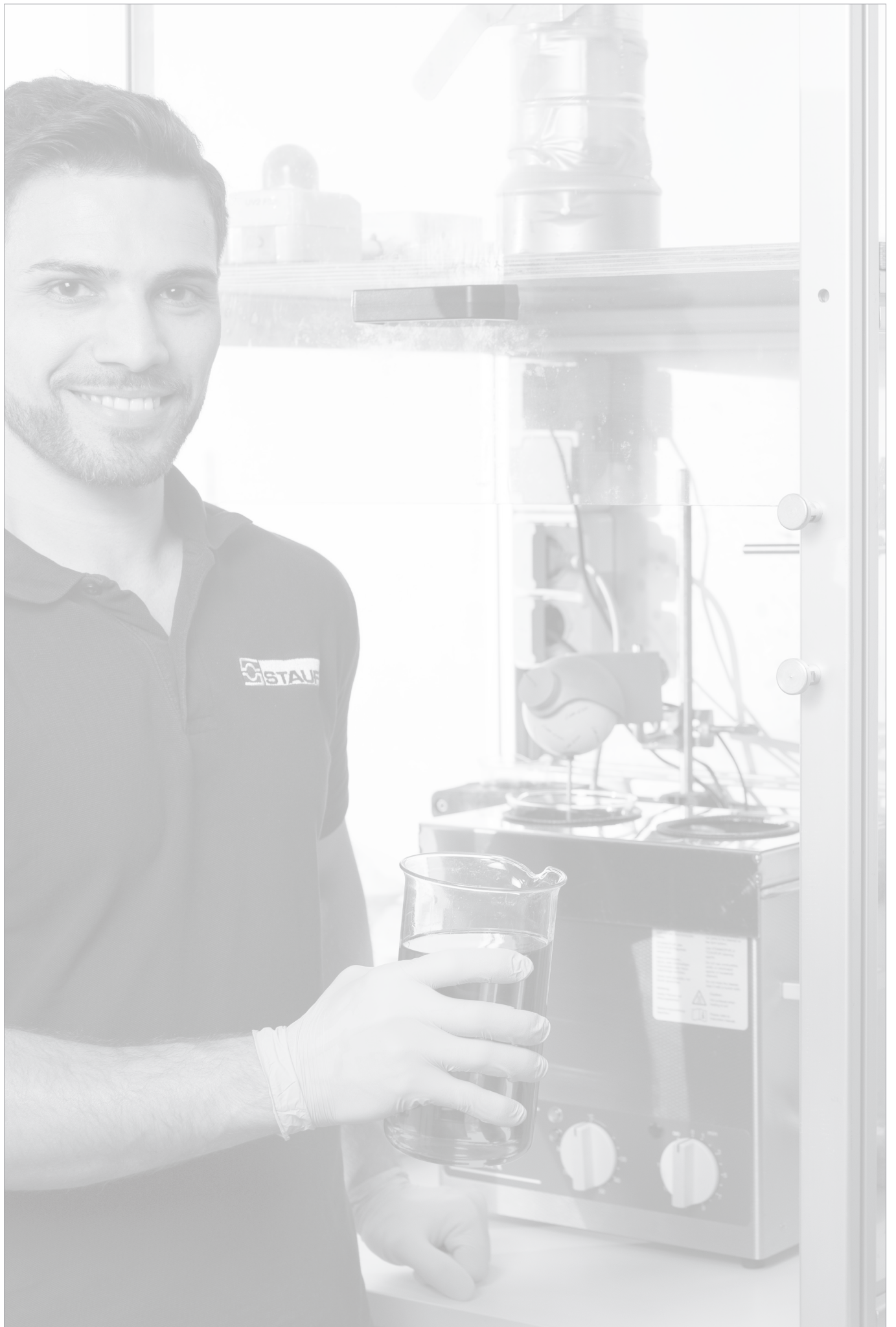














STAUFF Diagtronics

Devices for determining and monitoring
the key parameters in hydraulics

Product Catalogue



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Introduction Particle Counting



Fluid analysis is a crucial element in any oil management programme. Early detection of potential faults avoids costly repairs and breakdowns.

STAUFF offers a world-leading range of the most advanced and versatile particle counters for every conceivable application. Whether in stationary systems or as a portable solution for mobile machines, they can be customised precisely to the application thanks to their wide range of options.

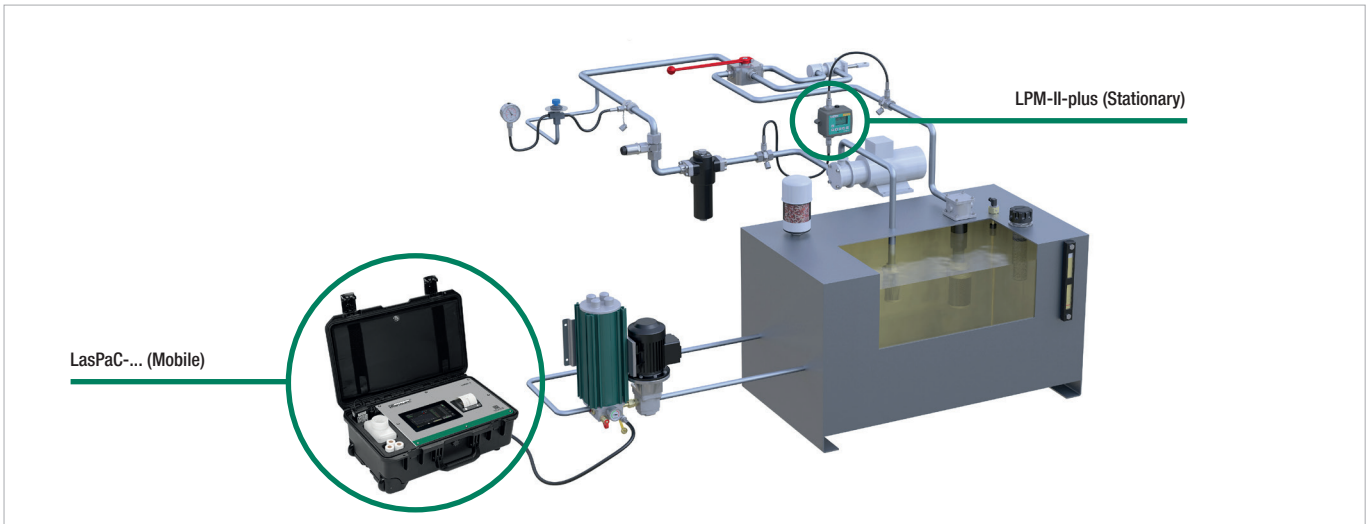
The various device types offer very fast, comprehensive and very accurate particle analysis for different applications.

Due to their design, the particle counters are extremely robust and adapted to the adverse conditions in the hydraulic environment.

Particle counting provides measurement results in accordance with all current international standards (ISO, NAS and SAE) and includes further analyses such as moisture, temperature and pressure measurement.

Real-time monitoring and proactive maintenance protects the machines, increases performance and productivity and reduces costs and unplanned downtime.

Testing standards and oil purity



Application examples of particle counters in the hydraulic circuit

Testing standards and oil purity

In order to guarantee reliable operation for years to come, certain components must comply with a specified oil cleanliness class.

The required oil cleanliness class is determined by the most sensitive system component.

Particle counters are used, for example, to measure oil purity in accordance with ISO 4406. The particle counters are used to count the number of particles $>4 \mu\text{m}$ (c), $>6 \mu\text{m}$ (c) and $>14 \mu\text{m}$ (c) in 100 ml of hydraulic oil. The number of particles is then assigned to a classification number (e.g. 14/11/8), which then corresponds to the ISO cleanliness class.

This classification is carried out automatically in the particle counter and evaluated according to the standards below, among others.

When interpreting these classes, it should be noted that the number of particles is doubled for each next higher class.

The STAUFF particle counters are calibrated with ISO test dust (ISO Medium Test Dust / ISO MTD) in accordance with ISO 11 171.

