MEET THE LEGEND

in cell-based research

www.cellcounting.de

OLS®
OMNI Life Science

Comprehensive Cell Status Monitoring label-free, with outstanding precision and reproducibility

The main actors in your cell-based assays are your cell cultures.

Performing reproducible cell-assays requires comprehensive knowledge of your cells' condition – including absolute cell count, viability and aggregation status.
It is also time-sensitive: This information is needed precisely at the moment your cells appear to be ready for an assay or for further processing.

Here, CASYs legendary precision and reliability comes into play.

For years, CASY has been a reliable workhorse in cell-culture laboratories. CASY is referenced in more than 2,000 publications, you'll find it in a myriad of diploma- and PhD theses and on laboratory benches around the world. CASY systems are essential tools in academic & industrial research and in process control: CASY delivers precision with outstanding reliability. Thousands of satisfied users prove the robustness, reproducibility and reliability of the system, even in scenarios with poorly trained multiple users.

CASY tracks all relevant aspects of the status of your cell cultures

+ **Label-free cell status, instantly.**
  Within seconds, measurement is performed non-invasively without using distorting dyes.
+ **Statistically relevant data**
  Analysis of more than 4,000 cells per run enables statistically significant results.
+ **Get the full picture**
  CASY quantifies all relevant parameters of cell cultures including cell viability and aggregation – at extremely low running costs.

What stands behind CASYs legendary reliability

+ Certified life time calibration: guaranteed maximum +/-2 % variation comparing measurements and instruments.
+ Automatic electronic surveillance of all relevant parameters of the system
+ Integrated QA system
+ GLP/GMP compliance
+ 21 CFR Part 11 compliance (only CASY TTC)

Cell Concentration + Cell Number + Cell Viability + Cell Volume

How it Works.

Viable / dead cells differentiation

CASY quantifies cells and particles passing a measuring pore exposed to a low voltage electrical field. Based on a cells size and conductivity, a resistance signal is generated and recorded. Living cells generate high resistance signals due to their intact membrane structure. Dying or dead cells cause much lower resistance due to their increased membrane permeability: they are measured by the size of their cell nuclei.

Cell viability

Furthermore, cell viability is determined by automatically quantitatively comparing viable cells with dead cells, the latter being represented by the size of their nuclei in the measurement chart.

Maximum information from flow-through measurement

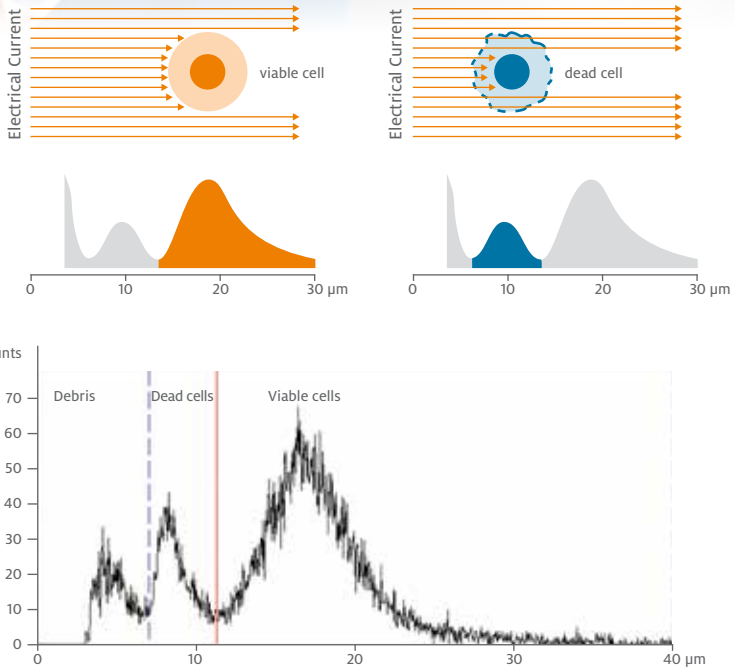
Objects passing the measuring pore are scanned with a high frequency of 1 MHz. This allows a precise recording of cell number and cell volume.

