

# **Proper Customer Service**



# **OPCom Portable Oil Lab**

We produce fluid power **solutions** 

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Performing service work without knowing the condition of the equipment can result in serious loss, not only in time and cost but also for warranty intervention.

Knowing the oil condition is the first and most important fact we must elaborate, even before touching any tools or discuss the cost involved in a service job.

ARGO-HYTOS offers the perfect instrument for this job – easy to use, portable, compact and cost-efficient.



# **OPCom Portable Oil Lab**

Particle Counting - The Easy Way

The **OPCom Portable Oil Lab** is a mobile oil laboratory for service, with which the oil cleanliness and the oil condition in hydraulic and lubrication systems can be measured quickly and easily.

Sampling can be carried out directly via a pressure line or via the integrated pump. Measurement can be accomplished either manually or automatically in an adjustable time interval.

The portable oil service device **OPCom Portable Oil Lab** offers an intelligent and cost-efficient possibility for monitoring of your system and oil parameters.

# What does our instrument offer?



- Enables Particle Measuring (according to ISO 4406:1999, SAE AS4059, NAS 1638 and GOST 17216)
- Displays Relative Humidity and Oil Temperature
- Information on the Oil Condition (taken from the conductivity and polarity)
- Operated via the Integrated Keypad
- Saving of 1,250 Data Records can be transferred to a processor via USB adapter or SD card
- Integrated Printer to print any data on the spot
- Powerful Battery allows operation of several hours

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## Usage for Customer Service

A common situation in customer service is overhauling a hydraulic system for periodic maintenance or after a machine break down.

To offer you the best starting position an oil analysis is highly recommended. It will give you the information you need, not only to service the hydraulics but also to support your customer for further improvements of the system.

Be it increased humidity, particles or oil ageing, the oil analysis offers you the background you need to improve and release the equipment for further operation.

- $\square$  The **temperature** of the hydraulic oil is a first indication of the system condition.
- ☑ The **contamination** of the hydraulic oil is specified in classes and need to be compared with the used equipment.
- $\square$  The **relative humidity** tells you where the water content starts to become dangerous.
- ☑ The **relative permittivity** (or dielectric constant) can be used to determine the oil type.
- $\square$  The **conductivity** can be used to analyse the additive amount in the oil.

And all these information are offered to you with a simple oil analysis performed with our OPCom Portable Oil Lab

# Test Procedure – Easily Done with Us

- 1. Take an oil measurement with our OPCom Portable Oil Lab
- 2. Justify the oil temperature with the recommendation of equipment manufacturer
- 3. Make sure the oil cleanliness is sufficient for the used components
- 4. Check if relative humidity is inside the maximum permissible value
- 5. Compare the relative permittivity and conductivity with the oil specification
- ⇒ Step 5 may require a comparison of the test results with an oil sample of the fresh oil used in the hydraulic system. This will also allow you to determine the remaining lifetime.
- ⇒ The oil shall be replaced if you detect an increase of the relative permittivity by 5% and the conductivity by 300% at the same time.
- We recommend testing the oil on a regular basis to ensure a safe and traceable monitoring of the condition – for example by agreeing to a service contract with your customers.

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# How to Interpret the Measurement

#### **Oil Temperature**

⇒ justify the result with the recommendation from the equipment manufacturer

In general, the oil temperature shall not exceed the maximum allowed of the machine. Increasing the temperature above 60°C by 10°C results in approximately a cut down of oil lifetime by factor 2.

Depending on the place where the sample is taken, the value might not represent the oil temperature in the machine accurately.

### **Particle Contamination**

#### ⇒ compare with the specific information from the system supplier

The oil cleanliness required in a system is determined by the component which is most sensitive to dirt. If the component manufacturer does not provide any specific information, it is advisable to determine the oil cleanliness based on the right-hand table.

