

# Countstar<sup>®</sup> Mira FL

## Fluorescence Cell Analyzer



# Innovative All-in-one Design



Learn more  
about Countstar®  
and the Mira FL



## ✦ Impressive Internal Data Storage Capacity

With an internal 128GB large micro SD flash drive, you can store up to 50,000 measurements on the analyzer. The integrated search tools gives you a quick access to the database of results and images

## ✦ Innovative 3x Optical Zoom Technology

Offering three magnifications (5.0x, 6.6x, and 8.0x) and combining them with our patented Fixed Focus Technology, allows a unique look of cells and particles in the range from 1µm to 180µm, a first in this class of cell analyzers

## ✦ Compact Dimensions

of the Countstar® Mira FL, 220mm x 285mm x 240mm (W x H x D), saves valuable lab bench space

## ✦ Advance, AI-based Image Analysis Algorithms

combined with our high-resolution CMOS 5 MP color camera, and the all-new 3-fold optical zoom technology delivers you detailed images and precise analysis results

## ✦ Intuitive Graphical User Interface

In combination with the glove sensitive 8 inch TFT touch screen in HD resolution allows for a detailed look of the monitored cells. The BioApp based software menu makes it easy to operate the analyzer and gives access to a multitude of analysis features

## ✦ Multiple Applications

Smart, preset, and customizable BioApps enable an uncomplicated and easy execution of experiments: AO/PI cell density and viability analysis, GFP/RFP transfection efficiency studies, classical Trypan Blue based cell counts, and apoptosis monitoring are only a few of possible applications on the Countstar® Mira FL

## ✦ Economical Disposable Consumables

Our proprietary, 5-chamber Countstar® Chamber Slides offer 250% higher capacity on the same footprint compared to classical 2 chamber chips. This allows for consecutive analysis of up to five samples, saving you time and costs, while reducing waste material as well

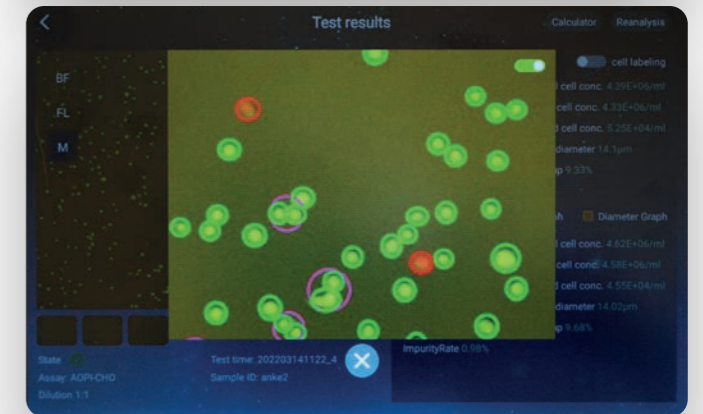
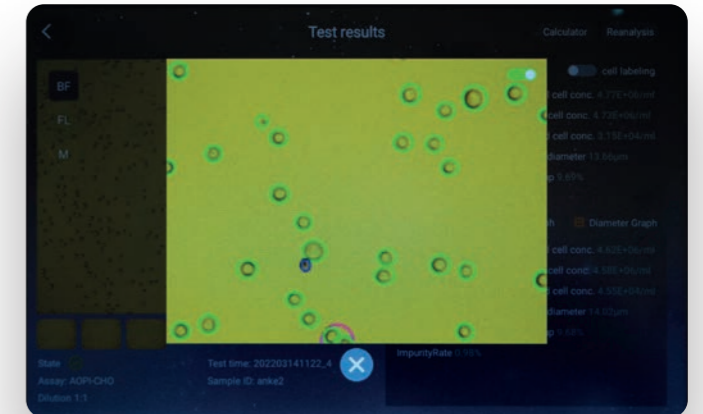
# High Resolution Images: Provides Visual Evidence of Your Research

