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# PC-2200 LASER PARTICLE COUNTER



#### **Calibration:**

Spectrex provides three sealed calibration standards with each unit. Each standard contains a precise number of NIST traceable polystyrene spheres of known size in suspension and are sealed with inert Argon gas These standards have a proven stability of more than 2 years and provide efficient calibration within 10 minutes.

# **Applications:**

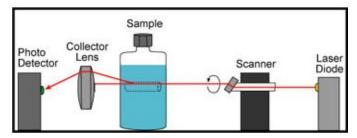
- Water Treatment Plants
- Hydraulic Fluids and Oil QC
- Silts and Sediment Sizing
- University Laboratories
- Pharmaceutical Manufacturers
- Oil Refineries and On-site drilling
- Bottling & Beverage Operations
- Oceanographic Studies
- Liquid Chromatography Solvent QC
- Cooling Power and Waste Water Filter Efficiency
- Particle Agglomeration Studies
- Particle Settling Characteristics
- Corrosive Chemical and Solvent Sizing
- Vial and Ampule Inspection
- De-ionized Water and Acid Testing
- Cell Counting

#### Features:

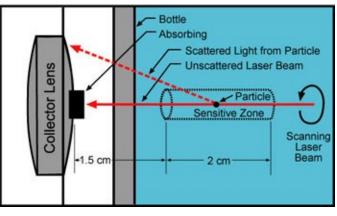
- Easy Do-It-Yourself Calibration
- SuperCount® Software
- Compact & Portable (6 lbs)
- Quickly Counts & Sizes
- No Cross-contamination of Flow Lines
- Eliminates Sample Flushing
- Built in magnetic stirrer

## **Operational Theory:**

Utilizing the principle of "near angle light scatter," a revolving laser beam passes through the walls of a glass container or a flow-thru cell. When it is directed through a central "sensitive zone" the PC-2200 not only counts the particles in suspension, but tabulates their size as well. The analog signals generated by the light pulses are routed to a computer and digitized.



