

Automated S-value – SV10

Test methods: ASTM D7157, ISO PAS 23263, CIMAC guidelines

The SV10 revolutionizes the S-value testing, by introducing the first **fully automated** instrument complying with ASTM D7157, which includes a **unique, temperature controlled, high precision measuring cell** (patent pending*). The SV10 is bringing a **major improvement in handling, accuracy and test duration**. Straightforward and user friendly, the SV10 does not need any operator action during the test or application expert: it comes with all programs ready for the different sample types described in ASTM D7157. In addition, **the SV10 eliminates all safety risks** linked to the manipulation of hazardous solvents.



Significance and Use

In oils, asphaltenes in suspension are subject to flocculate depending on stress, long heated storage or when the oils are blended. The S-value of an oil containing asphaltenes (crude oils, residual refinery streams, heavy fuel oils, marine fuels) refers to its intrinsic stability.

A low S-value oil is likely to generate asphaltenes flocculation when stressed or blended with other oils.

On the other hand, the blend of two oils having a high S-value is likely to maintain asphaltenes in suspension and not flocculate.

Applications

The SV10 is compatible with a wide range of samples:

- ✓ crude oils
- ✓ heavy fuel oils
- ✓ residues
- ✓ bitumens
- ✓ marine fuels (VLSFO, ULSFO, ...)
- ✓ asphalten free oils
- ✓ tar sand crude oils
- ✓ emulsions

S-value and Sa results are allowing to monitor and optimize efficiently the distillation, cracking (thermal, hydrocracking) and visbreaking units in a refinery.

Sa and So results are allowing to predict and optimize efficiently the oils blending.

The SV10 is the ideal instrument for:

- ✓ refineries
- ✓ fuel suppliers

- ✓ blenders
- ✓ traders
- ✓ terminals

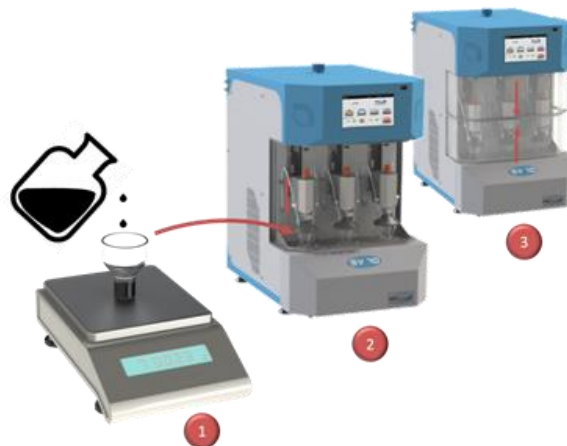
Principle

In order to detect the stability results of a sample, 3 different quantities of the sample are first automatically diluted with toluene. Then, the automatic titration of those 3 mixes with heptane will allow the asphaltenes to flocculate. To detect the flocculation, the SV10 uses a high precision measuring cell (patent pending*). Finally, using the results of the 3 titrations, the SV10 is automatically computing the stability results of the sample.

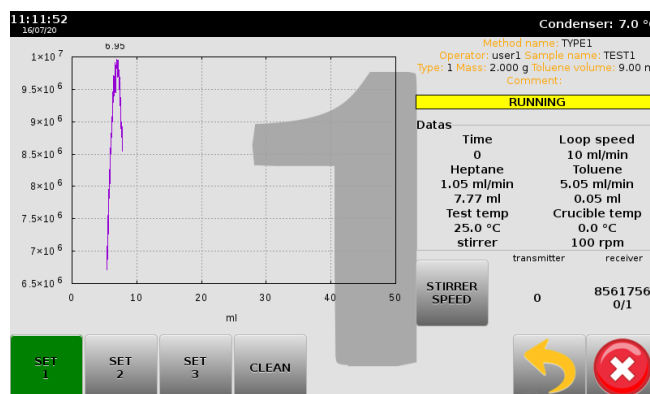
Operation

Running a test with the SV10 is straightforward and very easy, the operator:

- (1) weight the sample(s)
- (2) position up to 3 samples in parallel on the SV10
- (3) close the door and initiate the test(s)