8", HD resolution  
touch screen,  
glove sensitive

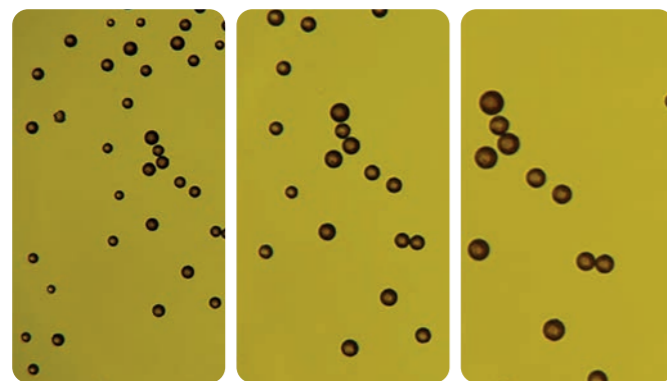


CHO cells, stained by AO/PI;  
bright field image,  
with viability labels.  
Green: detected algae cells,  
Blue: unspecific objects;  
Pink: aggregated cells

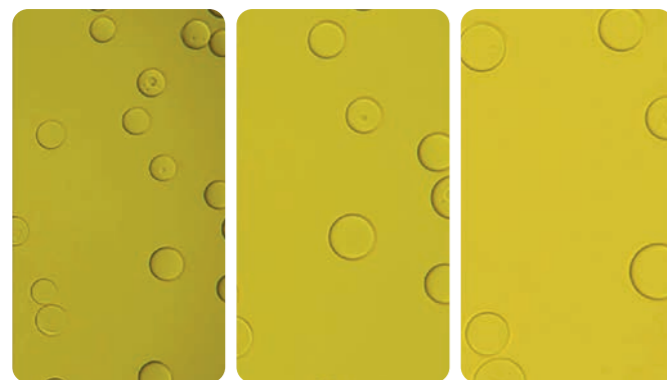
Same sample of CHOs as  
above; Fluorescence view:  
Green indicators: viable cells;  
Red: dead cells;  
Pink: aggregated cells



3-fold selectable  
optical zoom:  
5.0x, 6.6x, and 8.0x



From left to right:  
Chlorella spec. in bright field  
(green algae; 3-8  $\mu\text{m}$ ); 5.0x,  
6.6x, and 8.0x magnification;  
Cell Counting BioApp



From left to right:  
Cross-linked Agarose particles  
(20  $\mu\text{m}$  to 50  $\mu\text{m}$ ); 5.0x, 6.6x,  
and 8.0x magnification; Cell  
Counting BioApp

## Simply Smart: AI-based Image Analysis Algorithms

To analyze and classify the huge variability of cell's optical appearance in images, the Countstar<sup>®</sup> Mira FL uses the advance of Artificial Intelligence (AI) based image analysis algorithms. These self-learning image analysis tools are capable to analyze even complex image situations acquired by the Countstar<sup>®</sup> Mira FL. The implementation of cell shape analysis algorithms allows for a highly precise and reproducible analysis of the cell cycle status possible. Furthermore, the data can be used to interpret correlations between cell status, and the formation of cell clusters (aggregates, small spheroids), depending from the environmental conditions.

## Brilliant: 3- Fold Optical Zoom Technology

Our innovative 3-level, optical zooming technology (5.0x, 6.6x, and 8.0x ) enables the viewer to identify objects in a size range from 1  $\mu\text{m}$  to 180  $\mu\text{m}$ . Simply select one of the pre-installed BioApps for the different classes of objects. The high-resolution of images allows for an in depth-look inside monitored cells. This extends the range of applications to a wide range of cellular objects in a single device.

