# AccuSizer<sup>®</sup> A7000 DI Direct Inject Particle Count/Size Analyzer

Particle size analyzer and integrated auto-sampler for high sample throughput of slurries

The A7000 DI Direct Inject system was designed for high throughput particle size analysis of alumina and other slurries.

The system (Figure 1) consists of the following components:

- LE400-05 light extinction/scattering sensor
- Pulse height analyzer/counter
- Autosampler
- AD dilution fluidics

Samples are loaded into the rack and all analysis steps are fully automated using flexible protocols. There are three modes of operation; single stage or exponential dilution with the autosampler or manual one at a time analysis.

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 the use of pipette tips and a two-stage rinsing station for the mixer between samples. Rigorous testing has proved the system is reliable and low-maintenance even in high throughput laboratory conditions.

This system is designed to achieve the most accurate and repeatable size results for alumina slurries or similar samples. The mechanical stirrer only mixes the sample immediately prior to and during the sampling. Cross contamination is eliminated by using individual pipette tips for each analysis and two-stage washing of the mechanical mixer.



Figure 1. A7000 DI Direct Inject system



Figure 2. Mechanical mixer, pipette tips in background

Automated analysis sequence:

- Sample tube picks up pipette tip
- Mechanical stirrer agitates sample bottle
- + 150  $\mu L$  1 mL sample removed from sample bottle
- Sample directly injected into AD fluidics
- Single stage or exponential dilution
- Sample analyzed with LE400-05 sensor
- Cleanup

The entire process takes less than 3 minutes/sample.



## **SPECIFICATIONS**

Configurations	Includes sensor, counter, direct inject fluidics module with autosampler and pump module. Syringe volumes of 0.5 – 25 mL, 1024 size channels.
Sensor	LE400-05; 0.5 – 400 μm light extinction and scattering, summation calibration, particle sensitivity to 10 ppt, concentration limit 9000 particles/mL, size accuracy 2%, count accuracy 10%, recommended flow rate = 30 mL/min, but can be calibrated at other flow rates depending on configuration.
Sample	150 μL – 25 mL (or larger with multiple syringe pulls). Direct inject has support for 2 pipette volumes {1000μL, 100μL}. The pipette volume dictates the maximum allowable injection volume defined within the protocol of the AccuSizer® software.
Options	Autosampler (2×3 rack)
	Magnetic stirrer for autosampler
	IQ/OQ documentation
	21 CFR Part 11 software
	Custom report generation
Software	Complete control of software (Figure 3)
	User defined autosampler definitions (Figure 4)
	Automatic calibration function
Power	100 – 120 VAC, 60 Hz or 220 – 240 VAC, 50 Hz

### Repeatability study using alumina

Sample	Mean	Mode	Median	Total counts	Concentration
А	7.085 µm	0.780 µm	0.772 µm	36032	7.2064/mL
В	7.802 µm	0.780 µm	0.772 µm	36241	7.2482/mL
С	7.679 µm	0.780 µm	0.772 µm	33660	6.7320/mL
Mean	7.522 µm	0.780 µm	0.772 µm	35311	7.06/mL
Std. dev.	0.313 µm	0.000 µm	0.000 µm	1171	0.2341/mL
RSD	0.416 µm	0.000 µm	0.000 µm	3.316	4.161/mL

## Overlay of three sample runs



6	Setup Protocol					×
	Instrument Chan	nels/Physical Pro	perties	Report		
	General					
	Sampled volume	30	mL	Measurement mode	Autonomolor	
	Sampleu volume			Medsurement mode	<u> </u>	<u> </u>
	Flow rate	60	mL/min	Replicates	1	
	Injection volume	1000	μL	Replicate delay		0 sec
	Equilibration volume	0	mL	V Auto Rinse Char	nber Drain/Fill	
	Pre-intection drain	5	mL	Perform flush be	fore each replicate	
	volume			📝 Enable Air Gap		
	Size threshold	0.5	μm	Exponential dilut	tion	
	Sample run time	30	sec	Target concentratio	n 3000	/mL
	Sensor Mode	Property			Value	
	Extinction	Sample Run Protoc	ol			
		🛓 Auto rinse chambe	r drain/fill		false	
		Auto run reports			No Report	
	Background mode	Background measu	rement		2000 counts/n	nL
		🛓 Background measu	rement mod	e	Concentration	(counts/mL)
	Background measur	Baseline offset			0	
		🛓 Delay between run	IS		0 sec	
	Stirrers	🛓 Enable air gap			True	
		🛓 Equilibration volum			0 mL	
	Vessel Stirrer	🛓 Exponential dilution	1		true	
	C Ramp stirrer sp	🛓 Flow rate			60 mL/min	
	C Ramp surrer spr	🛓 Flush before each sample			true	
	Max speed	🛓 Injection volume			100 µL	
	· · ·	🛓 Measurement mod			Manual injection	on
	Constant stirrer			2	5 sec	
	Speed	Mechanical stirrer s Number of channel			40 %	
		Number of channel Number of contain			1024	
	Delay sampling unti	PFATS fat concent			30	
		PFAT5 oil density	GUUT		0.9213	
		Pre-injection drain	volume		0.9215 0 mL	
L F	Protocol Filter	A Protocol name	- Concerne			in and Valve Flush Test Set to
		A Ramp stirrer speed	from max t	o min	false	
	Measurement mode	Replicates			1	
		Ann stirrer time be	fore samplin	q	0 sec	
	Protocol name	Sample run time			128.6 sec	
1		🛓 Sample volume			128.6 mL	
		🛓 Sensor mode			Summation	
		🛓 Size threshold			0.5 µm	
_		🛓 Stirrer speed			40 %	
		🛓 Target concentrati			3000 /mL	
		🛓 Volume per contain	er		0 mL	

Tray label Tray description	Trays       Sample:     Cups (2x3)       Pipette:     3x8	Setup sample wells: (Right clock for options):
Well order	ription	
AutoSampler Arm Settings Sample depth mm Sti	rer depth mm	Setup pipette availability (Click to change its availability status. Right click for options):
Report Properties   Automatic	ally export report as: None 👻	0000000

Figure 4. Autosampler tray setup window

Figure 3. Protocol window and protocol information window

#### FOR MORE INFORMATION

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