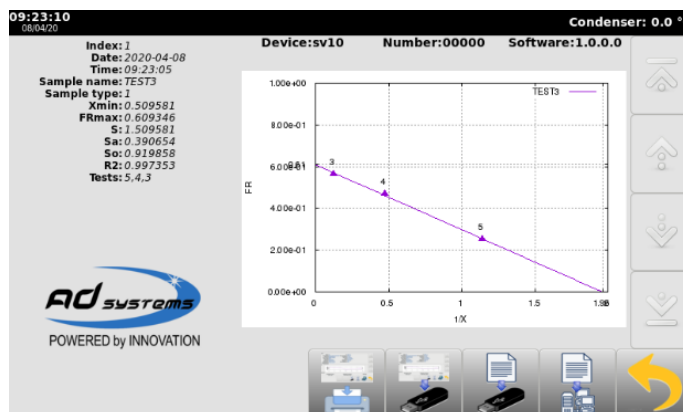
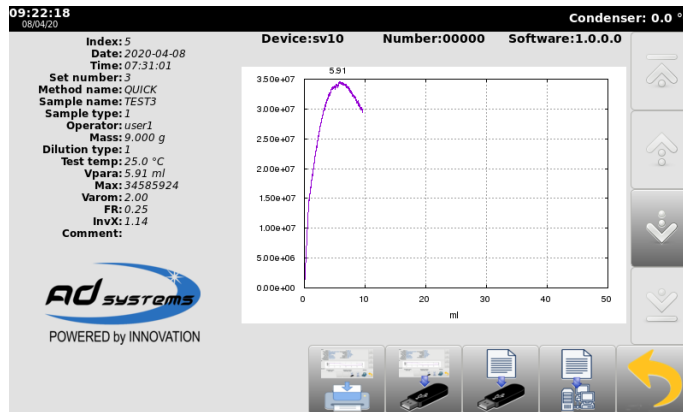
Then the all procedure is automated: toluene dilution, heptane titration, measure of the flocculation point and cleaning. Detection curves are displayed in real time, and the SV10 computes the stability results according to the selected titration tests.



* <https://www.adsystems-sa.com/patents>

Reporting

A detailed report of the titrations and S-value determinations are displayed and saved in the built-in database. They can be printed, transmitted to LIMS or copied to USB stick.



The final report includes:

- ✓ Date & time, sample name & type
- ✓ Xmin : minimum heptane consumption to reach the flocculation (ml/g)
- ✓ FRmax : maximum flocculation ratio
- ✓ S : S-value (intrinsic stability of the oil)
- ✓ Sa : peptizability of the asphaltene
- ✓ So : peptizing power of the oil
- ✓ R2 : goodness of fit
- ✓ Titration tests & linear regression graph

Features and Benefits

☞ Easy

The SV10 is a straightforward automated instrument that strictly follows the test method ASTM D7157. The test preparation is simplified and the test is run unattended, simultaneously, on the 3 positions.

☞ Wide range of samples application

The SV10 has the ability to measure samples with asphaltene concentration <0.4%. It is compatible with crude oils, heavy fuel oils, residues, bitumens, marine fuels (VLSFO, ULSFO, ...), asphaltene free oils, tar sand crude oils, emulsions...

The presence of coke particles will not affect the measurement with the SV10, there is then no need to remove coke particles prior to run a test.

It allows:

- the monitoring and optimization of the refinery processes: distillation, craking (thermal, hydrocracking) and visbreaking units
- the prediction and optimization of the oils blending: marine, power plants, ...
- the monitoring and optimization of the tar sands dilution with light ends in the field
- the bitumen analysis and blending optimization

☞ Increases precision

The temperature controlled high precision measuring cell (patent pending*), combined with the simplified weighting procedure and automated toluene dilution of the SV10 are significantly improving the precision of the test. Indeed, the test is not anymore dependant on the ambient temperature, and the toluene dilution is precisely performed according to the sample's weight, independently from the operator.

☞ Reduces labor

The SV10 is a "Set it and Forget it" instrument. Once the titration cups are weighted and positioned on the instrument, the operator keys in the test details and starts the test. Then all the test phases (dilution, titration and cleaning) are automatic. The operator time is reduced to its minimum. At the end of the test, the titration results are displayed and the stability results are automatically computed and transferred if the SV10 is connected to a LIMS system.