# Intuitive Software: AI-based BioApps for Multiple Cell Culture Applications

## Convincing: Multiple Analysis Features

The advance, Artificial Intelligence (AI) based image analysis algorithms of the Countstar® Mira FL software deliver all essential cell viability parameters to evaluate the actual status of a cell culture. Along with cell density and viability, the cell size distribution, the cell shape factor, and any formation of cell clusters (aggregates) are analyzed as well. The relative fluorescence intensity delivers you data about the content of markers or fluorescent tagged products. The growth curve feature allows an immediate feedback about the kinetics of a running bio-process. Single cells can be classified even inside aggregates. Changes of the cell shape factor can be an important, early-stage indicator for changes in your cell culture. The data provided from the Countstar® Mira FL enables better interpretation for users to optimize the dynamics of cell culture processes with mammalian, algae, and yeast cells.

## Intuitive: Graphical User Interface with BioApps

The structured and intuitive graphical user interface of the Countstar® Mira FL was designed to make the daily challenged of the lab workflow more efficient. Customizable assay protocol templates can be adapted to varying characteristics of each cell line. The GUI allows a quick access to already acquired images and results stored in the internal database. An export of images, pdf reports, and csv files can be accomplished in a few simple steps.

### Results Display and Output:

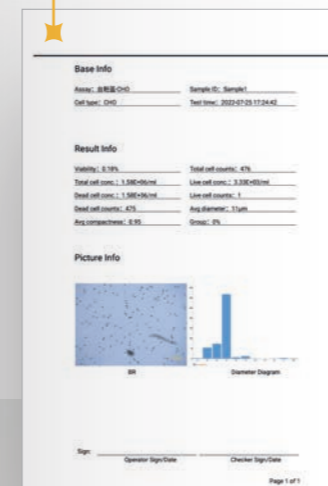
- ✦ Original images (jpg)
- ✦ Test data
- ✦ Histograms
- ✦ Growth Curves
- ✦ PDF reports
- ✦ CSV files



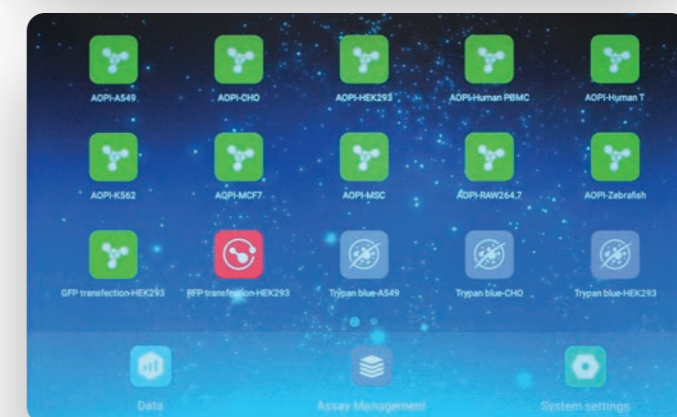
Data menu:  
overview results  
single analysis



