





SQA-Vision vs. Hamilton Thorne vs. Microptic vs. Biophos CASA Comparison Table

Item	SQA-Vision	Hamilton Thorne	Microptic CASA	Biophos CASA
General view				
Certification	FDA, CE, ISO 13485, ISO 9001	CEROS II Clinical: US: Pending 510k. Not available for sale in United States. EU: Currently undergoing conformity assessment. ISO 13485	ISO 13485, ISO 9001	Not specified
Technology	<p>Combines technology in optoelectronics, computer algorithms and video microscopy.</p> <p>Signal processing: Two independent channels which capture Motility and Concentration provide a direct measurement of semen with a high level of accuracy and repeatability.</p> <p>For use primarily in clinical, andrology labs and IVF centers. Minimally used for research.</p> <p>LIS integration capability.</p>	<p>Image analysis. Video images of sperm cells are captured and analyzed by the software.</p> <p>Morphology is semi-automated or manual with automated click counters in some systems.</p> <p>Automated results can be "corrected" manually (operator can accept or reject trajectories and automated sperm cell counts). This results in lack of objectivity.</p> <p>Used primarily in labs, research centers and animal reproduction.</p>	<p>Image analysis. Video images of sperm cells are captured and analyzed by the software.</p> <p>Morphology is semi-automated or manual with automated click counters in some systems.</p> <p>Automated results can be "corrected" manually (operator can accept or reject trajectories and automated sperm cell counts). This results in lack of objectivity.</p> <p>Used primarily in labs, research centers and animal reproduction.</p>	<p>Image analysis. Video images of sperm cells are captured and analyzed by the software.</p> <p>Modular components with 3 software types:</p> <ul style="list-style-type: none"> Automated concentration and motility, laboratory software integration. Software for a manual sperm count environment. Fully customizable spermiograms and reports. Starter Kit for manual spermiogram acquisition management. <p>Automated results can be "corrected" manually (operator can accept or reject trajectories and automated sperm cell counts). This results in lack of objectivity.</p> <p>Used primarily in research centers and animal reproduction.</p>

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Standardization	Systems are all biologically standardized during the manufacturing calibration process. Results including % normal Morphology (WHO 3rd, 4th or 5th criteria based on the settings).	Not standardized. Results are system setting dependent.	Not standardized. Results are system setting dependent.	Not standardized. Results are system setting dependent.
User Interface	Touch-screen menus for easy navigation. Online help menu/user guide interface. Warning for calibration issues and maintenance. Automated counters, timers, calendars.	Complex user interface requires extensive training.	Complex user interface requires extensive training.	Complex user interface requires extensive training.
System Navigation	Friendly and easy man-machine interface with touch screen technology.	Navigation can be cumbersome	Navigation can be cumbersome	Navigation can be cumbersome
Automation	<ul style="list-style-type: none"> Concentration: Automated results range 2 to 400 M/ml. Reportable range 0 to 400 M/ml using high resolution sample visualization feature. Automated % Normal vs. Abnormal Morphology Automated MSC, Motility grades. Click counter for Vitality and Morphology differential Pre-calibrated. 	Not Fully Automated: <ul style="list-style-type: none"> Operation of the microscope (fields of view, focus, etc.) is not automated Morphology assessment is semi-automated The system requires calibration, settings and adjustments Results can be manually edited by revising the captured images 	Not Fully Automated: <ul style="list-style-type: none"> Operation of the microscope (fields of view, focus, etc.) is not automated Morphology assessment is semi-automated The system requires calibration, settings and adjustments Manual edit of automated results (captured images). 	Not Fully Automated: <ul style="list-style-type: none"> Operation of the microscope (fields of view, focus, etc.) is not automated Morphology assessment is semi-automated The system requires calibration, settings and adjustments Manual edit of automated results (captured images).
Sample size	500 µl resulting in high accuracy and precision.	Several microliters resulting in low level of precision.	Several microliters resulting in low level of precision.	Several microliters resulting in low level of precision.
Number of spermatozoa analyzed	Thousands in motility channel and millions in concentration channel.	Two hundred or more cells are individually tracked.	Two hundred or more cells are individually tracked.	1000 cells per image
Statistical representation	Representative due to the large sample size.	Poor due to the small sample size.	Poor due to the small sample size.	Poor due to the small sample size.
Sample Loading	A single testing capillary equipped with a syringe is loaded with a neat sample and inserted into the testing chamber.	Motility, concentration and Morphology require different types of chambers/slides and sample preparation.	Motility, concentration and Morphology require different types of chambers/slides and sample preparation.	Motility, concentration and Morphology require different types of chambers/slides and sample preparation.