Cleanliness classes according to ISO 4406

Number of particles in 100 ml		Classification numbers ISO 4406		
More than	Less than	$> 4 \mu\text{m}_{(c)}$	$> 6 \mu\text{m}_{(c)}$	$> 14 \mu\text{m}_{(c)}$
16000000	32000000	25	25	25
8000000	16000000	24	24	24
4000000	8000000	23	23	23
2000000	4000000	22	22	22
1000000	2000000	21	21	21
500000	1000000	20	20	20
250000	500000	19	19	19
130000	250000	18	18	18
64000	130000	17	17	17
32000	64000	16	16	16
16000	32000	15	15	15
8000	16000	14	14	14
4000	8000	13	13	13
2000	4000	12	12	12
1000	2000	11	11	11
500	1000	10	10	10
250	500	9	9	9
130	250	8	8	8
64	130	7	7	7
32	64	6	6	6
16	32	5	5	5

Cleanliness classes according to NAS 1638

Class	Number of particles 100 ml [μm]				
	5 – 15	15 – 25	25 – 50	50 – 100	>100
00	125	22	4	1	0
0	250	44	8	2	1
1	500	89	16	3	1
2	1000	178	32	6	1
3	2000	356	63	11	2
4	4000	712	126	22	4
5	8000	1425	253	45	8
6	16000	2850	508	90	16
7	32000	5700	1012	180	32
8	64000	11400	2052	360	64
9	128000	22800	4050	720	128
10	256000	45600	8100	1140	256
11	512000	91200	16200	2880	512
12	1024000	182000	32400	5760	1024

The methods for determining oil purity and the assignment of cleanliness classes are defined in ISO 4406 and NAS 1638. The main difference between these two standards is that ISO and NAS define the size of the particles differently.

Overview of particle counters

Mobile

Stationary



LasPaC-3 in mobile application



LPM-II-plus in stationary application

Version/Design	Mobile		Stationary
Type	LasPaC-3-P	LasPaC-II-M	LPM-II-plus
Measuring range	8 Channels (4,6,14,21,25,38,50,70 µm(c))	8 Channels (4,6,14,21,25,38,50,70 µm(c))	8 Channels (4,6,14,21,25,38,50,70 µm(c))
Compatible with	Fluids based on mineral oil and petroleum, Specific water glycols, bio-oils or phosphate esters	Fluids based on mineral oil and petroleum, Specific water glycols, bio-oils or phosphate esters	Fluids based on mineral oil and petroleum, Specific water glycols, bio-oils or phosphate esters
Moisture Sensor	optional	optional	optional
Viscosity range	1 ... 400 cSt	1 ... 400 cSt	1 ... 1000 cSt
Pressure range (bar)	2 ... 420 bar / 29 ... 6091 PSI	2 ... 420 bar / 29 ... 6091 PSI	2 ... 420 bar / 29 ... 6091 PSI
Measuring point pressure sensor	optional	-	-
Display	7" Touchscreen	LCD display	LCD display
Printer	integrated	-	-
Data storage	integrated (for about 4000 measurements)	integrated (for about 600 measurements)	integrated (for about 4000 measurements)
PC-Interface	USB-C	RS-232 (USB converter incl.)	USB (via USB interface)
Direct connection of USB stick	integrated	-	optional
SPS / PLC connection	-	-	RS485, RS232, Modbus, CAN Bus
Analogue output	-	-	4 - 20 mA (See data sheet for details)
Power supply	Battery pack integrated Li-Ion or 110/220V	Battery pack integrated NiMH or 110/220 V	9 - 36VDC or 110V/230V optional
Page	70	74	78



Analyses anywhere - bottle sampling unit

If it is not possible to count particles directly on your system, you can use the oil sampling kit (page 82) to take oil samples for later analysis with the LasPaC bottle sampler.

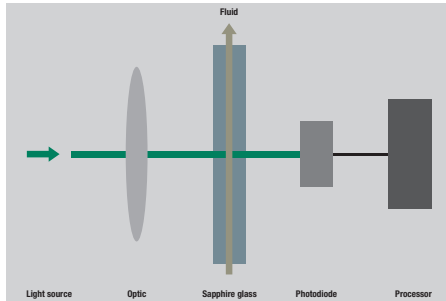
Please see page 76

Particle counting in general

Operating principle

All STAUFF particle counters work according to the light-blockade principle, in which LEDs shine through the liquid to be measured and illuminate a photodiode.

When a particle in the oil passes the light beam, the amount of light that hits the photodiode decreases. As this change is directly proportional to the size of the particle, the degree of contamination can be determined from this.



For all applications - High compatibility

Depending on the model, STAUFF particle counters are compatible with mineral oils and petroleum-based fluids, phosphate esters (e.g. Skydrol®) or specific water glycols and specific bio-oils.

For every type of application - Large pressure range

A major advantage of STAUFF particle counters is the wide application pressure range from 2 bar / 29 PSI to 420 bar / 6091 PSI. This leads to reliable measurement results without the need for additional devices.

Moisture / Temperature Sensor

The STAUFF particle counters can also be equipped with a moisture / temperature sensor.

This sensor measures the water content of the measured fluid (results in relative humidity, RH%) and also indicates the current fluid temperature (in °C).

Further information can be found on page 77.

Please note that the moisture / temperature sensor cannot be used with phosphate esters (e.g. Skydrol®), water-glycol fluids and bio-oils.

Calibration according to ISO 11 171

The STAUFF particle counters are calibrated with ISO test dust (ISO Medium Test Dust / ISO MTD) in accordance with ISO 11 171.

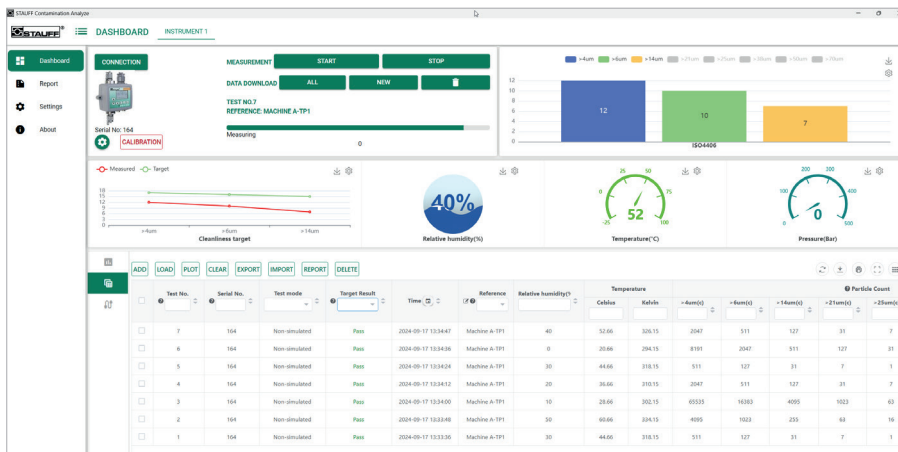
The cleanliness classes are analysed according to the various standards used. These include ISO 4406, NAS 1638, AS 4059 / ISO 11218 Rev E and F, GBT 14039 and GJB 420B.

Bottle Sampling Unit

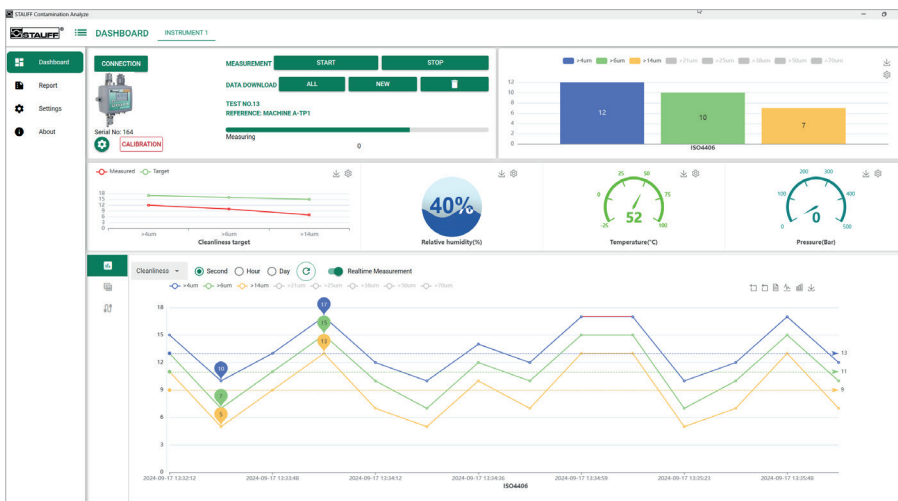
Fluids that are heavily mixed with air cannot be measured correctly. To remedy this, the bottle sampling unit has a vacuum pump that removes air from the oil sample. The bottle sampling unit is supplied in both sizes (110 ml and 500 ml) with an external power supply. For further information please see page 76.

