation / temperature characteristic is known.



More Oil Analysis - Oil Saturation and Temperature

In Mineral Oils and non-aqueous fire resistant fluids, water is undesirable. Once the water exceeds a saturation level (about 500 ppm for Mineral Oils) the fluid starts to appear hazy. Above this level there is a danger of free water accumulating in the system. This can lead to corrosion and accelerated wear.

As an option, all LasPaC II devices provide accurate and repeatable measurement of the saturation level of water in oil with the moisture / temperature sensor. The sensor is located internally in a specially designed housing and is positioned in the low pressure constant flow line.

Simplicity - Saturation Level as a Percentage

Different oils have different saturation levels. For this reason, measurements in % saturation is the best and most practical way. Of course these results can be converted to ppm (parts per million) if the oil type saturation / temperature characteristics are known.

Additional Information - Oil Temperature Readings

Beside the saturation level the optional moisture / temperature sensor of the LasPaC II units has the ability to measure the fluid temperature. This allows to provide a reference temperature for the RH (relative humidity / % saturation of water in oil) readings.

Both results, RH % and °C, are displayed on the main / test progress screen and on the printed analysis.

Please note: Due to the temperature gradient existing between the system tapping point and the RH / temperature module, the temperature reading can be 5° to 10° less than the actual system temperature, depending on operating conditions. The moisture / temperature sensor is not suitable for bottle sampling.



Order Codes

Accessories / Spare Parts

①

① Type of Accessories / Spare Parts

Waste hose 2 m / 6.56 ft	LasPaC II - Waste hose 2m
Pressure hose 1,5 m / 4.92 ft	SMS-20-1500-A-C6F
100 ml certified clean bottle (5 pieces)	LasPaC II - Bottle 100-C Set
250 ml certified clean bottle (5 pieces)	LasPaC II - Bottle 250-C Set
100 ml glass sample bottle (5 pieces)	LasPaC II - Bottle 100 Set
250 ml glass sample bottle (5 pieces)	LasPaC II - Bottle 250 Set
Printer paper LasPaC II-P (5 pieces)	LasPaC II - P-Printer Paper Set
RS 232 to USB converter	Adapter PPC-04/12-RS232-to-USB-CAB
Screen filter	LasPaC II - Screen Filter