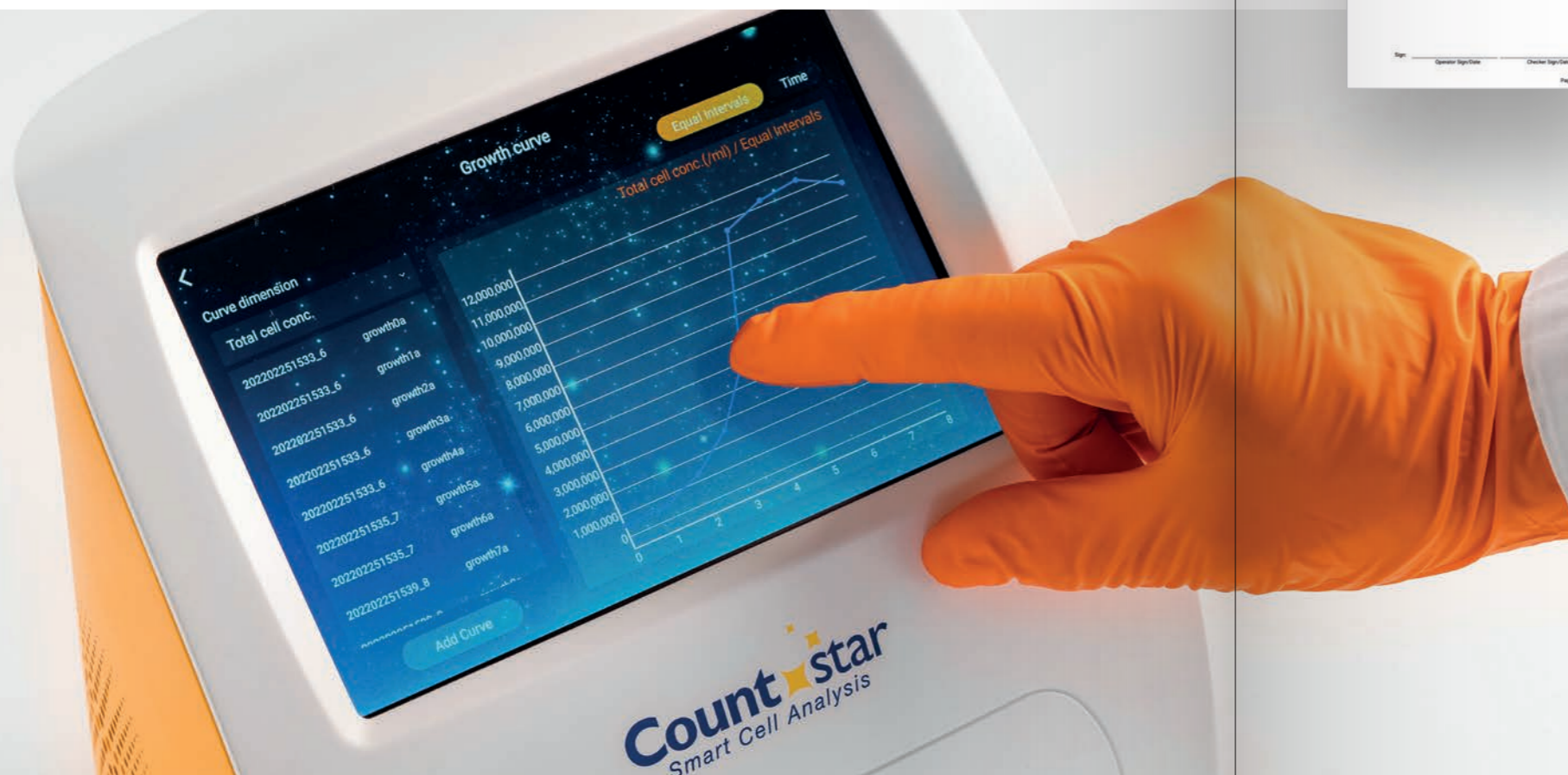
Size distribution  
histogram of a  
CHO culture,  
stained by AO/PI



Growth curve,  
comparing two  
cultivations to  
each other



Main menu  
showing the  
pre-installed  
BioApps



# Versatile: Powerful BioApps for Various Cell Types



One of the unique features of the Countstar® Mira FL are the pre-installed BioApps. BioApps allow for a wide range of experiments to be performed on various organisms and delivers multiple data points to help determine cell culture status.

## ✦ Customization

BioApps are individually designed to fit single cell type characteristics. Their configuration can be adapted, copied, and exported to other Countstar® Mira FL devices

## ✦ Analysis Speed

The plug and play versatility of the Countstar® Mira FL allows for cell culture data results in seconds. A simple click on the BioApp, naming your sample, and the system delivers results in seconds

## ✦ Future-Oriented

The large number of already pre-installed BioApps can be expanded at any time by the ability to download and install new customized assay protocols.