Please note that the moisture / temperature sensor mentioned above cannot be operated in conjunction with the bottle sampling unit.

PC software for LasPaC and LPM STAUFF Contamination Analyze



Measurement data view in table form



Viewing trends directly in the software

Using the software supplied, the measurement data stored on the devices can be visualised and evaluated. The software works on a database basis, which makes it easy for the user to obtain an overview of the cleanliness classes of their machines and systems. Trends and threshold values can be read off simply and easily.

By creating report templates, reports for customers or your own documents can be created very easy. It is possible to store logos and addresses. This allows the report to be optimised for your own service.

All particle counters or monitors supplied by STAUFF can be read out with the same software, so that even a comparison of different measuring devices is possible.

Name: _____ Logo

27.11.2024

Pressure Test Report

Accum-H46-987-00010C-14Aug2018-102351

Conducted by: _____

Customer: _____ Customer A

System/Machine: Arbug TMS352
 Test date: 14.Aug.2018
 Test time: 10:23:51
 Sersername: Accum-H46-987
 SN PT-RF Sensor: 00010C

Pressure in bar:	240,00	Nominal value:	325,0 bar
		Tolerance +:	5,0 %
		Max:	236,3 bar
		Tolerance -:	5,0 %
		Min:	213,0 bar

Temperatur in °C:	22,44
----------------------	-------

Date of issue: _____ Conducted by: _____
 27.11.2024

Create customised reports

Particle Counter ■ Type LasPaC-3-P (Professional)



Robust design (co-polymer housing)



Modern 7" touchscreen and thermal printer



Mobile due to integrated trolley function

Product Description

The LasPaC-3 sets new standards in particle measurement. The third generation mobile laboratory simply on site. Fast, precise, robust and reliable.

Features

Works fast

Fast generation of measurement results due to free programmable test volume (100 ml in one minute)

According to international standards

ISO 4406, NAS 1638, AS 4059 / ISO 11218 Rev E and F, GBT 14039 and GJB 420B

Additional oil moisture measurement incl. temperature monitoring

Optional moisture sensor (results in relative humidity, RH%) with integrated temperature measurement (°C)

Sample size according to requirements

Sample size free selectable up to 100ml

Connect to the working system

Pressure range from 2 to 420 bar.
Optional, integrated measuring point pressure sensor

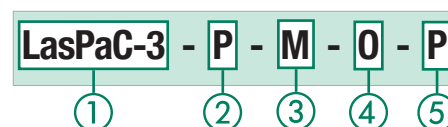
Mobile and robust

Robust construction (co-polymer housing) with still lowest weight, mobile due to integrated trolley function. All necessary connections, hoses and waste oil bottle integrated in the case.

Various measurement modes

Measuring modes adapted to the measuring task:
Simple, continuous, bottle sampler

Order Codes



① Series and Type

Particle Counter **LasPaC-3**

② Version

Professional **P**

③ Fluid Compatibility

Mineral Oil, Petroleum based fluids	M
Phosphate Ester (e.g. Skydrol®)	E
Specific Water Glycol fluids and bio-oils	G

Note: If you have any queries on fluid compatibility, please contact STAUFF.

④ Moisture/ Temperature Sensor

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

Please note: Not suitable for Phosphate Ester (e.g. Skydrol®), Glycol fluids and bio-oils.

⑤ Measuring point pressure sensor

Without Measuring point pressure sensor	0
With Measuring point pressure sensor	P

Long battery life

Long-life Li-Ion battery enables self-sufficient operation directly at the measuring point. Easy battery removal for air freight transportation possible.

Integrated self-cleaning

Automatic program for sensor cleaning



Waste oil bottle

The sample oil can be collected in the integrated waste oil bottle and disposed later.

Simple operation

Via 7" touchscreen with intuitive menu navigation

Direct documentation

Printout of the results including particle counts directly using the integrated printer or permanently due to internal storage for measurement result

Particle Counter - Type LasPaC-3-P (Professional)

C



Connections



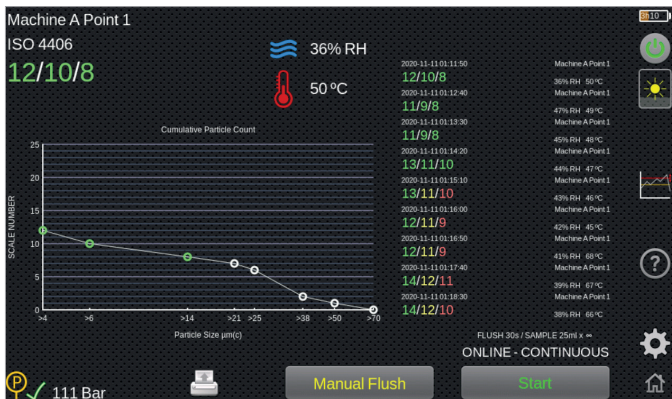
Integrated Organizer



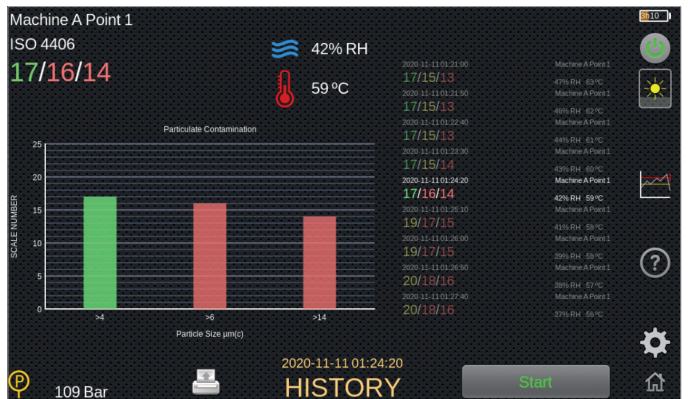
Thermal printer printouts directly

Extensive analysis functions

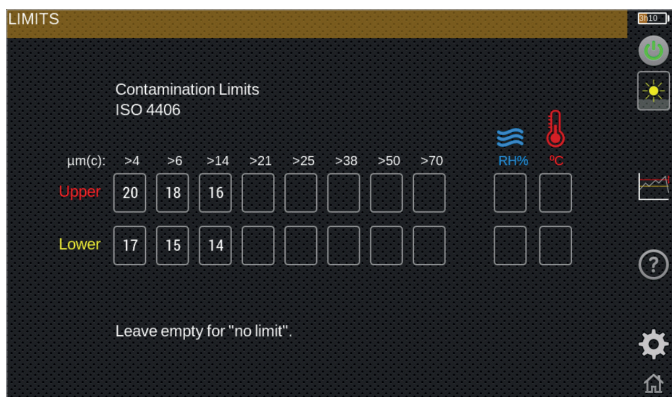
The measurement data can be analyzed and evaluated on the screen (RED/YELLOW/GREEN/BLUE) or transferred to the PC software for further processing via USB-C.