Optical Schematic of the Laser Particle Counter



Detail of Laser Optics

Image: Construction of the second s	3940 ve. 1 1990 Filter 0% A-T 0 s S-T 160 s S-T 160 s Dilutn 1.00.1 1.00.1 0.00V Gain 5.55x Counts 827 Nor Smps
Interim   Spectra   Claure   0   20   55   87   16   145   174   203   233   281   2	290 Filter 0% A-T 0 5 S-T 160 5 Dilutin 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
# um   %   Count   0   20   58   87   116   145   174   203   232   261   2	29) Filter 0% A-T 0 5 S-T 160 5 Dilutin 1.00.1 0.00V Gain 5.55x Counts 827 Nar
Column   Column   Column   Column   Mass/bin	0% A-T 0 s S-T 160 s Dilut n 1.00.1 Offset 0.00V Gain 5.55x Counts 827 Nar
Image: Section of the sectio	A-T 0 s S-T 160 s Dilut n 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
Image: Section of the sectio	0 s S-T 160 s Dilut n 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
Str   Counts   Surface     23   23   24   10     11   13   13   13   13     13   13   13   13   14   14     14   <	0 s S-T 160 s Dilut n 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
10 10 10 10 12 <t< th=""><th>S-T 160 s Dilutin 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar</th></t<>	S-T 160 s Dilutin 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
10 10 10 10 12 <t< th=""><th>160 s Diluťia 1.00.1 Offsei 0.00V Gain 5.55x Counts 827 Nar</th></t<>	160 s Diluťia 1.00.1 Offsei 0.00V Gain 5.55x Counts 827 Nar
11111405 12	Dilutin 1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
13 13 0.30 3   14 14 0.30 3   15 0.36 3   16 15 0.36 3   16 15 0.36 3   17 16 16 14   18 16 0.36 1   19 27 0.07 1 1   19 27 0.00 0 0   22 37 0.00 0 0   22 27 0.00 0 0   22 27 0.00 0 0   22 27 0.00 0 0   22 27 0.00 0 0   22 2000 0 0 00% 0.00% 0.00%   1 1um 217.32 26.28% 1.30% 0.25% 0.0007   3 3um 147.02 17.78% 7.93% 3.49% 0.0017   3 3um 147.02 17.78% 7.93% 3.49% 0.0023	1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
16 0.15 1   17 17 0.07 1   19 27 0.07 1   19 27 0.07 1   22 23 0.00 0   22 23 0.00 0   22 23 0.00 0   22 24 52 0.00 0   22 25 0.00 0 0   23 22 0.00 0 0   23 22 0.00 0 0   23 22 0.00 0 0   23 22 0.00 0 0   23 22 0.00 0 0 0.00% 0.00% 0.000%   1 1um 217.32 26.28% 1.30% 0.25% 0.0001   2 2um 195.6C 23.55% 4.99% 1.52% 0.0001   3 3um 147.02 17.78% 7.23% 3.69% 0.0023   6 6um 24.01 2.92%	1.00.1 Offsel 0.00V Gain 5.55x Counts 827 Nar
18=22 0.18 2   19=27 0.07 1   19=27 0.07 0   22=23 0.00 0   23=45 0.00 0   24=52 0.00 0   22=57 0.00 0   23=45 0.00 0   23=77 0.00 0   23=77 0.00 0   23=77 0.00 0   23=77 0.00 0   23=77 0.00 0   23=77 0.00 0   31=87 0.00 0   31=87 0.00 0   2 0.00 0   1 1 2.526.8% 1.00%   1 1.1 2.526.8% 4.00% 0.000%   1 1.1 1.1 1.1 1.1 1.1 1.1   1 2 2.0m 95.6C 2.355% 4.60% 0.0023   3 3.0m 147.02 17.76% 7.25% 5.06% 0.00027   5 <t< th=""><th>0.00V Gain 5.55x Counts 827 Nar</th></t<>	0.00V Gain 5.55x Counts 827 Nar
19-72 0.07 1   20-32 0.00 0   23-42 0.00 0   23-45 0.00 0   24-52 0.00 0   24-52 0.00 0   24-52 0.00 0   24-52 0.00 0   25-57 0.00 0   24-57 0.00 0   23-57 0.00 0   24-57 0.00 0   25-57 0.00 0   24-57 0.00 0   25-57 0.00 0   26-77 0.00 0   27-75 0.00 0   31-57 0.00 0   31-57 0.00 0   1 1um 217.32 26.28% 1.30% 0.25% 0.0001   1 1um 217.32 26.26% 1.30% 0.25% 0.00023   3 3um 147.02 17.78% 7.35% 3.49% 0.0023   5 5um 2.47% 7.28%	0.00V Gain 5.55x Counts 827 Nar
22   52   0.00   0     22   62   0.00   0     23   67   0.00   0     23   67   0.00   0     23   77   0.00   0     23   77   0.00   0     23   72   0.00   0     31   27   0.00   0     31   27   0.00   0     31   27   0.00   0     1   100   0.00   0.00%   0.00%     1   1um   217.32   26.26%   1.30%   0.25%     1   1um   217.32   26.26%   1.30%   0.25%   0.0001     2   2um   195.6C   23.65%   4.99%   1.0023   5.5%   0.0001     3   3um   147.05   1.77%   7.2%   4.60%   0.0027     3   9   1.117.1%   2.52%   6.11%   0.0027   0.0027     5	Gain 5.55x Counts 827 Nar
22   52   0.00   0     22   62   0.00   0     23   67   0.00   0     23   67   0.00   0     23   77   0.00   0     23   77   0.00   0     23   72   0.00   0     31   27   0.00   0     31   27   0.00   0     31   27   0.00   0     1   100   0.00   0.00%   0.00%     1   1um   217.32   26.26%   1.30%   0.25%     1   1um   217.32   26.26%   1.30%   0.25%   0.0001     2   2um   195.6C   23.65%   4.99%   1.0023   5.5%   0.0001     3   3um   147.05   1.77%   7.2%   4.60%   0.0027     3   9   1.117.1%   2.52%   6.11%   0.0027   0.0027     5	5.55x Counts 827 Nar