Laser Particle Counter - Accessories



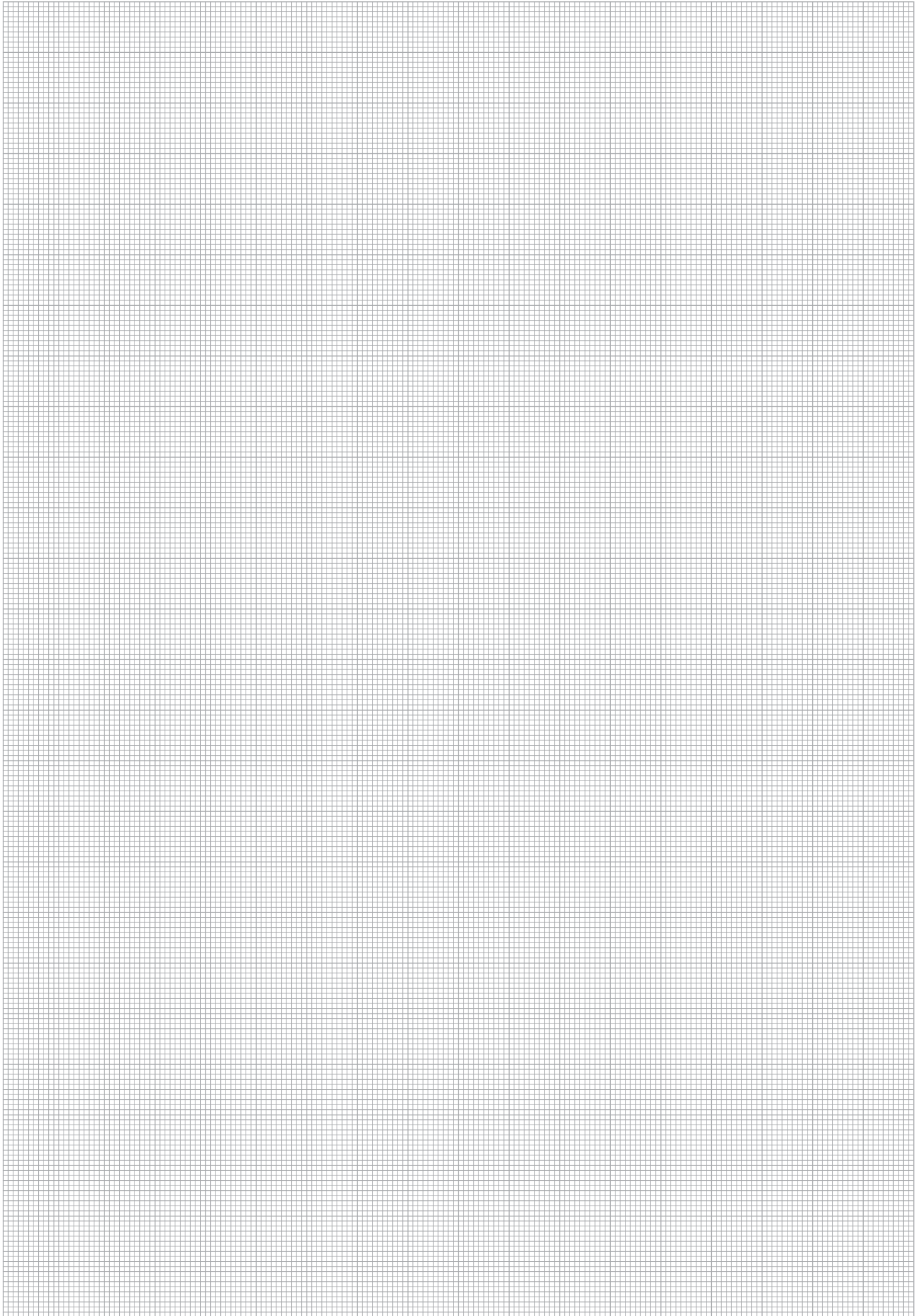
Product Description: Screen Filter

An optional Screen Filter is available for heavily contaminated systems. The filter device is assembled directly to the supply line and allows particle counts in ambient conditions where normally the contamination is too high for a reliable test.

The Stainless Steel Filter has a mesh of 500 µm and is cleanable.

Laser Particle Counter - Technical Data

Type	LasPaC II-P (Portable)	LasPaC II-M (Mobile)	LasPaC II-I (Inline)
Dimensions (mm/in) (W x D x H)	551 x 358 x 226 21.69 x 14.09 x 8.90	340 x 295 x 152 13.40 x 11.61 x 5.98	120 x 275 x 250 4.72 x 10.83 x 9.84
Weight (kg/lbs)	13 28.66	4,75 10.47	4,80 10.58
Keyboard	QWERTY keyboard integrated	-	-
Printer	Thermal printer integrated (384 dots per line)	-	-
Viscosity Range	1 ... 400 cSt	1 ... 400 cSt	1 ... 400 cSt
Calibration	MTD, ISO 11 171:1999	MTD, ISO 11 171:1999	MTD, ISO 11 171:1999
Analysis Range	ISO 8-24, ISO 4406 Code, NAS 1638 Code 2-12, SAE AS 4059 Code 2-12	ISO 8-24, ISO 4406 Code, NAS 1638 Code 2-12, SAE AS 4059 Code 2-12	ISO 8-24, ISO 4406 Code, NAS 1638 Code 2-12, SAE AS 4059 Code 2-12
Sensitivity	4, 6, 14, 21, 25, 38, 50, 68 $\mu\text{m}_{(c)}$	4, 6, 14, 21, 25, 38, 50, 68 $\mu\text{m}_{(c)}$	4, 6, 14, 21, 25, 38, 50, 68 $\mu\text{m}_{(c)}$
Sample Volume	8 ml (short)	8 ml (short)	8 ml (short)
	15 ml (normal)	15 ml (normal)	15 ml (normal)
	30 ml (dynamic)	30 ml (dynamic)	30 ml (dynamic)