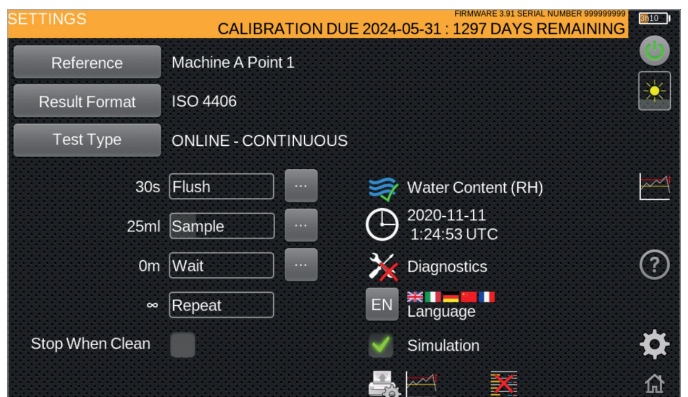
- Measured value display directly in the diagram



- Historical data always available and quickly retrievable



- Definition of limit values, directly in the device
- Visual coloring when measured values are exceeded



- Simple setting of measurement tasks

Particle Counter ■ Type LasPaC-3-P (Professional)



Technical Data

Dimensions and Weight

- L/W/H: 551 x 358 x 226 mm /
21.69 x 14.09 x 8.90 in
- Weight: 15,5 kg / 34.17 lbs

Display / Printer

- Display: 7" touchscreen
- Printer: Thermal printer

Power Supply

- Voltage range: 110 ... 240 V AC
- European, UK and US power plug adaptors included
- Number of tests before recharging is required: 100
- Removable Li-Ion battery pack

Calibration

- ISO Medium Test Dust (MTD) according to ISO 11 171

Analysis range

- ISO 4406 Codes 0-24
- NAS 1638 Classes 00-12
- AS 4059 / ISO 11218 Rev E, Table 1 Codes 00-12
- AS 4059 / ISO 11218 Rev E, Table 2 Codes A-F: 000-12
- AS 4059 Rev F, Table 1 Codes 000-12
- AS 4059 Rev F, Table 2 Codes cps 000-12
- GBT 14039 Codes 0-24
- GJB 420B Codes, A-F: 000-12

Accuracy

± 1/2 class for:
ISO 4406 and GBT 14039 Codes 8-24 and for Codes 4, 6, 14 $\mu\text{m(c)}$,
NAS 1638 and AS 4059 / ISO 11218 Rev E and F,
Table 1 Size Codes Class 2-12,
AS4059 / ISO 11218 Rev E and F Table 2 and GJB 420B Size
classes, A: 000-12, B: 00-12, C: 00-12, D: 2-12, E: 4-12,
F: 7-12

± 1 class for larger sizes and lower size codes as mentioned
above

Pressure / Viscosity

- Pressure range: 2 ... 420 bar /
29 ... 6091 PSI
- Viscosity range: 1 ... 400 cSt

LED Sensor

- High accuracy laser LED: Automatic optical particle counter with high-precision LED light blockage
- Measured channels: 4, 6, 14, 21, 25, 38, 50, 70 $\mu\text{m}_{(e)}$
- The maximum concentration is ISO 4406 Code 24 (160.000 p/ml)
- Sample quantity: Maximum 100 ml per pump stroke
Programmable test volume

Moisture Sensor (optional)

- % RH (relative humidity) ± 3 %
- ± 3 °C / ± 32 °F

Measuring point pressure sensor (optional)

- $\pm 0.5\%$ full scale accuracy (min. 10 bar)

Accessories

- Bottle Sampling Unit 110 ml
- Bottle Sampling Unit 500 ml
- For further information please see on page 76.
- Screen filter: 500 μm (see on page 77)

Hose Connections

- In: Test points STAUFF Test 20 or similar (M16 x 2)
1.5 m hose included in the scope of delivery
- Out: Quick-release coupling (unpressurised)
2 m hose included in the scope of delivery

Permissible Temperature

- Media temperature: +5 °C ... +80 °C / +41 °F ... +176 °F
- Ambient temperature: -10 °C ... +80 °C / +14 °F ... 176 °F
- Rel. humidity: < 80%

Data output

- 2 x USB output: 1 x USB-C for connection to PC
1 x USB-A for data download to USB memory stick

Data Storage

- for 4000 tests

Fluid Compatibility

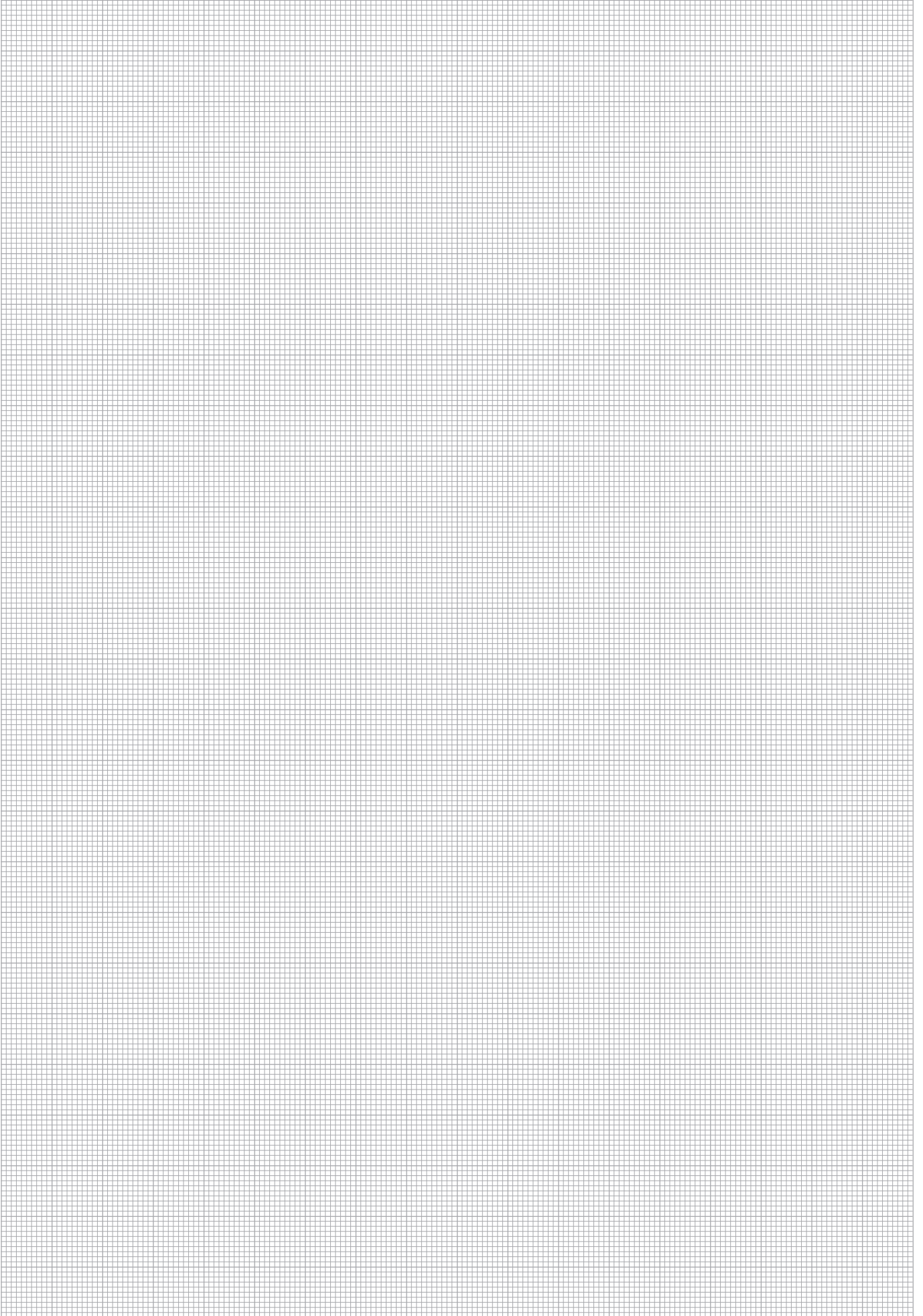
- Mineral Oil, Petroleum based fluids
- Specific water glycols, bio-oils or phosphate esters

Protection class

- IP 66 (closed cover)
- IP 54 (open cover)

Software

- Downloading and storage of data using the 'STAUFF Contamination Analyze' software supplied. Further processing with Microsoft Excel® possible.



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



LasPaC-II-M with integrated battery (standard option)

LasPaC-II-M also available without integrated battery

Product Description

The LasPaC-II-M (mobile) is a simplified particle counter that has been specially designed for applications where it is important to have a lightweight and robust service device.