22   52   0.00   0     22   62   0.00   0     23   67   0.00   0     23   67   0.00   0     23   77   0.00   0     23   77   0.00   0     23   72   0.00   0     31   27   0.00   0     31   27   0.00   0     31   27   0.00   0     1   100   0.00   0.00%   0.00%     1   1um   217.32   26.26%   1.30%   0.25%     1   1um   217.32   26.26%   1.30%   0.25%   0.0001     2   2um   195.6C   23.65%   4.99%   1.0023   5.5%   0.0001     3   3um   147.05   1.77%   7.2%   4.60%   0.0027     3   9   1.117.1%   2.52%   6.11%   0.0027   0.0027     5	Counts 827 Nar
20   62   0.00   0     22   77   0.00   0     31   62   0.00   0     31   62   0.00   0     31   62   0.00   0     31   62   0.00   0     31   62   0.00   0     32   22   0.00   0     31   62   0.00   0     31   62   0.00   0     31   62   0.00   0     1   1um   217.32   266.28%   1.30%   0.025%   0.0001     2   2um   195.6C   23.65%   4.69%   1.52%   0.0001     2   2um   195.6C   21.68%   9.25%   5.06%   0.0023     3   3um   147.6C   17.78%   7.35%   3.49%   0.0023     5   5um   2.52%   6.11%   5.06%   0.0023     6   6um   2.401 <t< th=""><th>827 NBF</th></t<>	827 NBF
28-72   0.00   0     31-82   0.00   0     31-82   0.00   0     31-82   0.00   0     31-82   0.00   0     32-7   0.00   0     31-82   0.00   0     32-7   0.00   0     31-82   0.00   0     1   1um   20.732   26.28%     1   1um   217.32   26.28%   1.30%   0.25%     1   1um   217.32   26.28%   1.30%   0.25%   0.0007     3   3um   147.02   17.78%   7.53%   3.49%   0.0017     3   3um   147.02   17.78%   7.55%   0.0023   5.5%   0.0024   0.0027     6   6um   24.01   2.90%   5.18%   0.0027   10.0030   9   9um   12.12   1.47%   5.88%   5.91%   0.0027     10   10um   17.15   2.07%   10.28%	827 NBF
30   22   0.00   0     31   62   0.00   0     22   0.00   0   0     32   22   0.00   0     12   22   0.00   0     12   20   0.00   0     13   100   0.00%   0.00%   0.00%     1   1um   217.32   26.26%   1.30%   0.25%   0.0001     2   2um   195.62   23.65%   4.09%   1.52%   0.0007   0.0023   0.00023   0.0001   1.168%   9.26%   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0023   0.0001   0.0025   0.0001   0.0023   0.0001	
Cool   Tota   Surface     NSF   counts   Counts   area   Volume   Mass/bin     Bin   Size   /cc   percent   percent <th></th>	
Tota   Surface   Surface   Mass/bin     Bin   Size   /cc   percent	
NSF   counts   Counts   area   Volume   Mass/sin     Bin   Size   /cc   percent   percent <t< th=""><th></th></t<>	
-   -	
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4   4um   96.6C   11.68%   9.26%   5.06%   0.0023     5   5um   47.56   5.75%   7.12%   4.60%   0.0021     6   6um   24.01   2.90%   5.18%   3.84%   0.0021     7   7um   20.81   2.52%   6.11%   5.08%   0.0023     8   8um   18.75   2.27%   7.19%   6.61%   0.0023     9   9um   12.12   1.47%   5.88%   5.91%   0.0027     10   10um   17.15   2.07%   10.28%   11.16%   0.0020     11   11um   11.55   1.40%   8.37%   9.77%   0.0044     12   12um   4.12   0.30%   3.24%   4.29%   0.0019     13   13um   3.22   0.30%   3.25%   5.13%   0.0019     14   14um   2.52   0.30%   3.25%   5.07%   0.0026     16   16um   2.56   0.35%   3	
5   5um   47.56   5.75%   7.12%   4.60%   0.0021     6   6um   24.01   2.90%   5.18%   3.84%   0.0017     7   7um   20.81   2.52%   6.11%   5.08%   0.0023     8   8um   18.72   2.27%   7.19%   6.81%   0.0023     9   9um   12.12   1.47%   5.88%   5.91%   0.0027     10   10um   17.15   1.47%   5.88%   5.91%   0.0027     11   1um   1.155   1.40%   8.35%   4.42%   0.0021     13   13um   3.22   0.39%   3.24%   4.29%   0.0019     14   1.4um   2.52   0.30%   3.55%   4.13%   0.0026     14   1.4um   2.52   0.30%   3.25%   5.0%   0.0032     15   16um   2.86   0.35%   3.85%   5.0%   0.0032     16   16um   1.26   0.16%   4.42	