## ✦ Service and Support

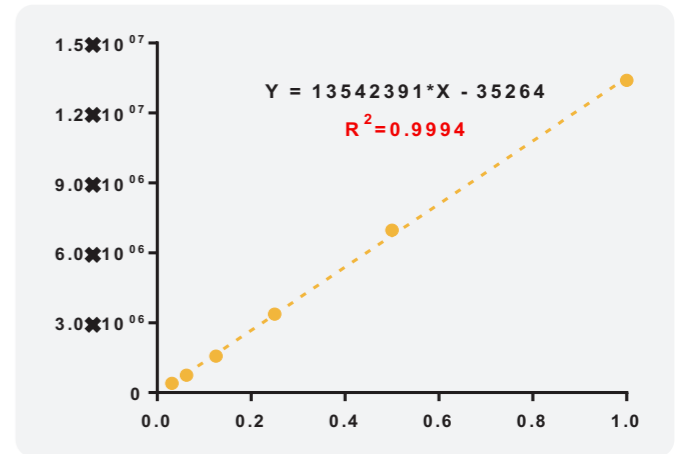
Benefit from our long experience in designing and customizing BioApps specifically to the varying characteristics of thousands of cell types

## ✦ Access to Results

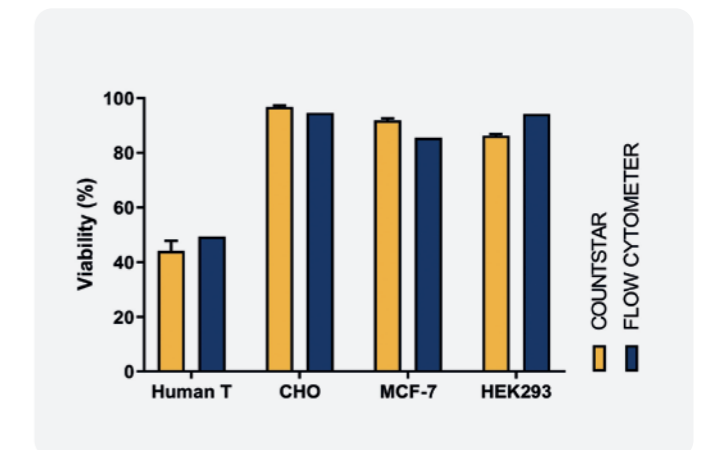
All analysis data and images are pre-sorted by the BioApp names. The search for specific results can be facilitated by narrowing down the measurement period. Up to 50,000 analysis data sets are permanently and quickly accessible on the internal 128GB storage medium

## AO/PI Cell Density and Viability BioApps

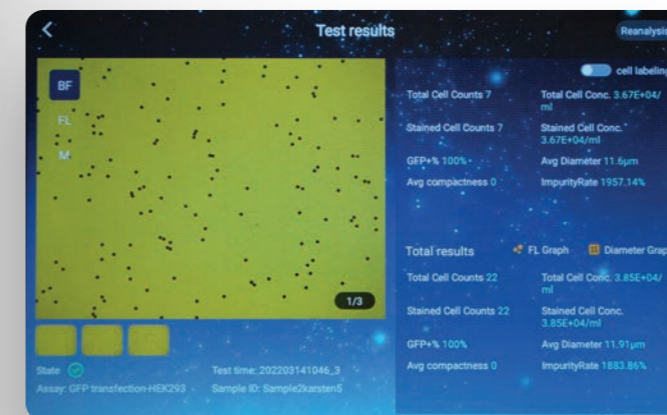
The AO/PI dual dye fluorescence BioApp for determination of cell density and viability of eukaryotic cell cultures is based on the principle that both dyes, Acridine Orange (AO) and Propidium Iodide (PI), will intercalate between the nucleic acids of the chromosomes inside the nucleus. AO will permeate an intact nucleus membrane at any time to stain the DNA, emitting a green light at 525nm max., if excited at 480nm. PI is only capable to pass a disintegrating nucleus membrane of a dying (dead) cell. This dye will emit a red light with its amplitude at 615nm, if PI is excited at 525nm. The AO/PI staining kit utilizes the physico-chemical phenomenon of the FRET-effect (Foerster Resonance Energy Transfer). If samples of cells are excited at 480nm, the emitting light of the present AO dye in the nucleus at 525nm will be totally absorbed by the accumulated PI dye in the nuclei of dead (dying) cells, which then emit due to their excitation the red light at 615nm. The energy transfer ensures that no double light emission or overexposure of light will occur. Additionally, it also ensures that only nuclei containing cells will get stained and no akaryotes, like erythrocytes, will be included.