Huge dynamic measuring range

1 MHz sampled Pulse Area Analysis leads to an unsurpassed dynamic measuring range visualizing the whole range of particles from cell debris to large cellular aggregates in a single measurement

Get the full picture of your cells

In a simple, fast and dye-free measurement, the huge dynamic measuring range provides you with all aspects of the current status of your cell culture: Monitor **cell debris**, distinguish **viable cells** from **dead cells**, and readily observe cell clusters / **aggregates** – all at a single glance.



CASY's measuring principle to discriminate between debris, dead and viable cells – and how it is graphically represented during measurement (Mixture of chondrocyte primary culture).

Biomass-determination or aggregates? CASY delivers accurate volumes

High-frequency scanning of objects and the high dynamic measuring range, enable CASY to precisely measure volumes of cells or objects. Thus, cell aggregates and the entire biomass content of each sample are immediately available.

Accurate total cell count includes aggregates

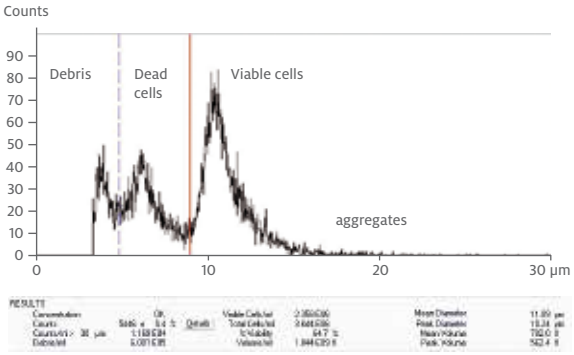
Mathematically breaking down aggregates into single cells, CASY optionally counts all cells hidden in aggregates – and thus provides an accurate total cell count.

No limits. CASY measures cell lines, primary cells, bacteria, yeast, algae, parasites ... – you name it

With a detection range of 0.7 – 120 µm, CASY measures all types of mammalian cells and stem cells, as well as bacteria, yeast, algae, parasites, pollen, sperm and more. Any particle in the size range might be measurable – and a lot of various samples have been readily measured.

Cell Aggregation + Cell Size Distribution + Biomass + Cell Debris

GET THE WHOLE PICTURE stay up-to-date with your cells

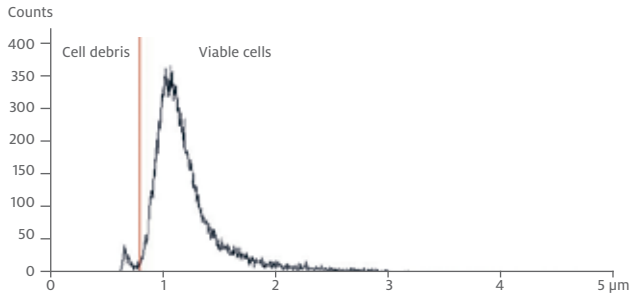


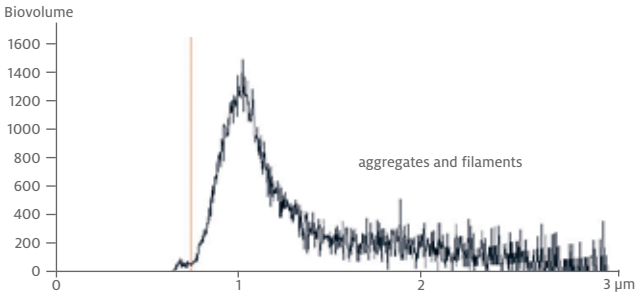
Mammalian Cells. Precise Counting & Cell Seeding Control

The success and reproducibility of cell culture experiments depend on the concentration and the health status of the cells. Thus, a CASY evaluation of your cells just before seeding is indispensable to set up experiments. Particularly, if you are about to start long-term experiments with enhanced resource requirements. A quick CASY measurement provides comprehensive insights in cell health, viability and aggregation with a single short and simple measurement.

CASY TTC measurement results of human stem cells from cord blood. A high resolution size distribution differentiates cell debris, dead cells, viable cells and cell clusters (aggregates). Results include cell counts, cell concentration, viability, aggregation factor, biomass volume, cell diameter and cell volume.

