



CS-APC-3 Automated Particle Counter



? ASTM D7647-10 Ready

The system meets the requirements of ASTM D7647-10 in which oil samples are diluted prior to testing to eliminate interferences from "soft" particles.



? Fully Automated

Samples are batched by quickly pouring suitable volumes of homogenized sample into 2oz (32ml) sample cups that are placed in the 104 position sample tray.



? Auto-Dilution

Samples do not require accurate dispensing as the volume of the sample in each cup is measured automatically by the system to an accuracy of $\pm 2\%$ prior to dilution.

? Leading Edge Technology

The CINRG CS-APC-3 particle counting system is a fully automated system that meets the requirements of ASTM D7647-10 in which oil samples are diluted with solvent prior to testing in order to eliminate interferences from "soft" particles such as water, varnish and suspended liquid additives.

The system combines equipment from several leading equipment manufacturers with some innovative technology and sophisticated software that was developed by Wearcheck for use in their oil Analysis laboratory. The system has a high degree of flexibility and can be customized to a large extent to suit local laboratory processing requirements.



? Complete Automation

A batch of samples can be quickly prepared by pouring suitable volumes of homogenized sample into 2oz (32ml) sample cups that are then placed in a 104 position sample tray. Samples do not have to be accurately dispensed into the sample cups as the volume of the sample in each cup is measured by the system to an accuracy of $\pm 2\%$ prior to dilution. Laboratory technicians can easily control sample dilution by controlling the amount of sample that is poured into the cup as all samples are diluted to a final volume of 30ml.

If a higher degree of accuracy than $\pm 2\%$ is desired for the volume measurement samples may be pipetted or weighed into the cups and the sample volume or sample weight and sample density included in the systems batch file.

? Handles a Wide Range of Viscosities

As samples are automatically diluted prior to testing and dilution ratios can be varied between 1:0 (no dilution) and 1:9 (one part oil and 9 part solvent) it is possible to process samples having a wide range in viscosities. A 1:4 dilution for example, is more than adequate to process an oil sample with a viscosity of 1,000 cSt @ 40°C.

Samples can be processed without dilution if required but viscosity of these samples should be ≤ 46 cSt. Using the manual pipetting mode dilution ratios can be as high as 1:60 for grossly contaminated oils.





[?] Highly Customizable Automation

A batch file containing both sample information and processing parameters is required by the application software in order to process samples and this can be created within the software itself or imported from an external file in csv format. The sample information part of the batch file contains the sample ID, the sample position within the tray and if applicable, a sample volume or sample weight and density. If the sample volume and weight fields are blank the system will measure the volume of oil in the sample cup prior to sample dilution.

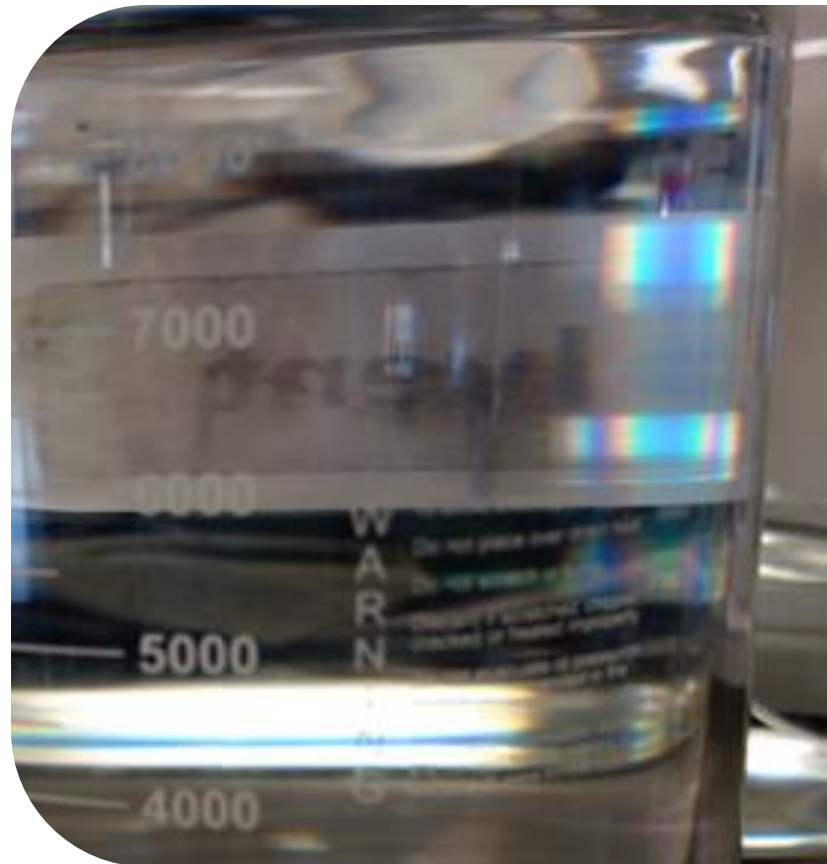
The process parameters control how the sample is processed prior to testing. The parameter settings determine how fast and for how long a sample is stirred and determine how a sample is degassed if this process is required. The report format can also be specified in the batch file (ISO 4406 or AS4059).