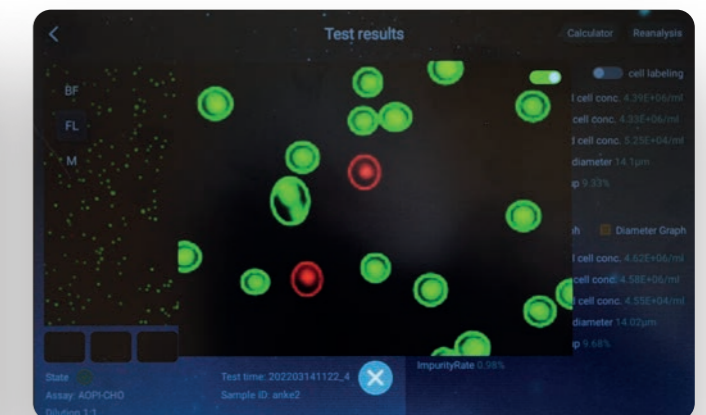
Dilution series of a HEK293 cell sample, showing the high accuracy of Countstar® Mira FL test results



High comparability in viability of different cell samples, tested in a Countstar® Mira FL and flow cytometer (B/C CytoFLEX)

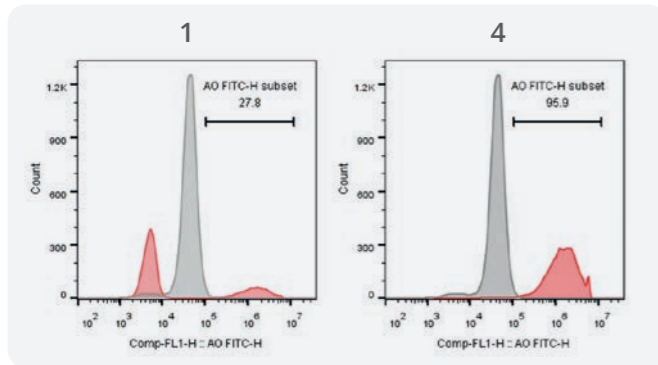


Result view screen of a CHO cell culture sample, stained by AO/PI, showing the bright field images with deactivated labelling (5.0x magnification)



The same sample showing the fluorescence labelling results in an enlarged view - green circles identify the viable cells, red circles identify the dead or dying cells.

# Versatile: Powerful BioApps for Various Cell Types

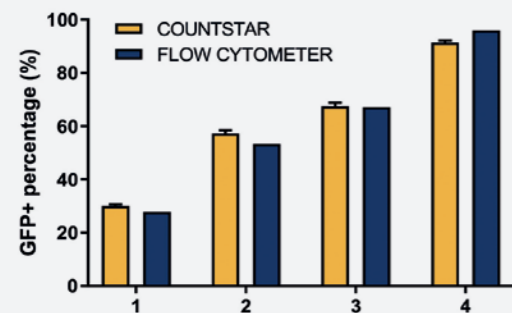


Peak diagrams of samples 1+4 (see below), showing GFP expressing HEK 293 cells, tested in a B/C CytoFLEX, showing a 27.8%, and a 95.9% transfection efficiency rate

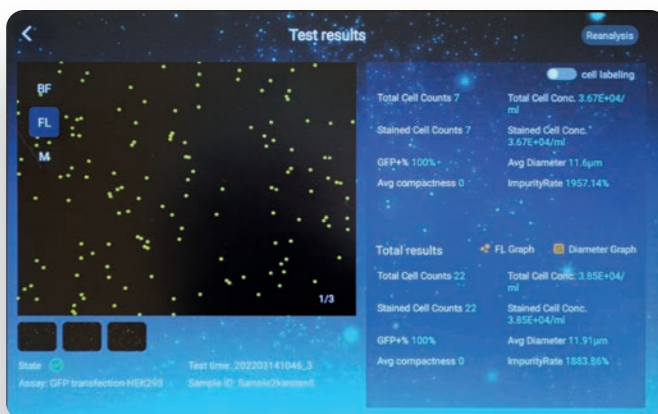
## GFP/RFP Transfection Efficiency BioApps