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10   10um   17.15   2.07%,   10.28%,   11.16%,   0.0050     11   11um   11.55   1.40%,   8.37%,   9.77%,   0.0044     12   12um   4.12   0.50%,   3.55%,   4.42%,   0.0020     13   13um   3.2C   0.33%,   3.24%,   4.29%,   0.0019     14   14um   2.52   0.30%,   2.95%,   4.13%,   0.0019     15   16um   2.86   0.35%,   3.85%,   5.67%,   0.0032     16   16µm,   1.26   0.15%,   1.93%,   2.98%,   0.0032     17   17µm,   2.45   0.30%,   4.42%,   8.88%,   0.0032     18   22µm,   0.55   0.07%,   4.42%,   8.88%,   0.0025     20   32µm,   0.00   0.00%,   0.00%,   0.00%,   0.0000     21   37µm,   0.00   0.00%,   0.00%,   0.00%,   0.000%     22   42µm,   0.	
12   12um   4.12   0.50%   3.55%   4.42%   0.0020     13   13um   3.22   0.39%   3.24%   4.29%   0.0019     14   14um   2.52   0.30%   2.95%   4.13%   0.0019     15   15um   2.88   0.35%   3.85%   5.67%   0.0026     16   16um   1.26   0.15%   1.93%   2.98%   0.0032     17   17um   2.45   0.30%   4.32%   6.99%   0.0032     19   22um   1.52   0.18%   4.42%   8.88%   0.0039     19   27um   0.55   0.07%   0.40%   0.00%	
13   13um   3.2C   0.39%   3.24%   4.29%   0.0019     14   1.4um   2.52   0.30%   2.95%   4.13%   0.0019     15   15um   2.86   0.35%   3.85%   5.6%   0.0026     16   16um   1.26   0.35%   1.93%   2.98%   0.0013     17   17um   2.46   0.35%   4.42%   6.89%   0.0032     18   22um   1.52   0.18%   4.42%   8.68%   0.0026     20   32um   0.00   0.00%   0.00%   0.00%   0.0026     21   37um   0.00   0.00%   0.00%   0.00%   0.000     22   42um   0.00   0.00%   0.00%   0.00%   0.00%   0.00%     23   47um   0.00   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00% <th></th>	
15   15um   2.86   0.35%   3.85%   5.67%   0.0026     16   16um   1.26   0.15%   1.93%   2.98%   0.0013     17   17um   2.46   0.30%   4.32%   6.98%   0.0032     18   22um   1.52   0.18%   4.42%   8.88%   0.0025     20   32um   0.55   0.07%   2.42%   5.54%   0.0025     20   32um   0.00   0.00%   0.00%   0.00%   0.0000     21   37um   0.00   0.00%   0.00%   0.00%   0.0000     22   42um   0.00   0.00%   0.00%   0.00%   0.000%   0.000%     23   47um   0.00   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%     24   52um   0.00   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%	
16   16µm   1.2€   0.15%   1.93%   2.98%   0.0013     17   17µm   2.4≦   0.30%   4.32%   6.99%   0.0032     18   22µm   1.55   0.18%   4.42%   8.89%   0.0032     19   27µm   0.55   0.07%   2.42%   5.54%   0.0025     20   32µm   0.0C   0.00%   0.00%   0.00%   0.00%   0.00%     21   37µm   0.0C   0.00% <td< th=""><th></th></td<>	
18   22um   1.52   0.18%   4.42%   8.68%   0.0039     19   27um   0.55   0.07%   2.42%   5.54%   0.0025     20   32um   0.0C   0.00%   0.00%   0.00%   0.009%   0.0025     21   37um   0.0C   0.00%   0.00%   0.00%   0.00%   0.0096   0.0006     22   42um   0.0C   0.00%	
19   27um   0.55   0.07%   2.42%   5.54%   0.0025     20   32um   0.0C   0.00%   0.00%   0.00%   0.00%   0.00%     21   37um   0.0C   0.00%   0.00%   0.00%   0.00%   0.00%   0.000%     22   42um   0.0C   0.00%   0.00%   0.00%   0.0000   23   47um   0.0C   0.00%   0.00%   0.00%   0.0000   24   52um   0.0C   0.00%   0.00%   0.00%   0.000%	
21   37um   0.0C   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.00%   0.0000   23   47um   0.0C   0.00%   0.00%   0.00%   0.00%   0.000% <t< th=""><th></th></t<>	
22 42um 0.00 9.00% 0.00% 0.00% 0.000 23 47um 0.00 0.00% 0.00% 0.00% 0.00% 24 52um 0.00 0.00% 0.00% 0.00% 0.000%	
24 52um 0.00 0.00% 0.00% 0.00% 0.0000	
25 57um 0.00 0.00% 0.00% 0.00% 0.0000	
26 62um 0.0C 0.00% 0.00% 0.00% 0.0000	
27 67um 0.00 0.00% 0.00% 0.00% 0.0000 28 72um 0.00 0.00% 0.00% 0.00% 0.0000	
29 77um 0.00 0.00% 0.00% 0.00% 0.0000	
30 82um 0.00 0.00% 0.00% 0.00% 0.0000 31 87um 0.00 0.00% 0.00% 0.00% 0.00%	
32 92um 0.00 0.00% 0.00% 0.00% 0.0000	
> 0.00 0.00% 0.00% 0.00% 0.000	
TOTALS 827.00 100.00% 100.00% 100.00% 0.0452	
Total Surface NSF counts area Volume Mass/bin	
NSF counts Counts area Volume Mass/bin Class Size /cc percent percent ppm	
#1 < 1 0.00 0.00% 0.00% 0.00% 0.00% 0.0000 #2 1-5 656.55 79.39% 23.18% 10.33% 0.0047	
#3 5-15 161.76 19.58% 59.88% 59.81% 0.0270	
#4 15-30 8.69 1.05% 16.94% 29.86% 0.0135 #5 30-50 0.00 0.00% 0.00% 0.00% 0.00%	
#6 50-100 0.00 0.00% 0.00% 0.00% 0.000	
Total counts. 827.00/cc	
Total suspended	
solids: 0.05pp/n (mg/liter) Spec. gravity. 1.00	
Mean size: 3.39um	
Stendard dev: 2.95im	