	24 ml (bottle sampler)	24 ml (bottle sampler)	24 ml (bottle sampler)
	15 ml (continuous)	15 ml (continuous)	15 ml (continuous)
Pressure Range (bar/psi)	2 ... 400	2 ... 400	Series 30: 2 ... 400 29 ... 5801
	29 ... 5801	29 ... 5801	Series 31: 10 ... 400 145 ... 5801
Operating Temperature (°C/°F)	+5 ... +80	+5 ... +80	+5 ... +80
	+41 ... +176	+41 ... +176	+41 ... +176
Max. Concentration	ISO 24	ISO 24	ISO 24
Power Supply	110 ... 240 V AC 12 ... 24 V DC	110 ... 240 V AC 12 ... 24 V DC	110 ... 240 V AC 12 ... 24 V DC
Accumulator	Internal rechargeable battery	Internal rechargeable battery (optional)	-
Data Storage	600 tests	600 tests	600 tests
Fluid Compatibility	Mineral Oil / Petroleum based fluids; Phosphate Ester and water glycol compatible devices on request	Mineral Oil / Petroleum based fluids; Phosphate Ester and Water Glycol compatible devices on request	Mineral Oil / Petroleum based fluids; Phosphate Ester and Water Glycol compatible devices on request
Computer Interface	RS-232	RS-232	RS-232
External Alarm	External alarm socket	-	Signal in connector cable
Hose Connections	Test coupling STAUFF Test 20 or comparable (M16 x 2)	Test coupling STAUFF Test 20 or comparable (M16 x 2)	Test coupling STAUFF Test 20 or comparable (M16 x 2)
Accessories	Moisture/temperature sensor	Moisture/temperature sensor	Moisture/temperature sensor
	Bottle sampling unit (110 ml / 250 ml)	Bottle sampling unit (110 ml / 250 ml)	Bottle sampling unit (110 ml / 250 ml)
	Screen filter (500 μm)	Screen filter (500 μm)	Screen filter (500 μm)