Bacteria. Monitoring Cells, Debris and Aggregates



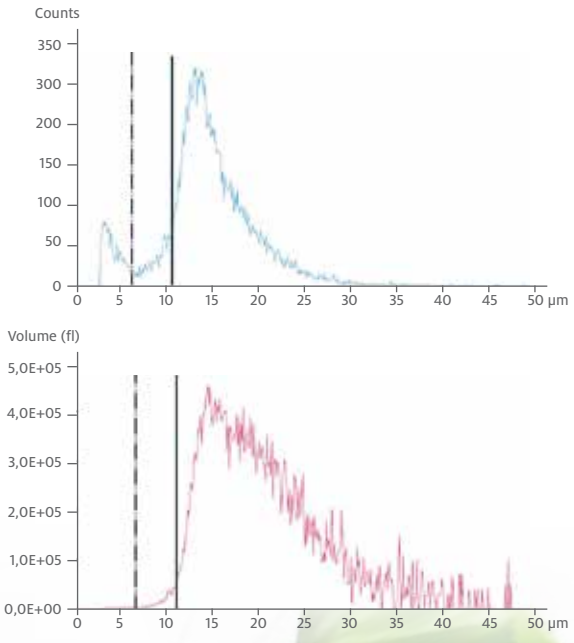


CASY, equipped with a 45 µm capillary, is ideally suitable to monitor bacterial proliferation and aggregation. For example, during fermentation CASY allows you to plot changes in mean cell volume and proliferation kinetics and provides an easy dye-free tool to monitor cell debris.

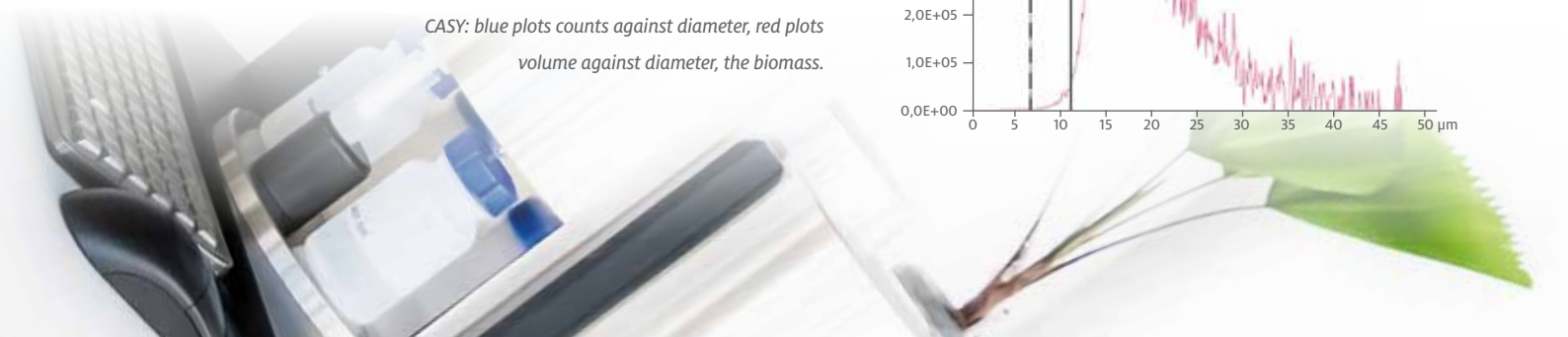
CASY TTC measurement results of E. coli cells. A high resolution size distribution differentiates cell debris, viable cells and cell aggregates. Left: cell counts plotted against cell diameter; right: biovolume plotted against cell diameter. Results include automatically calculated cell counts, cell concentration, aggregation factor, cell volume and cell diameter.

Biomass Determination. Taking Aggregates into Account

Cell aggregation is a critical parameter, in particular if accurate evaluation of stem cells is required. The proprietary CASY software algorithm provides accurate cell counts, taking cell clusters into account. Measuring individual volumes of cells and aggregates enables CASY to calculate the number of single cells within the aggregates. Volumes of single cells and aggregates can be plotted as biomass volume against cell size. Thus, CASY delivers an overview of the distribution of biomass over the entire measurable size range.