Sample Print-out

### **Specifications:**

Size: 4.75" x 14" x 4.5" (height with Light Tight Cover is 5.5") Weight: 6 lbs **Typical Bottle Size:** 15-60 mm inside diameter Detectable Particle Size: From 0.5µm - 100µm.

## SuperCount<sup>®</sup> Software:

Developed by Spectrex, the custom interfacing electronics and proprietary software provide an easy means of analyzing and saving data generated by the PC-2200. SuperCount® provides instant sizing information and generates a printout with count information and a histogram of size distribution in addition to indicating:

- **Absolute Counts**
- Mean Size •
- Mass Distribution
- Percentage Distribution
- Standard Deviation
- **Total Suspended Solids**

The dilution factor can be automatically computed to give absolute counts for liquids as dense as sludge! SuperCount® also is loaded with a special bonus program for hydraulic fluids \* and Phi classifications. Auto-Mode Software for sequential reading at user selected intervals is available upon request. It is ideal for monitoring rates of change such as dissolution or agglomeration. \* NAS, SAE, and ISO classifications.

### **Options:**

- **Opacity Meter** provides an instantaneous measurement of the sample's opacity to correlate with computer calculations.
- Small Vial Attachment follows for use of 5ml vials or ampoules.
- Flow-Thru-Cell Spectrex stocks various sizes of flow-thru-cells and can manufacture cells to customer specifications. Cells are also available for testing at high pressure and temperatures.
- Datacom a 21 CFR 11 compliant product for pharmaceutical and other applications that require secure liquid particle data logging. (See our website for more information)

Bottle Material: Transparent, scratch-free glass Power: 115v 60Hz (230v optional)