Laser Particle Monitor - Type LPM-1

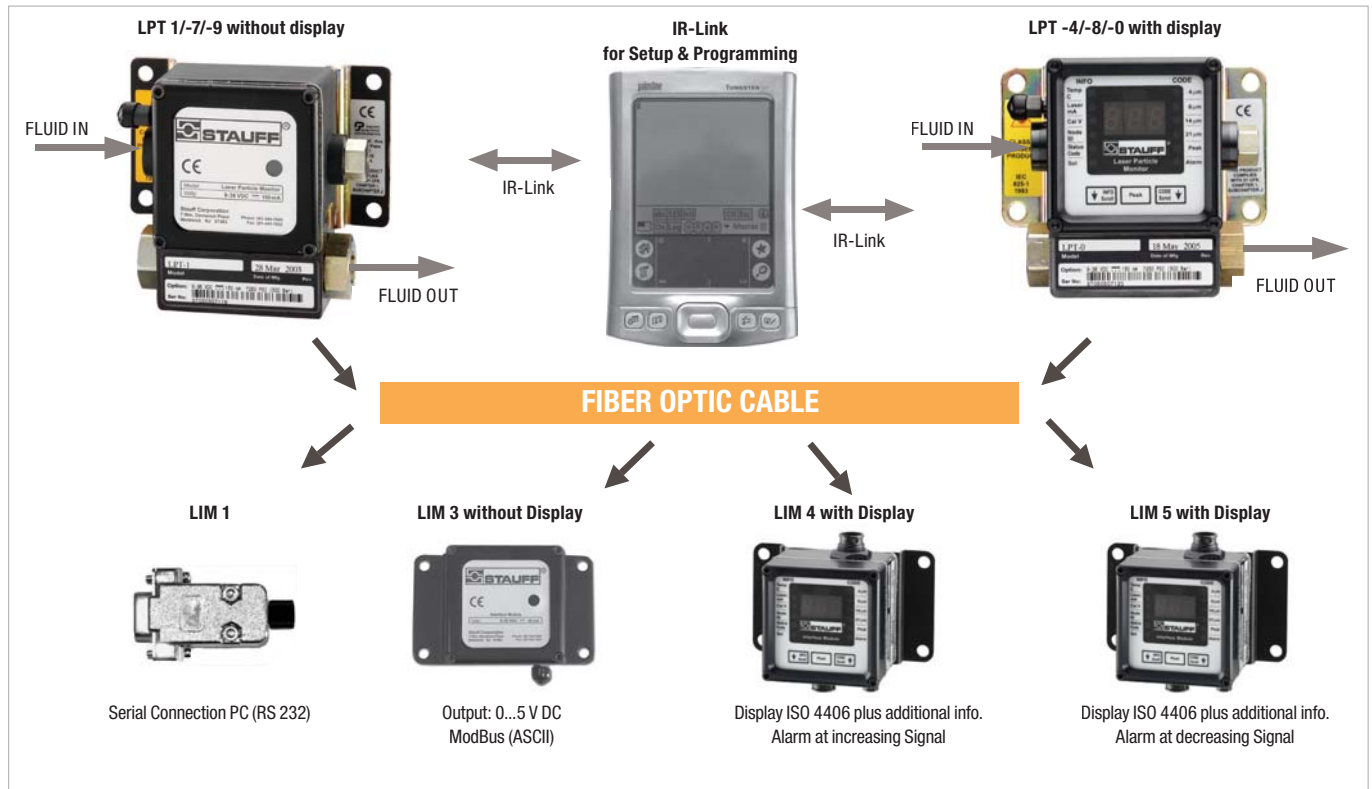
Product Description



The Laser Particle Monitor System LPM-1 is a laser based 4-channel inline particle monitor designed for the continuous monitoring of particle contamination. The LPM-1 provides cumulative particle concentration information at $>4 \mu\text{m}_{(0)}$, $>6 \mu\text{m}_{(0)}$ and $>14 \mu\text{m}_{(0)}$ sizes applicable to the ISO 4406, ISO 11943 und ISO 11171 requirements for optical particle counters. A $> 21 \mu\text{m}_{(0)}$ channel is also provided for larger particle concentration information. Machine operators are alerted to changes in particle contamination levels in a machine's fluid by the indications provided from the LPM-1.

The contamination level can be shown on the display or can be transmitted via the RS-232 serial port to a personal computer. With the ModBus-serial port the data can be transferred into a computer network or to an external display. The LPT Particle Transducer is configured via the IR-port on a Palm. The LPM-1 system consists of a Laser Particle Transducer LPT and a Laser Interface Module LIM.

Functional diagram



Order Codes

LPM-1 - T1 - M4 - DAV

① ② ③ ④

① Series and Type

Laser Particle Monitor **LPM-1**

② Laser Particle Transducer (LPT)

Without LPT	0
LPT-1; 28 ... 500 bar / 400 ... 7250 PSI; without display	T1
LPT-4; 28 ... 500 bar / 400 ... 7250 PSI; with display	T4
LPT-7; 3,4 ... 83 bar / 50 ... 1200 PSI; without display	T7
LPT-8; 3,4 ... 83 bar / 50 ... 1200 PSI; with display	T8
LPT-9; 1,4 ... 13,8 bar / 20 ... 200 PSI; without display	T9
LPT-0; 1,4 ... 13,8 bar / 20 ... 200 PSI; with display	T0

③ Laser Interface Module (LIM)

Without LIM	0
LIM-1; PC connection RS-232 serial port	M1
LIM-3; 8-channel (0 V ... 5 V DC) output, Modbus PC connection RS-485 serial port	M3
LIM-4; LED display with alarm contacts (for exceeding the set alarm level)	M4
LIM-5; LED display with alarm contacts (for falling below the set alarm level)	M5

④ Dynamic Application Valve (DAV)

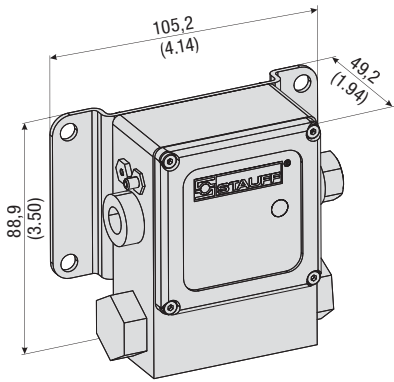
Without Dynamic Application Valve	0
Dynamic Application Valve	DAV

Scope of Delivery

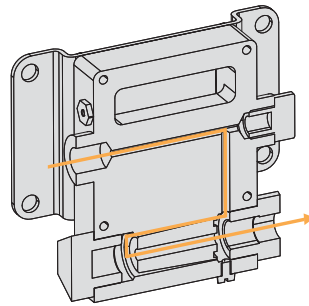
Each kit of LPM-1 includes:

- 1x Laser Particle Transducer LPT (optional)
 - includes 3 m / 9.84 ft flying lead power cable (9 ... 36 V DC required, not supplied)
- 1x Laser Interface Module LIM (optional)
 - LIM-1, includes 6 m / 19.69 ft interconnecting fiber optic cable
 - LIM-3, includes 6 m / 19.69 ft interconnecting fiber optic cable and two 3 m / 9.84 ft power cable with 3-Pin connector
 - LIM-4, includes 6 m / 19.69 ft interconnecting fiber optic cable and one breakout cable with 15-Pin connector
 - LIM-5, includes 6 m / 16.69 ft interconnecting fiber optic cable and one breakout cable with 15-Pin connector
- 1x Quick Start Guide
- 1x Operating Manual
- 1x Software
 - includes DDE server
 - hex and terminal logger for RS-232
 - Palm shareware