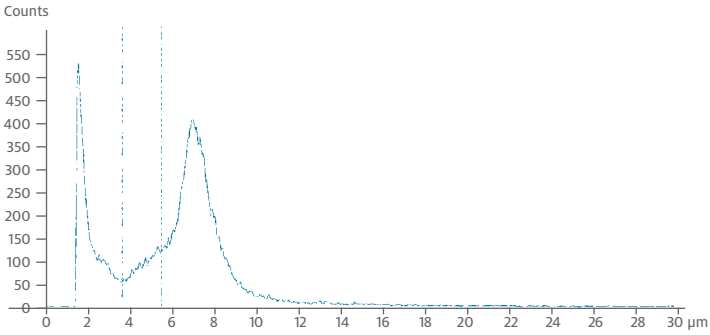
HEK 293 human fetal kidney cells analyzed with CASY: blue plots counts against diameter, red plots volume against diameter, the biomass.



Cell Proliferation, Cytotoxicity and Infection Monitoring

Yeast. Cell Proliferation Monitoring

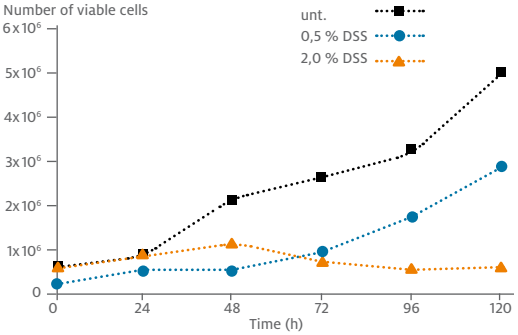
Cell proliferation strongly depends on various environmental factors. Thus, live monitoring of growth rates is mandatory during yeast fermentation. An easy-to-use and dye-free system, such as CASY, allows full insights with only little disturbance.



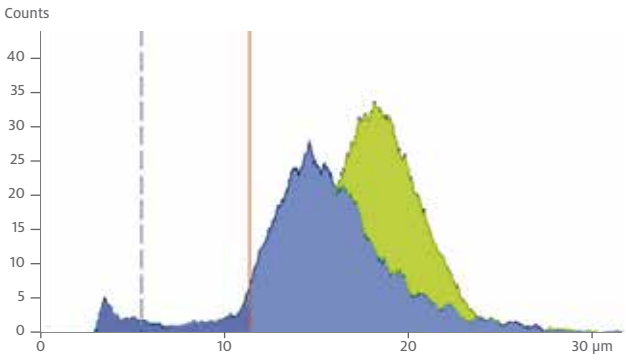
CASY TTC results of Saccharomyces cerevisiae free floating yeast measurements. Using a 60 µm capillary and 200 µl sample volume, a high resolution size distribution differentiates cell debris, viable cells and cell clusters (aggregates).

Cytotoxicity. Monitor Proliferation Inhibition and Cell Death

Performing Cytotoxicity Assays with CASY implies measurement of cell proliferation inhibition and cell death independently. While counting viable cells leads to insights into cell proliferation inhibition, the option to additionally monitor dead cells allows conclusions about cell viability.



DSS, dextran sodium sulfate, inhibits cell proliferation of Caco-2 cells in a dose-dependent manner. Dead cells were not detectable in the experiment (data not shown). For details read Application Note: »How Chemicals influence Cell Proliferation – Straightforward Cell Culture Monitoring using CASY TT«.