Using green or red fluorescence proteins (GFP / RFP) to bind them covalently as marker tags to the protein of interest, is a widely established technique to check the transfection efficiency of viral or plasmid vector-based genes. GFP/RFP are reliable tools to quantify the optimization of a protein manufacturing process, and is a fast, and highly precise method to determine the protein yield in many cGMP regulated manufacturing processes of APIs. This labelling technology has also become also an important tool in various gene therapeutic approaches to control the transfection efficiency of the genetical modifications. Compared to flow cytometry, the Countstar® Mira FL does not only deliver comparable results, but provides additionally images, proving the content of questioned cells. All images and data are permanently stored and offers a high level of traceability at any time. Additionally, the imaged based analysis is significantly faster, and needs only 20µL of sample liquid. The Countstar® Mira FL simplifies the analysis workflow, helping to streamline each optimization process.

Comparative analysis of four GFP-transfected HEK 293 cell samples in a Countstar® Mira FL and B/C Cytoflex.



The test data of all 4 samples show an excellent level of correlation between the two devices



Analysis results including image selection in fluorescence view of HEK293 cells, transfected by GFP

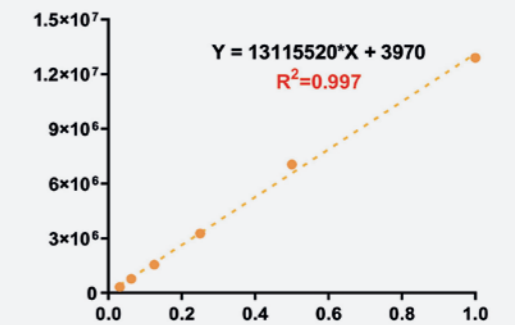


Enlarged segment of image no. 2 / 3 (see left), showing the intensively green glowing, GFP expressing HEK 293 cells

## Trypan Blue Cell Density/ Viability BioApps

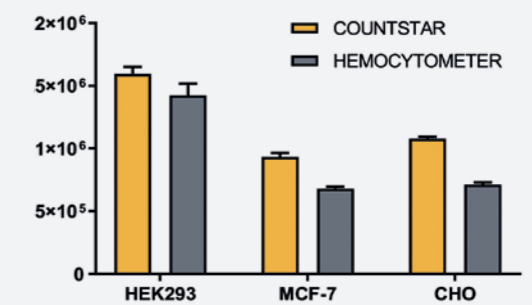
The Trypan Blue based exclusion method is commonly used in many labs to monitor cell culture status and is the gold standard in determination of concentration and viability. Trypan Blue will permeate disintegrating outer membrane structures of dying animal cells, accumulating inside the cell, and staining the cytoplasm blue. Live cells will block the Trypan Blue dye from penetrating their membranes. The viable cells will still appear bright under a microscope. This optical appearance of living and dead cells can be precisely discriminated using the AI based image analysis algorithms of a Countstar® Mira FL. Beyond cell number of dead and viable cells as results, the image analysis of our analyzer delivers additional data about the cells in focus: Cell diameters, aggregate formation, and cell morphology.