Features

According to international standards

ISO 4406, NAS 1638, AS 4059 / ISO 11218 Rev E and F, GBT 14039 and GJB 420B

Additional oil moisture measurement incl. temperature monitoring

Optional moisture sensor (results in relative humidity, RH%) with integrated temperature measurement (°C)

Simple operation

Intuitive three-button operation (start, stop, flush)

Display

LCD-Screen for ISO / NAS-Class

Documentation

Data Storage for 600 tests. Downloading and storage of data using the 'STAUFF Contamination Analyze' software supplied. Further processing with Microsoft Excel® possible.

Connect to the working system

Pressure range from 2 to 420 bar

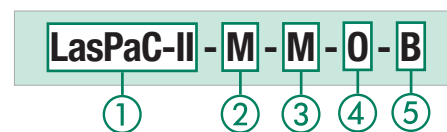
Mobile and robust

Robust construction (co-polymer housing) with still lowest weight. All necessary connections, hoses and waste oil bottle integrated in scope of delivery.

Various measurement modes

Measurement modes adapted to the measuring task can be selected using the "STAUFF Contamination Analyze" software

Order Codes



① Series and Type

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

② Version

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

③ Fluid Compatibility

Mineral Oil, Petroleum based fluids	M
Phosphate Ester (e.g. Skydrol®)	E
Specific Water Glycol fluids and bio-oils	G

Note: If you have any queries on fluid compatibility, please contact STAUFF.

④ Moisture/ Temperature Sensor

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

Please note: Not suitable for Phosphate Ester (e.g. Skydrol®), Glycol fluids and bio-oils.

⑤ Battery

With internal rechargeable battery	B
Without internal rechargeable battery	0

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

- ISO Medium Test Dust (MTD) according to ISO 11 171

Analysis range

- ISO 4406 Codes 0-24
- NAS 1638 Classes 00-12
- AS 4059 / ISO 11218 Rev E, Table 1 Codes 00-12
- AS 4059 / ISO 11218 Rev E, Table 2 Codes A-F: 000-12
- AS 4059 Rev F, Table 1 Codes 000-12
- AS 4059 Rev F, Table 2 Codes cps 000-12
- GBT 14039 Codes 0-24
- GJB 420B Codes, A-F: 000-12

Accuracy

± 1/2 class for:
ISO 4406 and GBT 14039 Codes 8-24 and for Codes 4, 6, 14 μm(c),
NAS 1638 and AS 4059 / ISO 11218 Rev E and F,
Table 1 Size Codes Class 2-12,
AS4059 / ISO 11218 Rev E and F Table 2 and GJB 420B Size
classes, A: 000-12, B: 00-12, C: 00-12, D: 2-12, E: 4-12,
F: 7-12

- ± 1 class for larger sizes and lower size codes as mentioned above

Pressure / Viscosity

- Pressure range: 2 ... 400 bar / 29 ... 5801 PSI
- Viscosity range: 1 ... 400 cSt

Laser Sensors

- High accuracy laser: 4 ... 6 μm_(c)
- Standard accuracy laser: 6 ... 70 μm_(c)
- Measured channels: 4, 6, 14, 21, 25, 38, 50, 70 μm_(c)
- The maximum concentration is ISO 4406 Code 24 (160.000 p/ml)

Accessories

- Bottle Sampling Unit 110 ml
- Bottle Sampling Unit 500 ml
- For further information please see on page 76.
- Screen filter: 500 μm (see on page 77)

Hose Connections

- In: Test points STAUFF Test 20 or similar (M16 x 2)
1.5 m hose included in the scope of delivery
- Out: Quick-release coupling (unpressurised)
2 m hose included in the scope of delivery

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
- Rel. humidity: < 80%

Data Storage

- 600 tests

Fluid Compatibilit

- Mineral Oil, Petroleum based fluids
- Specific water glycols, bio-oils or phosphate esters

Computer Interface

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

Software

- Downloading and storage of data using the 'STAUFF Contamination Analyze' software supplied. Further processing with Microsoft Excel® possible.

Internal Rechargeable Battery

- As an option with internal rechargeable battery

Bottle Sampling Unit ▪ Typ Bottle-Sampler-LasPaC



Bottle Sampling Unit 110 ml and Accessories



Bottle Sampling Unit 110 ml



Bottle Sampling Unit 500 ml

Product Description

Analysis Everywhere - Bottle Sampling Unit

If it is not possible to count particles directly on your system, you can use the oil sampling kit (page 82) to take oil samples for later analysis with the LasPaC bottle sampler.

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 500 ml Size

STAUFF offers two sizes of bottle sampling units for the LasPaC devices: 110 ml and 500 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 adaptors. It is designed for mobile applications and is only compatible with Mineral Oil and Petroleum based fluids.

The 500 ml bottle sampling unit is delivered with five sample bottles and the required power supply.

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

Order Codes

Bottle-Sampler-LasPaC - 110-M

①

②

① Series and Type

Bottle Sampling Unit	Bottle-Sampler-LasPaC
----------------------	------------------------------

② Unit

110 ml Bottle Sampling Unit suitable for Mineral Oil and Petroleum based fluids only	110-M
500 ml Bottle Sampling Unit suitable for Mineral Oil and Petroleum based fluids, Specific Water Glycol fluids and bio-oils	500-M/G
500 ml Bottle Sampling Unit suitable for Phosphate Ester (e.g. Skydrol®)	500-E

Moisture / Temperature Sensor

Product Description

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 STAUFF Particle Counters 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.

Additional Information - Oil Temperature Readings

Beside the saturation level the optional moisture / temperature sensor of the STAUFF Particle Counters 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.

Saturation Levels

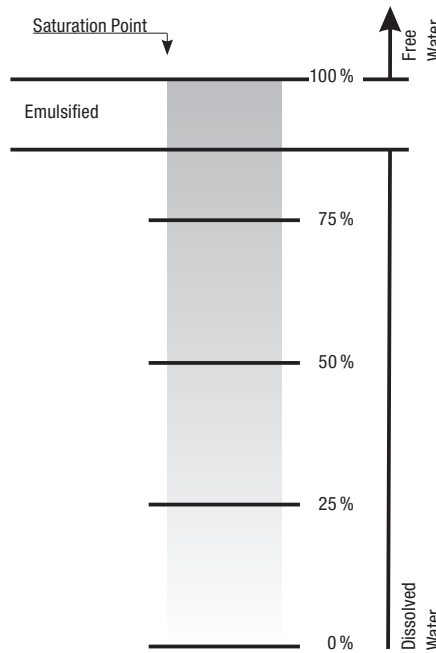
Since the effects of free (also emulsified) water are more harmful than those of dissolved water, water levels should remain always well below the saturation point.

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.



Product Description: Screen Filter ▪ Type Screen-Filter-LasPaC



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.

Order Codes

Particle Counter ▪ Accessories

Accessories / Spare Parts

①

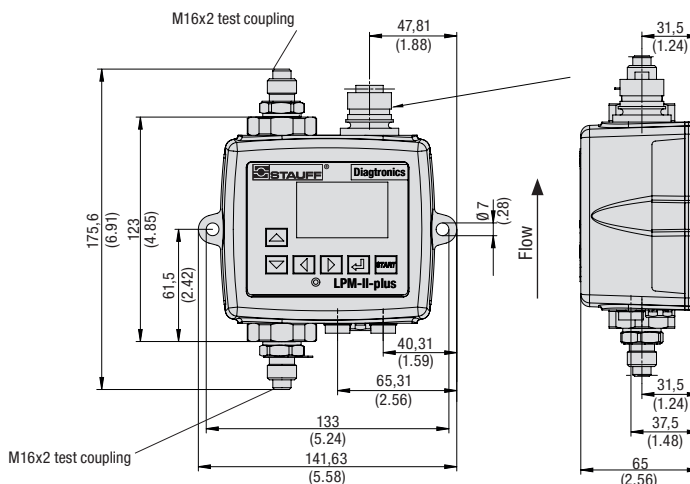
① Type of Accessories / Spare Parts

Waste hose 2 m / 6.56 ft	Hose-LasPaC-Waste-2m
Pressure hose 1,5 m / 4.92 ft	SMS-20-1500-A-W3
110 ml certified clean* bottle (5 pieces)	Set-Bottle-LasPaC-110-C
250 ml certified clean* bottle (5 pieces)	Set-Bottle-LasPaC-250-C
110 ml glass sample bottle (5 pieces)	Set-Bottle-LasPaC-110
250 ml glass sample bottle (5 pieces)	Set-Bottle-LasPaC-250
500 ml glass sample bottle (5 pieces)	Set-Bottle-LasPaC-500
Printer paper LasPaC-II-P (5 pieces)	Set-Paper-LasPaC-II-Printer
Printer paper LasPaC-3-P (5 pieces)	Set-Paper-LasPaC-3-Printer
RS 232 to USB converter	Adaptor-PPC-04/12-RS232-to-USB-CAB
Screen filter (for Mineral Oil/Petroleum based fluids, specific Water Glycol fluids, bio-oils)	Screen-Filter-LasPaC-M/G
Screen filter (for Phosphate Ester)	Screen-Filter-LasPaC-E



* Cleaned in accordance with DIN/ISO 5884 and verified to ISO 3722 with a NAS 1638 cleanliness of between Class 00 and 0.