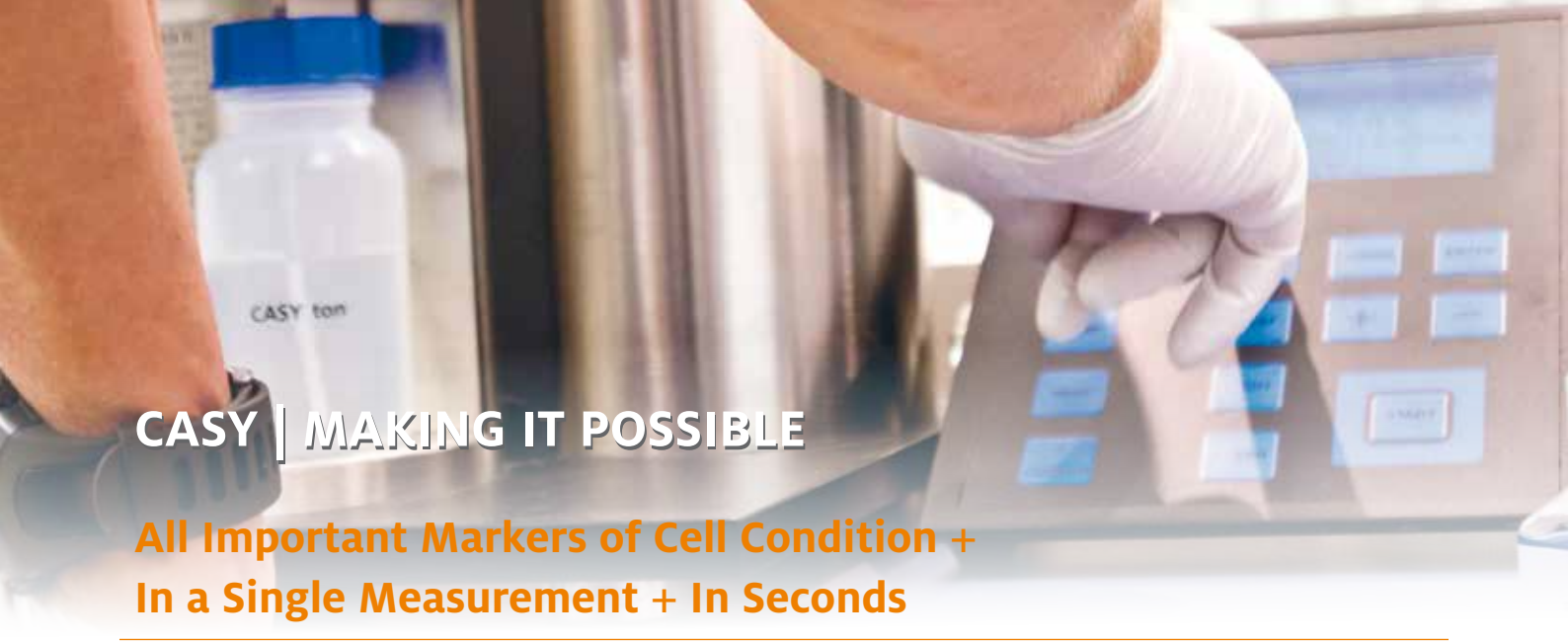
Insect Cells. Virus-Infection Monitoring

The precise, standardized cell volume determination allows to monitor the protein production process during viral infection of cells. From the increase in cell volume, the viral MOI (multiplicity of infection) can be deduced. A simple dye-free measurement using CASY enables conclusions on cell status, cell viability and cell volume.

CASY TTC cell size measurement using a 150 µm capillary. Sf9 insect cells were infected with Baculovirus. Blue: Control, untreated cells; Green: 20 h after infection.

Application Support

Challenge us with your application or problem! Our highly trained application specialists are ready to help you in establishing new solutions. A huge database of measured samples is already available to serve as a reference.