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Sample preparation	<ul style="list-style-type: none"> Neat samples are aspirated into a disposable testing capillary. Low volume samples can be diluted 1+1 and tested. Easy sample preparation: <ul style="list-style-type: none"> Fill the testing capillary Insert into the testing chamber. Testing begins automatically 	<ul style="list-style-type: none"> Dilute highly concentrated semen samples to the optimal level to avoid sperm cell overlap. Dilution errors can occur. Optimal sample dilution can be complex because sperm concentration is not known in advance. Lower accuracy for very high and very low sperm concentration. Overly diluted or insufficiently diluted samples are rejected by the system and have to be re-run. Motility and Concentration are assessed using fixed coverslip slides and Morphology examination requires stained smears. 	<ul style="list-style-type: none"> Dilute highly concentrated semen samples to the optimal level to avoid sperm cell overlap. Dilution errors can occur. Optimal sample dilution can be complex because sperm concentration is not known in advance. Lower accuracy for very high and very low sperm concentration. Overly diluted or insufficiently diluted samples are rejected by the system and have to be re-run. Motility and Concentration are assessed using fixed coverslip slides and Morphology examination requires stained smears. 	<ul style="list-style-type: none"> Dilute highly concentrated semen samples to the optimal level to avoid sperm cell overlap. Dilution errors can occur. Optimal sample dilution can be complex because sperm concentration is not known in advance. Lower accuracy for very high and very low sperm concentration. Overly diluted or insufficiently diluted samples are rejected by the system and have to be re-run. Motility and Concentration are assessed using fixed coverslip slides and Morphology examination requires stained smears.
Starting test	Testing begins automatically when a testing capillary is inserted into the measurement chamber.	Place the sample chamber on the stage, focus the image, select the fields, and begin analysis.	Place the sample chamber on the stage, focus the image, select the fields, and begin analysis.	Place the sample chamber on the stage, focus the image, select the fields, and begin analysis.
Results	Fully objective standardized automated test results generated by a device pre-calibrated by the manufacturer.	Automated counts may be impacted by different user settings and corrections. Statistical counting errors associated with image processing may affect accuracy.	Automated counts may be impacted by different user settings and corrections. Statistical counting errors associated with image processing may affect accuracy.	Automated counts may be impacted by different user settings and corrections. Statistical counting errors associated with image processing may affect accuracy.
Accuracy (correlation to manual results)	Concentration: 0.99 Motility: 0.83 Morphology: 0.71	Not specified. Statistical counting errors ~ 10% are typical for image processing	Not specified. Statistical counting errors ~ 10% are typical for image processing.	Not specified. Statistical counting errors ~ 10% are typical for image processing.

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Precision	High precision (semen parameters CV < 6%) due to adequate sample representation and biological pre-calibration of the system by the manufacturer. Control material (beads): <ul style="list-style-type: none"> Intra-device CV \leq 0.01 % Inter-device CV \leq 2.5 % 	The subjective nature of instrument calibration and the requirement to adjust the settings leads to high inter- and intra-device variability.	The subjective nature of instrument calibration and the requirement to adjust the settings leads to high inter- and intra-device variability.	The subjective nature of instrument calibration and the requirement to adjust the settings leads to high inter- and intra-device variability. Publications cover assessment of animal semen only.
Visualization	High resolution digital CCD (1280 x 1024 pixels) captures a high # of frames per second for "live" and "frozen" images; Objective: x40 with chromatic aberration correction; Highly magnified images are displayed on a large PC touch screen; Zoom for smooth magnification transition from x1188 to x1725. Captures both static and dynamic images for sperm counting, debris scanning, vitality and differential morphology assessment.	The visualization features depend on the microscope configuration used in the facility.	The visualization features depend on the microscope configuration used in the facility.	The visualization features depend on the microscope configuration used in the facility.
Set-up Defaults	Extensive user options. WHO 3 rd /4 th or 5 th criteria, QwikCheck Beads set-up with barcode scanner.	Parameters per WHO laboratory manual + kinematic variables.	Parameters of WHO 5th laboratory manual + kinematic variables.	WHO standardization is not noted.
PC Interface	All-in-one PC touch screen	CEROS: Microscope with mounted camera is connected to PC.	Microscope with mounted camera is connected to PC.	Microscope with mounted camera is connected to PC.
Printing	PC printer	PC printer	PC printer	PC printer
Archive	PC based	PC based	PC based	PC based
Reports	<ul style="list-style-type: none"> Reports show results for tested parameters only (user can designate) Report defaults, logos, contact information (user designated) Sperm images can be attached. 	User customized reports including letterhead and specified results.	User customized reports including letterhead and specified results.	User customized reports including letterhead and specified results.

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Limitations	Sample size: 0.3 ml required for automated testing. Other optional available for semi-automated testing of low volume samples.	<ul style="list-style-type: none"> • Semi-automated system • Instrument settings are subjective. • Different CASA systems use different mathematical algorithms. The degree of comparability of measurements across all CASA systems is not yet known. • Problems with accuracy reporting high and low sperm concentration. • Statistical counting errors impact the accuracy of system measurements. • CASA requires extensive training and cross validation to ensure technician competency. • The clinical significance of kinematical test results is limited. • The analysis is not standardized due to the different instrument settings, algorithms and result corrections by the user. 	<ul style="list-style-type: none"> • Semi-automated system • Instrument settings are subjective. • Different CASA systems use different mathematical algorithms. The degree of comparability of measurements across all CASA systems is not yet known. • Problems with accuracy reporting high and low sperm concentration. • Statistical counting errors impact the accuracy of system measurements. • CASA requires extensive training and cross validation to ensure technician competency. • The clinical significance of kinematical test results is limited. • The analysis is not standardized due to the different instrument settings, algorithms and result corrections by the user. 	<ul style="list-style-type: none"> • Semi-automated system • Instrument settings are subjective. • Different CASA systems use different mathematical algorithms. The degree of comparability of measurements across all CASA systems is not yet known. • Problems with accuracy reporting high and low sperm concentration. • Statistical counting errors impact the accuracy of system measurements. • CASA requires extensive training and cross validation to ensure technician competency. • The clinical significance of kinematical test results is limited. • The analysis is not standardized due to the different instrument settings, algorithms and result corrections by the user.

References:

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2. SQA-Vision User Guide, 2015.
3. Hamilton Thorne and CRISMAS CASA websites.
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6. Spiropoulos J. Computerized semen analysis (CASA): effect of semen concentration and chamber depth on measurements. Arch Androl 2001 Jan-Feb; 46(1):37-42.
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