☞ Quality procedure features

The SV10 has a built in result database. All details related to each test result are memorized. In addition, all information related to the instrument calibration is memorized to ensure a perfect traceability.

☞ Increases safety

The SV10 totally eliminates all safety risks linked to the manipulation of hazardous solvents.

☞ Very compact design

The 3 positions standalone automated SV10 instrument does not need much bench space: the width is only 44cm.

Technical information


Technical specifications	Description
Test method	ASTM D7157
S-value range	1.05 to 15.00
Resolution	0.01
Interface	7" full-color touch screen
Test temperature	From 15°C to 60°C
Reported results	S-value Sa So Xmin Fmax R2
Languages	English, French, Russian
Results storage	Up to 100 000 results database (8GB) USB stick, LAN
Communication	USB (2), Ethernet
Printing	USB graphic printer (optional)
Dimensions	W x D x H (mm) W x D x H (inches) 440 x 620 x 700 (17" x 24" x 28")
Weight	50 kg (110 lb)
Electrical	100/240V – 50/60 Hz – 750 W

SV10 Packing list:


- 1 x SV10 Apparatus
- 2 x Solvent bottle connections
- 1 x Pack of 10 magnetic bars PTFE
- 1 x Magnetic extractor PTFE
- 2 x Glass bottle ISO 1000ml
- 3 x Titration cell
- 3 x Cleaning cell
- 1 x 3 positions stand for titration cells
- 1 x Weighting stand
- 1 x Instruction / User manual


PARTS DESCRIPTION

INSTRUMENT

<u>Part number</u>	<u>Description</u>	<u>Picture</u>
AA410-001	SV10 S-value apparatus In accordance with ASTM D7157 Electrical: 100/240 VAC, 10A, 50/60 Hz, Supplied complete ready for operation, user manual in English	

ACCESSORIES


AK000-001	PRINTER 100/240V-50/60Hz EU power cord & USB adapter 112mm thermal printer, delivered pre-configured with USB adapter and 1 paper roll	
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AK000-002	PRINTER 100/240V-50/60Hz US power cord & USB adapter 112mm thermal printer, delivered pre-configured with USB adapter and 1 paper roll	
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NA005-001	PRECISION BALANCE 100/265V-50/60Hz 210 gr – Resolution 0.1mg	
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CONSUMABLES

AD410-001	Solvent bottle connection	
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AD410-002	Magnetic bars PTFE 20x6mm (pack of 10)	
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AD410-003	Magnetic extractor PTFE 200mm	
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AD410-004 Glass bottle ISO 1000ml



AD410-005 SV10 titration cell



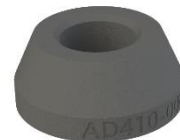
AD410-006 SV10 cleaning cell



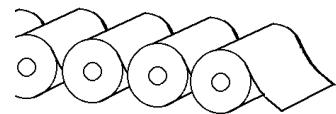
AD410-007 3 positions stand for titration cells



AD410-008 Weighting stand



AC000-001 Set of 10 printer paper rolls (112mm)



AC000-004 3ml Disposable Pasteur pipette (500/box)



ORDERING INFORMATION
(Standard Quote, refer to the price list for unit prices)

The instrument:

P/N	Qty	Designation	Unit Price
AA410-001	1	SV10 S-value apparatus 110/240 VAC – 50/60 Hz	

Accessories :

AK000-001	1	Printer 100/240V – 50/60Hz – EU power cord	
AK000-002	or 1	Printer 100/240V – 50/60Hz – US power cord	
NA005-001	1	Precision balance 210 gr Resolution 0.1mg 100-265V 50/60 Hz	

Consumable parts :

AD410-001	1	Solvent bottle connection	
AD410-002	1	Magnetic bars PTFE 20x6mm (pack of 10)	
AD410-003	1	Magnetic extractor PTFE 200mm	
AD410-004	2	Glass bottle ISO 1000ml	
AD410-005	3	SV10 titration cell	
AD410-006	3	SV10 cleaning cell	
AD410-007	1	3 positions stand for titration cells	
AD410-008	1	Weighting stand	
AC000-001	1	Set of 10 printer paper rolls (112mm)	
AC000-004	1	3ml Disposable Pasteur pipette (500/box)	

Note: The recommended consumable parts are for one year operation, please adjust the one year recommended quantities to your needs