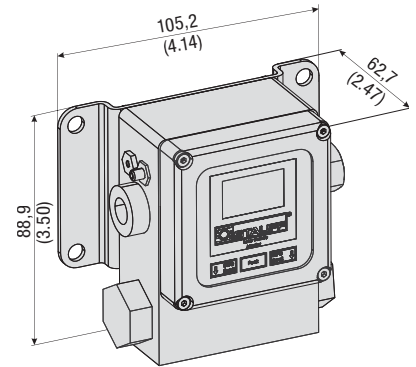
Laser Particle Transducer ■ Type LPT-1



Laser Particle Transducer LPT-1/-7/-9 without display.



Flow Pattern



Laser Particle Transducer LPT-4/-8/-0 with display.

Technical Data

Channel Sizes

- 4, 6, 14 and 21 μm_{D} (ISO MTD/ISO 11171)

Light Source

- Laser diode

Sampling

- Continuous online monitoring

Reproducibility

- ± 0.5 ISO code (ISO 4406)

Display

- Optional local display available; presents ISO codes and alarms

Power Supply

- 9 ... 36 V DC @ 150 mA (power must be supplied to instrument for operation)

Electrical Data and Output

- RS-232; RS-485
- 0 ... 5 V DC
- Modbus
- Alarms
- Local and remote displays

Reports

- Particles/ml; ISO 4406 codes 4, 6, 14 and additional 21 μm_{D} (ISO MTD/ISO 11171)

Process Connections

- SAE-4 (7/16–20 UNF)

Sensor Flow Rate

- 50 ... 500 ml/min (0.01 ... 0.1 US GPM) through the viewing area. All units offer integrated flow rate monitoring with alarms.

Media Compatibility

- Suitable for mineral based hydraulic and lubrication oils; compatibility with synthetic media (Phosphate Ester) on request

Viscosity

- 2 ... 424 cSt at ambient temperature of $+25^\circ\text{C} \pm 2^\circ\text{C} / +77^\circ\text{F} \pm 3.6^\circ\text{F}$

Operating Pressure

- 1,4 bar ... 500 bar / 20 PSI ... 7250 PSI

Permissible Temperature

- Storage: $-40^\circ\text{C} \dots +85^\circ\text{C} / -40^\circ\text{F} \dots +185^\circ\text{F}$
- Ambient: $-20^\circ\text{C} \dots +60^\circ\text{C} / -4^\circ\text{F} \dots +140^\circ\text{F}$
- Operating: $-10^\circ\text{C} \dots +60^\circ\text{C} / +14^\circ\text{F} \dots +140^\circ\text{F}$

Protection Rating

- IP 67 protection rating: Dust tight and protected against powerful water jets; even immersion (up to 1 m / 3.28 ft) in water is possible under defined conditions of pressure and time

Product Description

The Laser Particle Transducer (LPT) contains the sensing device and electronics for detecting the level of contamination.

The laser based sensor uses light blocking technology for particle detection whereby particles passing through an optical flow cell block an amount of laser light proportional to the particle size.

The resultant particle concentration data from the Laser Particle Transducer (LPT) are sent to the Laser Interface Module (LIM) via a fibre optic cable. The configuration of the Laser Particle Transducer (LPT) has to be done through the IrDA port of any Palm with IRA capabilities.

The Laser Particle Transducer (LPT) has a flow inhibitor downstream of the sensor that restricts and controls the fluid flow for any stable pressure within the models specified flow range. For use with a dynamic or changing inlet pressure, please use the additional Dynamic Application Valve (DAV, please see on page D52).

The pressure is reduced to near atmospheric for return to the hydraulic reservoir. The inlet pressure ranges from 1,4 bar to 500 bar / 20 PSI to 7250 PSI in three models.

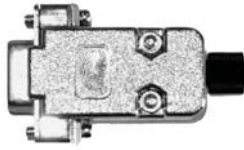
The Laser Particle Transducer (LPT) is optionally available with or without a LED display.

The three digit display shows the selected ISO code value or other function parameters.