The listed reference values for normal components refer to a basic pressure range of 160 to 210 bar. If the operating pressure is lower or higher, it is necessary to adapt the oil cleanliness to achieve the same wear lifetime for the components as follow:

Operating pressure	Change in oil cleanliness
0100 bar	3 classes worse
100160 bar	1 class worse
160210 bar	none
210250 bar	1 classe better
250315 bar	2 classes better
315420 bar	3 classes better
420500 bar	4 classes better
500630 bar	5 classes better

adaption of oil cleanliness

Pumps	
Axial piston pumps	21/18/15
Radial piston pumps	21/18/15
Gear pumps	21/18/15
Vane pumps	20/17/14
Motors	
Axial piston motors	21/18/15
Radial piston motors	21/18/15
Gear motors	21/18/15
Vane motors	20/17/14
Valves	
Directional control valves	21/18/15
(solenoid valves)	
(solenoid valves) Pressure valves	21/18/15
(solenoid valves) Pressure valves Flow control valves	21/18/15 21/18/15
(solenoid valves) Pressure valves Flow control valves Check valves	21 / 18 / 15 21 / 18 / 15 21 / 18 / 15
(solenoid valves) Pressure valves Flow control valves Check valves Proportional valves	21 / 18 / 15 21 / 18 / 15 21 / 18 / 15 20 / 17 / 14
(solenoid valves) Pressure valves Flow control valves Check valves Proportional valves Servo valves	21 / 18 / 15 21 / 18 / 15 21 / 18 / 15 20 / 17 / 14 17 / 14 / 11

required oil cleanliness according to ISO 4406

Did you know? Contamination smaller than 40 micron (human hair) are not visible to us and require special equipment to be detected.

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### **Relative Humidity**

#### ⇒ compare with the limitation and specific information from the oil supplier

Reaching 100% relative humidity (saturation point) means that the solved humidity is condensing to free water or to emulsion (oil becomes "milky").

The saturation point is dependent on temperature and on the oil type <sup>1</sup>). Therefore, the relative humidity is changing by the influence of the temperature of the oil, even though the absolute amount of water may stay constant. In general, oil can solve a higher amount of water when the temperature is rising.

- approx. saturation point of different oil: 1) 1000 ppm
  - HLP-46:
  - HLPD-46 / SAE 20W-20: 1200-1400 ppm
  - SAE 10W- 40 / SAE 15W- 40: 1500-2000 ppm

Temp rel. /ºC Hum./%	020	>2040	>4060	>6080	>80100
020					
>2040					
>4060					
>6080					
>80100					

relative humidity where the water content starts to become dangerous



- If the cooled oil seems to be clear, the water content normally is within the permitted range.
- If the cooled oil shows a clouding, the water content certainly is inadmissibly high.

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### **Relative Permittivity**

#### ⇒ compare with the specific information from the oil supplier

The relative permittivity measurement can be used to roughly determine the oil type. A good and clear distinction is possible by measuring of relative permittivity.

The signal ratio of mineral and ester oil is about 2 to 3, due to different polarity.

Following overview show some relative permittivity values for different oils and their classification.



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### Conductivity

⇒ compare with the specific information from the oil supplier

Following two figures show several different oil types with their additives. The vector is not necessarily a precise chemical property of the oil; however, it gives a rough impression of the number of additives in the oil.

Zinc in mg/kg	Sulfur in mg/kg	Calcium in mg/kg	Phosphor in mg/kg	Vector <mark>(Zn, S</mark> , Ca, P)	Conductivity in pS/m (at 40°C)	Oil Type/Name	
1534	4273	3789	1868	6201	40000	Autol N15 Special Fluid SAE5W	
3	4035	0	369	4052	50	Mobilgear XMP320	
1383	4509	3475	1077	5956	200000	Castrol AgriTrans Plus CVT80W	
467	2393	52	363	2466	470	Hyspin AWH-M 46	
465	2311	63	361	2386	510	Hydraulic Oil Straddle Carrier	
1322	7475	2868	1066	8184	<mark>1</mark> 80000	Brake Cooling Oil Straddle Carrier, fresh	
1315	7627	2985	1055	8362	52000	Brake Cooling Oil Straddle Carrier, used	
1270	12000	2980	1100	12478	350000	TDTO 10W	
1297	5056	3096	1077	6164	40000	AgriTrans Plus CVT80W 1200h	
1397	5407	3333	1164	6607	32000	AgriTrans Plus CVT80W 2300h	
1394	5721	3309	1134	6849	24000	AgriTrans Plus CVT80W 3400h	
1344	5384	2998	1107	6404	15400	AgriTrans Plus CVT80W 4600h	
696		1189	625	1513	17000	Hydraulic Oil Excavator, fresh	
723	0	1217	670	1566	13000	Hydraulic Oil Excavator, used	
48	3705	55	500	3739	1263	Synth GEM 4-100N, used	
8	4773	78	621	4814	1320	Synth GEM 4-100N, fresh	



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The Future of Oil Testing is Changing