Particle Monitor - LPM-II-plus



Product Description

The LPM-II-plus Particle Monitor determines the contamination level of the measured fluid on eight size channels and offers precise and complete determination of particle sizes in accordance with international standards.

The LPM-II-plus is an automatic, optical particle counter with high-performance LEDs that work on the light obscuration principle. STAUFF recommends recalibrating the measuring equipment at regular intervals.

- Multicolour indicators via LCD and LED with output alarm signals as standard
- Two switching outputs for customer-specific limit values
- 4-20mA analogue output as standard (time multiplex)

Options

- Moisture sensor / temperature sensor: RH in % (relative humidity) and temperatures in °C
- USB Port for Data transfer (optional)

Technical Data

Channels

- 4, 6, 14, 21, 25, 38, 50, 70 µm(c)

Calibration

ISO Medium Test Dust (MTD) in accordance with ISO 11171

Analysis range

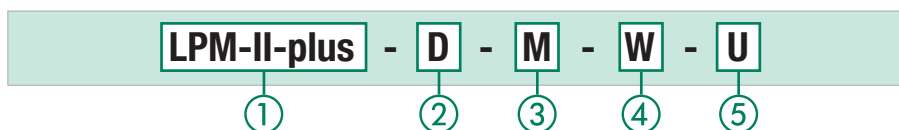
- ISO 4406 Codes 0-24
- NAS 1638 Classes 00-12
- AS 4059 / ISO 11218 Rev E, Table 1 Codes 00-12
- AS 4059 / ISO 11218 Rev E, Table 2 Codes A-F: 000-12
- AS 4059 Rev F, Table 1 Codes 000-12
- AS 4059 Rev F, Table 2 Codes cps 000-12
- GBT 14039 Codes 0-24
- GJB 420B Codes, A-F: 000-12

Accuracy:

± 1/2 class for: ISO 4406 and GBT 14039 Codes 8-24 and for Codes 4, 6, 14 µm(c), NAS 1638 and AS 4059 / ISO 11218 Rev E and F, Table 1 Size Codes Class 2-12, AS4059 / ISO 11218 Rev E and F Table 2 and GJB 420B Size classes, A: 000-12, B: 00-12, C: 00-12, D: 2-12, E: 4-12, F: 7-12

± 1 class for larger sizes and lower size codes as mentioned above

Order Codes



① Series and Type

Particle Monitor (Incl. LPM-II-CAB-P-FL-3 connecting cable) **LPM-II-plus**

② Version

With display and keypad **D**
Without display and keypad **0**

③ Fluid Compatibility

Fluids based on Mineral Oil and Petroleum **M**
Phosphate Ester (e.g. Skydrol®) **E**
Specific Water Glycols and bio-oils **G**

Note: If you have any queries on fluid compatibility, please contact STAUFF.

④ Moisture Sensor / Temperature Sensor

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

Please note: Not suitable for Phosphate Ester (e.g. Skydrol®), Water Glycol fluids and bio-oils.

⑤ Interface

USB interface to transfer measured data to a data carrier **U**

Note: In the case applications with extreme pressure peaks, please contact STAUFF.

Note: You need an interface module with either a USB or an Ethernet interface for exporting and programming.

Flow

- 20 ... 400 ml/min / 0.005 ... 0.11 US GPM

Viscosity Range

- ≤ 1000 mm²/s

Medium Temperature

- -25 °C ... +80 °C / -13 °F ... +176 °F

Ambient Temperature

- LPM II-O: -25 °C ... +80 °C / -13 °F ... +176 °F
- LPM II-D: -25 °C ... +55 °C / -13 °F ... +131 °F
- Rel. humidity: < 80%

Weight

- 1,6kg / 3.53 lbs

Max. Pressure

- 420 bar / 6091 PSI static
- Note: In systems with extreme pressure peaks, please contact STAUFF

Test Duration

- Settable between 10 ... 3600 sec., set ex-works to 120 sec.
- As standard with start delay and freely programmable test intervals

Moisture Sensor / Temperature Sensor

- % RH (relative humidity) ±3 %
- ±3 °C / ±32 °F

Volumetric Flow Measurement

- As display only

Hose Connections

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

Data Storage

- Max. 4000 measuring results

Interfaces

- RS485, RS232, Modbus, CAN Bus
- 4-20 mA time multiplex interface
- USB interface to transfer measured data to a data carrier (optional)

International Protection Rating

- IP 65/67: Dust-proof and protected from spray
- Impact resistance rating IK04

Power Supply / Power

- 9 ... 36 V DC, < 2.2 W (connecting cable with flying leads is included)

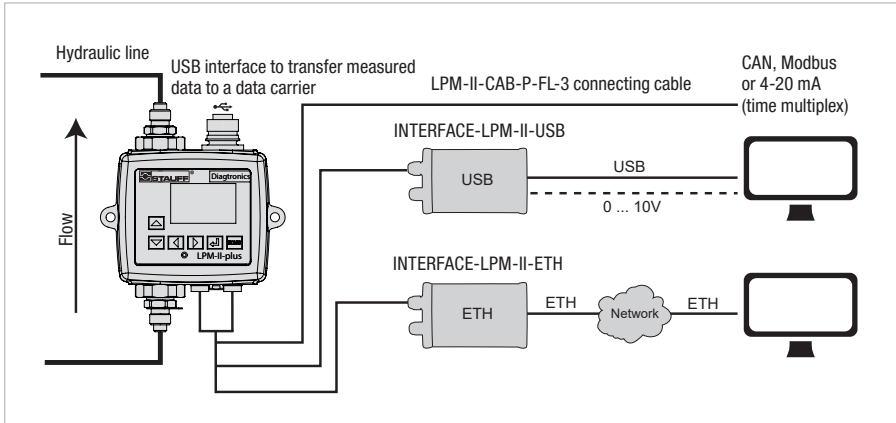
Current Consumption

- 12 V: 70 mA (LPM-II-plus-O), 150 mA (LPM-II-plus-D)
- 24 V: 40 mA (LPM-II-plus-O), 80 mA (LPM-II-plus-D)
- 36 V: 30 mA (LPM-II-plus-O), 60 mA (LPM-II-plus-D)

Housing Surface Treatment

- Polyurethane based paint, according to BSX34 colour BS381-638 (dark sea grey)
- Tested according to: BS2X34A and BS2X34B, MMO114 and SP-J-513-083 Part II. Cl. A
- The unit meets: MIL-PRF-85285

Interface Module with USB or Ethernet Interface ▪ INTERFACE -LPM-II-USB/ETH



Connection diagram: PC connection of the LPM-II-plus Particle Monitor

Order Code

INTERFACE-LPM-II-USB



① Series and Type

Interface module with USB interface **INTERFACE-LPM-II-USB**
 Interface module with USB interface and 0-10V analogue outputs **INTERFACE-LPM-II-USB-010V**

Scope of supply:

- Power supply unit
- Interface module with USB interface
- Connecting cable (3 m / 9.84 ft)
- USB cable

Order Code

INTERFACE-LPM-II-ETH



① Series and Type

Interface module with Ethernet interface **INTERFACE-LPM-II-ETH**

Scope of supply:

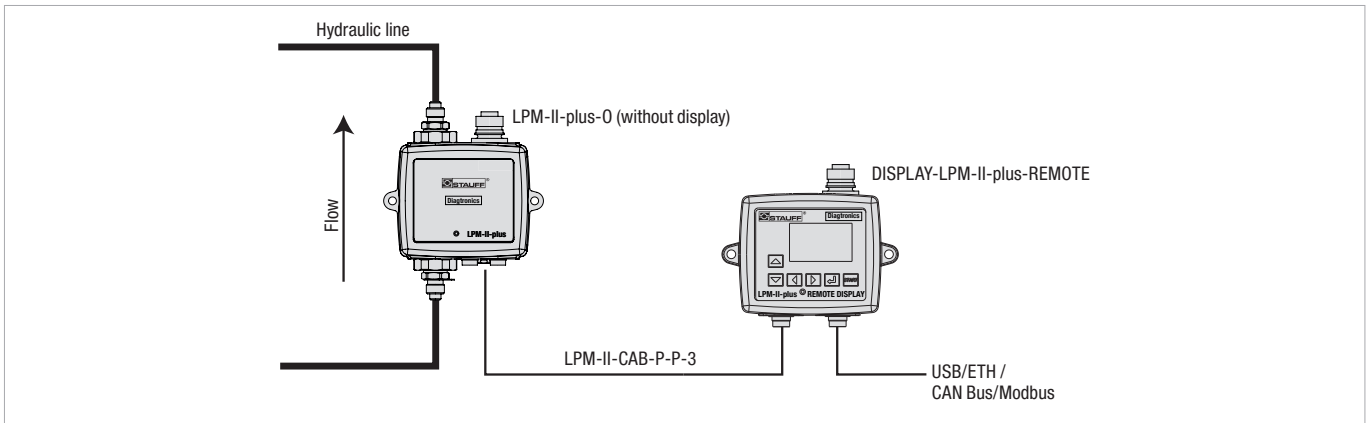
- Power supply unit
 - Interface module with Ethernet interface
 - Connecting cable (3 m / 9.84 ft)
- Note: An Ethernet cable is not supplied.

Product Description

The LPM-II-plus is connected to an EDP system or a laptop/PC using an interface module with a USB or an Ethernet interface. Either interface module is connected to the LPM-II-plus using a connecting cable (3 m / 9.84 ft). With the power supply unit connected, the LPM-II-plus is supplied with current via the connecting cable. The interface modules allow you to evaluate the measured data and to carry out programming using the supplied software. In USB operation, the LPM-II-plus can be supplied with current via the USB cable too.

The USB interface is optionally also available with additional 0-10 V outputs. The 0-10 V interface provides six ISO channels, the relative humidity and the temperature on eight voltage outputs.

Remote Display Unit ▪ DISPLAY-LPM-II-plus-REMOTE



Connection diagram: Remote display

Order Code

DISPLAY-LPM-II-plus-REMOTE



① Series and Type

Remote Display **DISPLAY-LPM-II-plus-REMOTE**

Scope of supply:

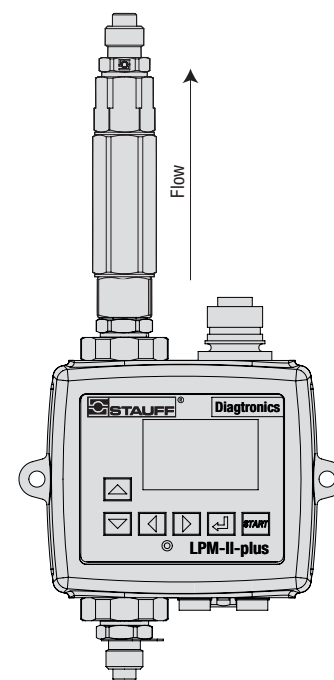
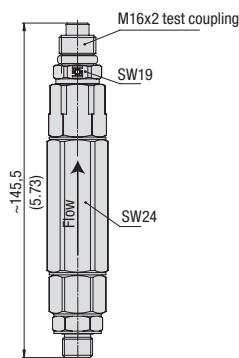
- Remote Display
- LPM-II-CAB-P-P-3 connecting cable

Product Description

In the case of applications outside the operator's field of view or in locations that are difficult to access, it is possible to display via a remote display the values that the LPM-II-plus measured.

Flow Control Valve - DAV-LPM-II

C



Product Description

In systems in which the volumetric flow or the pressure is too high, the optimum flow is achieved with the use of a flow control valve.

It can process pressures from 4 bar ... 400 bar / 58 PSI ... 5801 PSI.

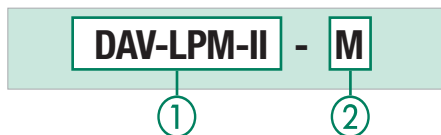
The DAV-LPM-II, flow control valve is connected to the hydraulic outlet of the LPM-II-plus via the connection fittings.

Max. Permissible Operating Pressure

▪ 400 bar / 5801 PSI

Note: Note that a minimum operating pressure of 4 bar / 58 PSI must be maintained for the proper function of the flow control valve.