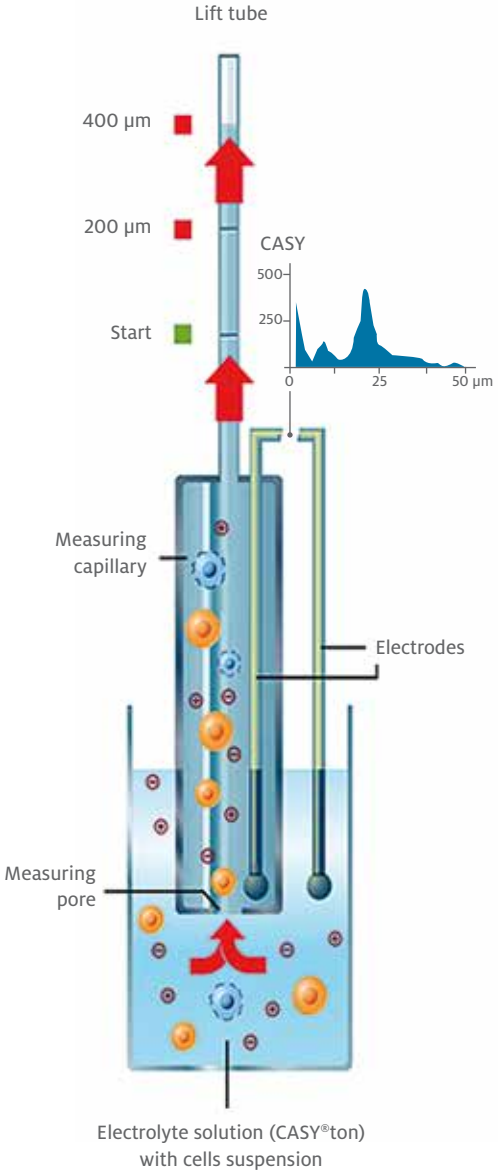


CASY | MAKING IT POSSIBLE

All Important Markers of Cell Condition + In a Single Measurement + In Seconds

Counting Cells in just Seconds

Cells suspended in CASYton, a conductive isotonic buffer solution, are drawn through a measuring pore. This pore is defined in size and housed inside the capillary which separates two platinum electrodes, the inner and outer electrode. Here, a low voltage field is cycling with 1 MHz. Each cell or particle passing the measuring pore generates an individual electrical pulse by displacing buffer electrolyte in the measuring pore. This pulse is measured as a cell count.



Cell Viability – Keep Tabs on Membrane Degradation

As CASY takes the whole pulse area into account, including amplitude and pulse width, high resolution measurements are enabled, allowing to detect slightest changes of the cell membrane's electrical properties. The permeable membrane of dying and dead cells thus allows to identify dead cells by a change in electrical resistance, finally indicating the size of the nucleus.

Accurate Cell Volume

The combination of amplitude and width of the electrical pulse is proportional to the individual volume of the cell or particle passing the pore. Thus, cell volume can be directly deduced from the change in electrical resistance.

Biomass & Cell Aggregation – The True Cell Count

Biomass concentration and cell aggregation are essential parameters in any cell culture- and fermentation setting. CASY's measuring principle, including accurate cell volume determination, enables CASY to calculate aggregate volumes. This delivers extremely precise and reliable information on biomass content and aggregation status of your cells in culture. Furthermore, by taking account of cells hidden in aggregates, the true cell count is determined. Thereby drastically improving the accuracy of counting results.

Cell Debris and the »Comfort Zone« of Your Cells

Cellular debris may dramatically influence cell-based assays and its absence is an excellent indicator verifying that your cells are in the »comfort zone«. The huge dynamic size range of each CASY measurement provides you with a significant criterion for the usability of the cells in any critical follow-up experiment – at a single glance. And it does so quickly: typical measurement time of mammalian cells is around 10 seconds.

CASYworX | Plug-In Evaluation Tool for CASY TT

Data Analysis + Overlays + Diagrams + Export + MeanValues

CASYworX

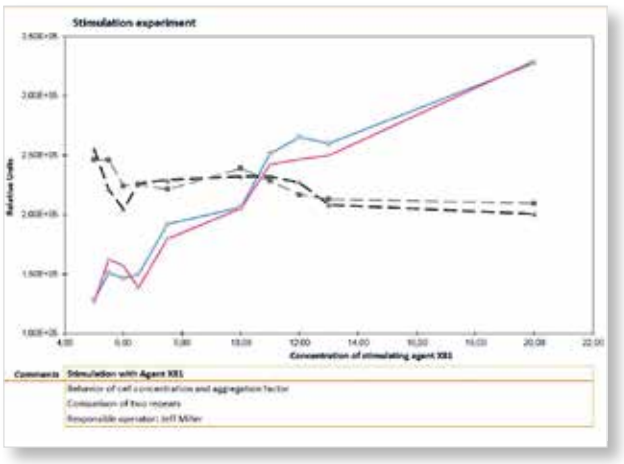
CASYworX is a software for management and evaluation of CASY TT data. CASYworX allows to transfer measurement data from CASY TT to a connected PC. All measurements for a certain experiment can be stored into one experiment file. Data sets within each file can be browsed and sorted.