The parameters are typically in the range of 1 to 4 with the actual value of each setting being determined by system parameters that can be modified by the end user. E.g. Sample stirring times of 1,2 and 3 in the batch file could be defined as 15,20 and 30 seconds in the system parameters.

[?] Automatic Solvent Verification

Before any testing is conducted the cleanliness of the batch of dilution solvent has to be determined to obtain the count data that is subsequently used to correct the particle count results for the effects of dilution. When selected in the application software a solvent verification is carried out automatically. Solvent is initially loaded into the sample cup in position 1 for use as a system flush and then into the sample cup in position 2 for actual measurement. Several measurements are conducted on the solvent and the suitability of the solvent is established by comparing the counts from each measurement against a set of system parameters that again can be modified by the end user to meet specific needs.

When sufficient data has been collected average count values are calculated from valid measurements and stored as the solvent background counts for subsequent calculations.



? Urgent Samples

The sample batch file remains accessible even after processing has begun allowing you to add or remove samples, and even set sample priority to run a sample out of sequence all as the instrument is processing samples. It is not possible to edit samples that have already been processed or edit the sample that is in process at the time of editing.

? Process Control Samples

A customizable suffix identifies process control samples for which count data is compared against upper and lower user defined limits in the 4 μ m, 6 μ m and 14 μ m range to confirm acceptable system performance. A system parameter controls how the system proceeds following an unsatisfactory result on a process control standard.

? Reporting

The output format is defined in the sample batch file and the data exported can be easily customized using system parameters. With the system parameters it is possible to include such information as solvent background counts, sample volume, sample dilution ratio, and all raw count data in the output file.

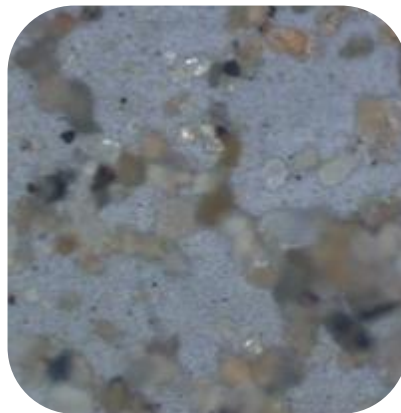
“Count that sample, no way it’s too dark!”

Way.



“You can really eliminate particle debris patches?!”

Absolutely.



“There’s no way you can count that?!”

Yes we can.



? Opaque Samples

Many dark fluid samples actually have low particle counts. The CS-APC-3 can perform particle counts on dark samples that standard particle counting systems cannot.

? Heavily Contaminated Fluids

Even samples with very high levels of contamination (ISO code > 27/25/23) can be processed using the manual dilution mode to achieve accurate high dilution samples.

? Samples with Water

The CS-APC-3 is capable of processing samples normally that contain more than 10% water contamination without effecting the particle count results.

Read the white paper at <http://www.cinrg.com/docs/wp-contaminated-samples.pdf>.

The CS-APC-3 was designed for commercial oil laboratories to initially be capable of processing samples that normally could not be processed using conventional particle counters due to high water content, high contaminant levels or because the sample was opaque. Subsequent redesign of the now patented dilution system saved more than ½ a day of technician’s labor coupled with high volume throughput, and low solvent usage give this instrument the low cost of ownership and quick payback that we were looking for.

Bill Quesnel - President

Specifications

System Performance

Parameter	Specification
Sample Through-put	3.5 min/sample (6 hrs for complete 102 sample tray)* Throughput 130-140 samples per 8-hour shift*
Solvent Usage	35 ml/sample**
Sample Batch Size	102 samples (tray has 104 positions, pos 1 = cleaning beaker, pos 2 = verification solvent)

Particle Sensor

Parameter	Specification
Model	KLOTZ LDS 45/50 Laser Sensor
Measuring Range	4µm to 70µm (3µm to 200µm) oil calibration range
4µm co-incidence threshold	25,000 particles/ml (undiluted sample) 50,000 particles/ml (1:1 dilution)
Cell Dimensions	450µm x 500µm
Flow Rate	10 to 50 ml/mine (CS-APC-3 instrument is calibrated at 30 ml/min)

Particle Counter

Parameter	Specification
Model	KLOTZ USB Counter
Number of Channels	4,096

Sample Level Sensor

Parameter	Specification
Model	Baumer UNKC 09
Accuracy	±0.1 mm from 3mm to 150mm

Physical Specifications

Parameter	Specification
Dimensions	35" (W) x 30" (H) x 38" (D) (89cm x 76cm x 97cm)
Weight	150 lbs (68 kg)
Voltage Requirement	100-120-230/240VAC selectable, 50/60 Hz.
Input Current	6.0A @ 100V, 5.0A @ 120V, 2.6A @ 230V, 2.5A @ 240V



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calibrated



ASTM D7647-10
ready



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