

## Particle counter and autosampler integrated for high sample throughput

Particulate contamination can cause serious problems in hydraulic fluid power systems and be used as an indicator of wear and maintenance requirements in lubricating oils. Reporting of contamination has been simplified in ISO 4406 (1) by providing concentration (particles/mL) in range codes at three sizes; 4, 6, and 14  $\mu$ m. The measurement is performed using an optical particle counter such as the PSS AccuSizer, calibrated per ISO 11171 (2).

These measurements can be performed manually when analyzing a handful of samples daily, but many labs require high sample throughput in excess of 200/day. The new PSS AccuSizer A2000 CMS is designed to meet the requirements of ISO 4406 and ISO 11171 while processing samples in under 2 minutes to meet requirements.

The system consists of the following components:

- Autosampler with one or two sample trays (Figure 1)
- LE400-05 light extinction sensor (Figure 2)
- Pulse height analyzer/counter
- Software

The sensor is calibrated using Conostan oil analysis standards. The counter generates results in 64 channels (upgrade to 512 channels is available). The autosampler can hold up to two trays with as many as 90 samples/tray, depending on volume and number of replicates. The AccuSizer software controls the entire measurement procedure and generates reports in ISO 4406 format. Custom reports are easily created for specific application/customer requirements.

Detailed protocols allow users the control to create methods according to their specific needs. Data is accurate and repeatable, and cleanliness is easily achieved through a twostage rinsing station between samples. Rigorous testing has proved the system is reliable and low-maintenance even in high throughput laboratory conditions.



Figure 1



Figure 2



## AccuSizer A2000 CMS Technical Specifications

LE 400-05 Sensor	1-400 µm using ISO 11171
	0.5-400 µm using PSL standards
Counter	64 channel default
	512 channel option
	1024 channels for calibration
Autosampler	Automated batch sample analysis
	3x8, 4x10, 5x12, 6x9, 6x15 racks
	Dual racks available
Software	Complete control of measurement (Figure 3)
	Complete control of autosampler (Figure 4)
	Custom tray definitions
	Automatic calibration function
	ISO 4406 reporting (Figure 5)

Custom report generator

## References

1. ISO 4406:1999, Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles 2. ISO 11171:2010, Hydraulic fluid power — Calibration of automatic particle counters for liquids

Sample	Run Date/Time	>4 um (#/mL)	> 6 um (#/mL)	> 14 um (#/mL)
Tube 20 Rep. 1	12/13/2016 17:03	671	294	39
Tube 20 Rep. 2	12/13/2016 17:04	764	325	39
Tube 20 Rep. 3	12/13/2016 17:05	750	308	38
	Mcan (#/mL)	728	309	39
	Standard Deviation (#/mL)	40.942	12.675	0.471

Classification 17/15/12

Figure 5

📦 Setup Protocol	×					
Instrument Channels/P	hysical Properties Report					
General						
Measurement volume	5 mL Replicates 1					
Syringe Flow Rate	30 mL/min Tare volume 2 mL					
Size threshold	0.56 µm Air gap volume 0 mL					
Sample run time	10 sec Delay between replicates 0 sec					
Perform flush before	each replicate I Pull tare volume before each replicate					
	Low volume measurement Pull/Push mixing					
Preserve sample	None v					
Cydes 0	Volume 0 mL Flow Rate 30 mL/min					
Sensor Mod						
	Extinction O Summation					
Background mode	Concentration -					
Background measuremer	nt 500 counts/mL					
-						
Stirrer						
Speed 40 %	Delay sampling until stirrer has run for: 0 seconds					
Protocol Filter						
Protocol Type	*					
Protocol name	<b></b>					
	Save Reload Delete Close					
	Save Keivau Delete Close					

Figures 3

AutoSampler Tra	y Setup					
Tray label		Tube Properties				
SIS Instrument Tes	t	Status	Not Selected	Sample nar	ne Test Tub	e 1
Tray description		Tube number	1	Descriptio	n	
	^	Tube order	1			-
	-	Sampling depth	110 mm	Protoc	ol SIS Inst	ument Test ] +
Sample Tray	Г	Report Properties				
LR21 (3 x 7)	•		•	Automatically e	xport report as	None 👻
Setup sample tube	es: (Right d	ick for options):				
	4	7	10	13	16	19
2	5	8	11	14	17	20
3	6	9	12	15	18	21
Tray Manager	R	un Tray	Import	Load	Save	Close

Figures 4

## Particle Sizing Systems

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Building solutions one particle at a time.