The following types of Laser Particle Transducers (LPT) are available:

- **LPT-1** 28 ... 500 bar (400 ... 7250 PSI), without LED display
- **LPT-4** 28 ... 500 bar (400 ... 7250 PSI), with LED display
- **LPT-7** 3,4 ... 83 bar (50 ... 1200 PSI), without LED display
- **LPT-8** 3,4 ... 83 bar (50 ... 1200 PSI), with LED display
- **LPT-9** 1,4 ... 13,8 bar (20 ... 200 PSI), without LED display
- **LPT-0** 1,4 ... 13,8 bar (20 ... 200 PSI), with LED display

Laser Interface Module - Type LIM



Laser Interface Module LIM-1



Laser Interface Module LIM-3



Laser Interface Module LIM-4 and LIM-5

Product Description

The LIM converts the raw count data from the LPT for display or use in acquisition, logging or control systems. A terminal emulation program can be used to read the ASCII data string. The LIM is available in four types to meet a wide variety of applications. LPT and LIM are connected via a fibre optic cable with a length up to 50 m / 164.04 ft.

LIM-1

The LIM-1 has a DCE configuration (9-Pin female) for direct attachment to a computer's RS-232 serial port. Power for the LIM-1 is supplied by the computer serial port. The LIM-1 receives the raw serial data from the LPT via a fibre optic cable and transmits them directly to the computer.

LIM-3

The LIM-3 receives raw serial data input from the LPT via a fibre optic cable. This data string is analyzed and converted into 0 ... 5 V DC analog output voltages proportional to the ISO codes and also into ModBus ASCII device protocol for interface to a PLC or computer via RS-485 to RS-232 serial port.

Special adapters also allow the integration into an ethernet-computer network. All signal outputs, as well as the input supply voltage (9 ... 36 V DC), are connected to the LIM-3 through a DB-15 connector.

LIM-4 and LIM-5

The LIM-4 and LIM-5 receive the raw serial data input from the LPT via a fibre optic cable. Results are displayed on the front panel 3-digit LED display.

The ISO 4406 code number displayed is categorized in four size channels (>4, >6, >14 and >21 μm_{90}). The ISO number represents the number of particles counts per ml fluid.

The user also can select internal information about the transducer (temperature C, laser mA, Cal V, Node ID status code). Alarm levels can be programmed for any of the four particle size channels. When set, an alarm indicator will flash if the alarm level is reached. For the LIM-4 the alarm is activated if the measured ISO numbers exceed the set alarm level. For the LIM-5 the alarm is activated if the ISO number falls below the set level.

Alarms on the LIM-4 and LIM-5 may be deactivated by pressing any button. Supply voltage is external and can be from a 9 ... 36 V DC source.

Dynamic Application Valve - Type DAV



Product Description

The DAV option is for applications where there is a continuous change of flow or pressure leading up to the LPT. The DAV stabilizes the fluid flow and pressure so that the LPT can read consistent sample volumes.

Each DAV includes:

- 1x LPMFC-0.2-3/8BSP
- 1x Thread adaptors for connection of LPT to LPMFC

Software (optional)

The standard software allows the download and the visualization of the measured particle distribution.

On request, a special software is available that allows the customer to control, monitor and analyse more than one LPM-1 which are connected in a network.

For custom configuration, please contact STAUFF.

Oil Sampling Kit - Type SFSK-1/ -2



Order Codes

SFSK-1

①

① Series and Type

NPT type
BSP type

SFSK-1
SFSK-2

Components

SFSK-1

- 1x Fluid Sample Pump FSP-38
- 1x Hose adaptor SHA-20-5,5mm
- 1 m / 3.28 ft Push on 1/4" hose
- 1x SMK20-1/4NPT-VD-C6F
- 1x SMK20-7/16UNF-VE-C6F
- Sample bottles

SFSK-2

- 1x Fluid Sample Pump FSP-38
- 1x Hose adaptor SHA-20-5,5mm
- 1 m / 3.28 ft Push on 1/4" hose
- 1x SMK20-G1/4-PC-C6F
- 1x SMK20-M10x1-PA-C6F
- Sample bottles

Product Description

Fluid analysis is a crucial component of any oil management program. Early detection of potential problems can prevent costly repairs and downtime. STAUFF SFSK oil analysis kits provide the tools to take a sample from a STAUFF test coupling or directly from a reservoir or sump.

For this the supplied hose is directly connected to the test coupling with an adapter and the fluid is filled into the supplied vials.

But there is also the possibility to draw up the sample directly from a tank with the hand pump and fill it into the vial.

This sample set is available in two versions with BSP and NPT test couplings.

Scope of Delivery

- Contains vacuum pump for drawing samples of oil equipment
- 1 m / 3.28 ft hose for insertion into tank
- Two sample bottles
- STAUFF test points and adaptor allows oil sample to be taken from STAUFF Test 20 test points