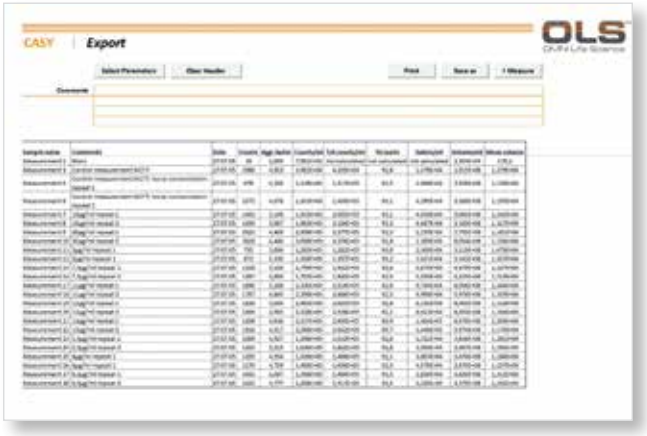
Measurement Data Handling

The software supports display of measurement size distributions and cursor settings, features a dilution calculator and the export of experiment data in excel file format (*.xlsx).

Data Evaluation

For data evaluation, CASYworX features 2D overlay functionality for up to 6 measurements. Thus, multiple measurements can be displayed simultaneously. Furthermore, creation of diagrams for up to 5 charts, mean value calculation, and measurement data listings are part of CASYworX data evaluation tools.





CASYWORX-MANAGE AND EVALUATE MEASUREMENT DATA

- Transfer of measurement data to PC
- Labeling and commenting
- MS-Excel spreadsheets of multiple measurements
- Modification of evaluation parameters (e.g. cursor settings, dilution factors)
- Printing and exporting of selectable parameters
- Dilution calculator for convenient preparation of defined cell suspensions
- Comparison of up to 6 measurements based on size distribution (2D-Overlay)
- Mean and %CV calculations
- Diagrams with up to 5 graphs
- Tool for saving and restoring CASY TT setups.

Proliferation of MCF-7 cells, treated with various concentrations of a growth factor and measured in duplicate (red and blue), analyzed with CASYworX. As a control, cell aggregation factors of both replicates are shown (dotted lines).

TECHNICAL DATA

Measurement principle	Electronic pulse area analysis with 1 million measurements per second acc. to ISO 13319
Viability determination	Electrical Current Exclusion (ECE)
Dynamic range	in volume > 1:70,000 in diameter > 1:40
Measured size channels	512,000
Displayed size channels	1,024 (TTC); 400 (TT)
Measurement range	0.7–120 µm
Volume Resolution	1 in 512,000
Typical analysis time	10 seconds
Typical sample volume	5 –100 µl
Interfaces	TT: RS 232 (2xDB9), Parallel (DB25), TTC: RS 232 (2xDB9), TCP/IP (RJ45), USB (3x),Compact flash memory card

CASY TT

Cell count, cell volume, cell debris, cell viability and aggregation in less than 10 seconds

+ 20 cell specific setups
+ separate control panel with graphical display
+ ASCII data format
+ CASYworX PC software
+ GLP compliant

CASY TTC

Cell count, cell volume, cell debris, cell viability and aggregation in less than 10 second

+ unlimited cell specific setups
+ menu-driven software, Win CE embedded PC, color screen, keypad & mouse
+ binary data format with checksum protection
+ CASYdatadoc PC software
+ GLP/GMP compliant
+ 21 CFR Part 11 compliant
+ full audit trails
+ 3 different user levels
+ electronic signature

More about CASY

Manuals, Application Notes & Support:
Visit www.casy-support.com

Watch CASY hands-on Videos:
bit.ly/cellcounting

Stay updated: register for our newsletter **ols-bio.de/newsletter**

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