Order Code



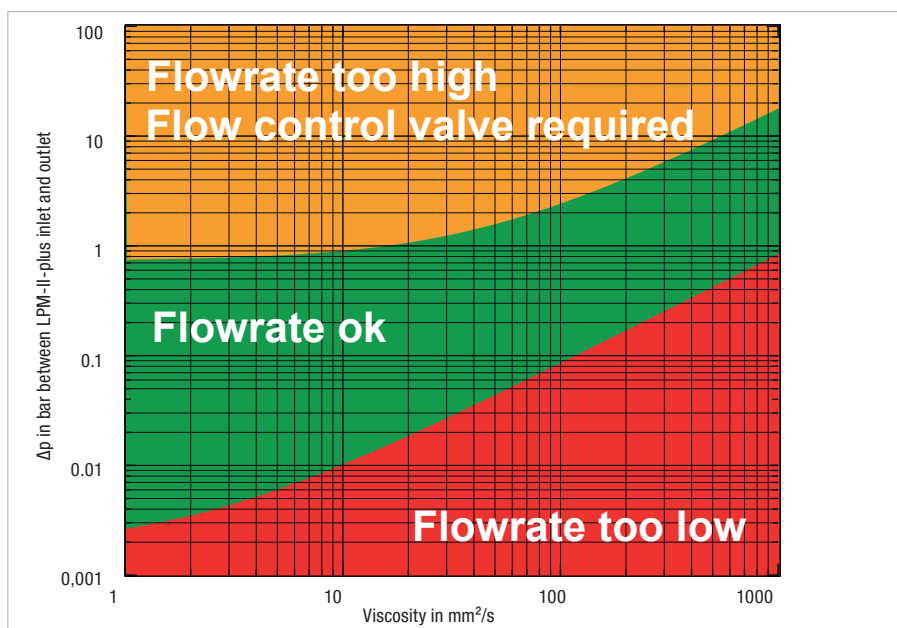
① Series and Type

Flow Control Valve **DAV-LPM-II**

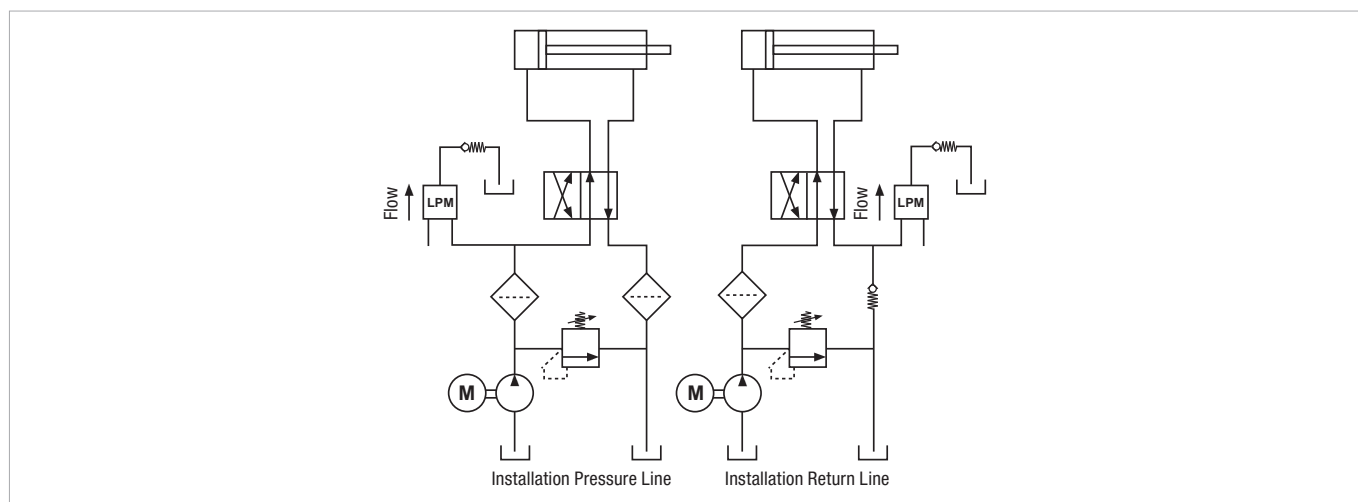
② Fluid Compatibility

Fluids based on Mineral Oil and Petroleum	M
Phosphate Ester (e.g. Skydrol®)	E
Specific Water Glycols and bio-oils	G

LPM-II-plus with flow control valve DAV-LPM-II



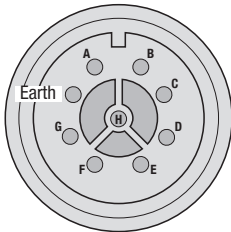
Application example



Particle Monitor ■ LPM-II-...-CX/2

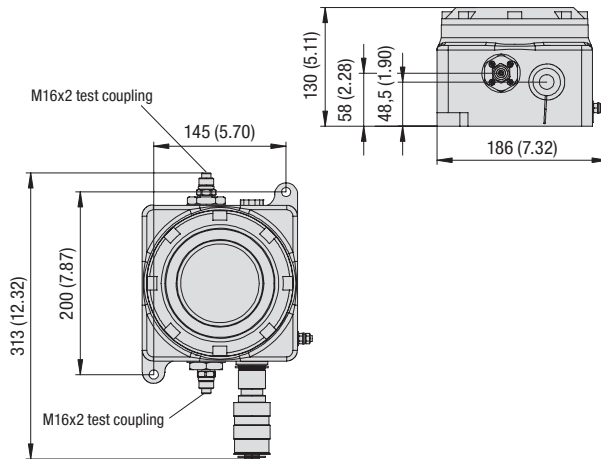
Wiring Diagram

Note: Please note that an ATEX approved connecting cable is not included in the scope of delivery of LPM-II-0-...-CX. A corresponding ATEX plug is included.



View when looking at supplied male connector

- A Data-
- B Data+
- C Power 0V
- D Power +9V-36V DC
- E Output 1
- F Output 2
- G Common
- H Start



Order Codes

LPM-II - D - M - 0 - CX/2

① ② ③ ④ ⑤

① Series and Type

Particle Monitor **LPM-II**

② Version

With display **D**

③ Fluid Compatibility

Fluids based on Mineral Oil and Petroleum **M**
 Phosphate Ester (e.g. Skydrol®) **E**
 Specific Water Glycols and bio-oils **G**

Note: If you have any queries on fluid compatibility, please contact STAUFF.

④ Moisture Sensor / Temperature Sensor

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

Please note: Not suitable for Phosphate Ester (e.g. Skydrol®), Water Glycol fluids and bio-oils.

⑤ Version according to ATEX 94/9/EG

ATEX certification (Zone 2 / Cat. 3G) **CX/2**

Note: You need an interface module with either USB or an ethernet interface for exporting and programming. The USB interface is not ATEX rated.

Product Description

The ATEX version of the Particle Monitor LPM-II is approved for use in hazardous areas (zone 2 / category 3G). The device thus meets the conditions to be used in e.g. oil and gas industry or chemical and process industry.

Product Features

- Determines contamination level of measured fluids in 8 size particle channels
- Precise and complete determination of particle sizes in accordance with international standards
- Integrated data storage for up to 4000 measuring results
- Integrated Modbus and CAN Bus interfaces can be used to connect the device to existing machine control, and data acquisition systems
- Option to specify different alarm thresholds
- Software on CD (included)
- ATEX compliant (Zone 2 / Category 3G)

Technical Data

Channels

- 4, 6, 14, 21, 25, 38, 50, 70 µm(c)

Calibration

ISO Medium Test Dust (MTD) in accordance with ISO 11171

Analysis range

- ISO 4406 Codes 0-24
- NAS 1638 Classes 00-12
- AS 4059 / ISO 11218 Rev E, Table 1 Codes 00-12
- AS 4059 / ISO 11218 Rev E, Table 2 Codes A-F: 000-12
- AS 4059 Rev F, Table 1 Codes 000-12
- AS 4059 Rev F, Table 2 Codes cps 000-12
- GBT 14039 Codes 0-24
- GJB 420B Codes, A-F: 000-12

Accuracy:

± 1/2 class for:
 ISO 4406 and GBT 14039 Codes 8-24 and for Codes 4, 6, 14 µm(c).

NAS 1638 and AS 4059 / ISO 11218 Rev E and F, Table 1 Size Codes Class 2-12,
 AS4059 / ISO 11218 Rev E and F Table 2 and GJB 420B Size classes, A: 000-12, B: 00-12, C: 00-12, D: 2-12, E: 4-12, F: 7-12

± 1 class for larger sizes and lower size codes as mentioned above

Flow

- 20 ... 400 ml/min / .00511 US GPM

Viscosity Range

- ≤ 1000 mm²/s

Temperature Range

- Media: -25 °C ... + 80 °C / -13 °F ... +176 °F
- Ambient: -5 °C ... +80 °C / +23 °F ... +176 °F

Weight

- 5,5 kg / 12.16 lbs

Power Supply

- 9 ... 36 V DC

Max. Pressure

- 420 bar / 6091 PSI
- Note: In systems with extreme pressure peaks, please contact STAUFF

Test Duration

- Settable between 10 ... 3600 sec., set ex-works to 120 sec.
- As standard with start delay and freely programmable test intervals

Moisture Sensor / Temperature Sensor

- % RH (relative humidity) ±3 %
- ±3 °C / ±32 °F

Volumetric Flow Measurement

- As display only

Hose Connections

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

Data Storage

- Max. 4000 measuring results

Interfaces

- RS485, RS232, Modbus, CAN Bus

Current Consumption

- 12 V: 70 mA
- 24 V: 40 mA
- 36 V: 30 mA

Power

- <2,2 W

Housing Surface Treatment

- Polyester vinyl paint (light grey)
- Cast
- Stainless Steel
- Material spec.: ANC ABF/C

ATEX Directive 94/9/EG

Harmonises legal provisions of memberstates for devices and protection systems for designated use in potentially explosive areas.

ATEX Classification

- CE II 3G Ex nR IIB T6 X

ATEX Rating

- Zone 2 / Cat. 3G



Oil Sampling Kit ■ Type KIT-SFS



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 KIT-SFS 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 adaptor 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

Components

KIT-SFS-01

- 1x Fluid Sample Pump FSP-38
- 1x Hose adaptor SHA-20-5.5mm
- 1 m / 3.28 ft Push on 1/4" hose
- 1x SMK-20-1/4NPT-V-D-W3
- 1x SMK-20-7/16UNF-V-E-W3
- Sample bottles

KIT-SFS-02

- 1x Fluid Sample Pump FSP-38
- 1x Hose adaptor SHA-20-5.5mm
- 1 m / 3.28 ft Push on 1/4" hose
- 1x SMK-20-G1/4-B-C-W3
- 1x SMK-20-M10x1-B-A-W3
- Sample bottles

Order Codes

KIT-SFS		-	01		-	110		-	MC-38AL		
①			②			③			④		
① Series and Type		Oil Sampling Kit		KIT-SFS							
② Version		NPT-Version		01							
		BSP-Version		02							
						③ Bottle Size		110 ml		110	
						④ Equipment		Protec. Container / 38 mm Aluminum pump		MC-38AL	