Dilution series of a high-density cell sample of human T-cells, monitored at 6.6x magnification

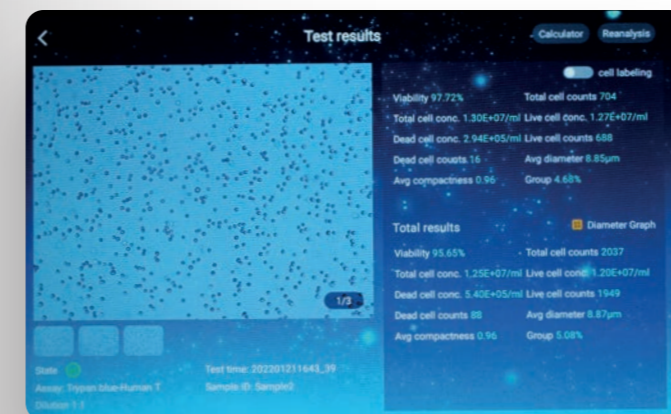


The linear regression value of the total cell density proves the high accuracy and precision of the Countstar® Mira FL technology

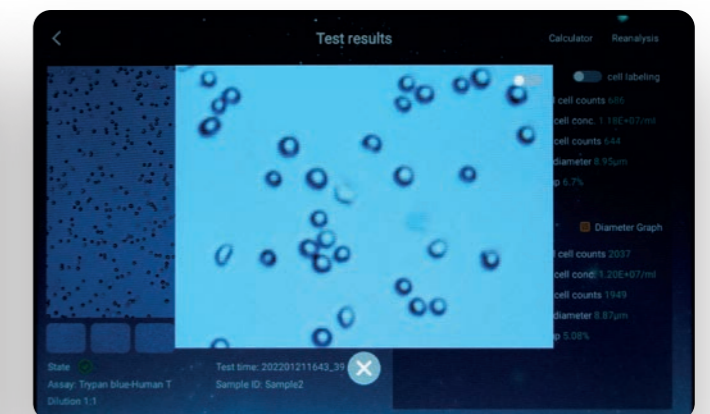
Comparative cell counts of three cell lines in a hemocytometer and a Countstar® Mira FL



Test results of the Countstar® Mira FL show a higher consistency compared to manual counts in a hemocytometer. Undercounts in manual analysis are typical due to lower statistical base quantity



Result and image overview of a human T-cell suspension, stained by Trypan Blue



Enlarged image segment of the sample on the left, showing the variable morphology of the cells.



## Technical Specifications

<b>Bright Field Optical Zoom</b>	5.0x; 6.6x; 8.0x
<b>Fluorescence Optical Zoom</b>	5.0x
<b>Camera</b>	CMOS (color, 5 mega pixels)
<b>Touchscreen</b>	8 inch HD resolution, glove sensitive
<b>Total Conc. Range</b>	1x10 <sup>4</sup> to 3x10 <sup>7</sup> cells/mL
<b>Optimum Conc. Range Range (cv &lt; 5%)</b>	5x10 <sup>5</sup> - 1x10 <sup>7</sup> cells/mL (5.0x) 1x10 <sup>6</sup> - 2x10 <sup>7</sup> cells/mL (6.6x) 1x10 <sup>6</sup> - 3x10 <sup>7</sup> cells/mL (8.0x)
<b>Diameter Range of Detectable Objects</b>	1µm to 180µm
<b>Fluorescence Channels</b>	Ex.: 465-485nm Em.: 535/40nm; 600nm LP
<b>Internal Storage Capacity</b>	128GB (up to 50,000 tests)
<b>USB Ports</b>	2 (USB 2.0)
<b>Dimensions</b>	220mm x 285mm x 240mm
<b>Weight</b>	4kg
<b>Power Requirements</b>	110V -230V / AC, 50Hz / 60Hz

## Ordering Information

	<b>Product Description</b>	<b>Name</b>	<b>Art. No.</b>
<b>Device</b>	Fluorescence Cell Analyzer	Countstar® Mira FL	05 13 01 01 0001
<b>Sample</b>	Countstar® Chamber Slides (50 pcs per box)		00 00 02 04 0001
<b>Assay Kits</b>	AO/PI staining kit (5mL)		00 00 02 01 0922
	AO/PI staining kit (25mL)		00 00 02 01 0923
	0.2% Trypan Blue staining kit (20mL)		00 00 02 01 0120