

The Pioneer in versatile Multiwell plate reading

Since more than 30 years BIOSYS provides versatile automated reader systems for biomedical assays. In the year 1999 the Bioreader® 2000 already did have the capability to read 96 well Microfilter plates as well as clear bottom plates from 6 well to 384 well plates. The first US patent 6,384,989 had been released in 2002!

Since 2012 the Bioreader® models are equipped with powerful fluoro LEDs for Fluoro excitation. In 2024 the illumination and camera of the all new EazyReader® 7000 has been improved significantly for better signal noise ratio.

Versatile reader for popular applications like Elispot, Fluorospot, Viral Plaque counting, CFU's, Clonogenic assays, FOCI and more.

The EazyReader® concept is full **modular and easy to upgrade on-site.**

Footnotes:

1. However, 1 channel is typically reserved for white light.
2. Only done by BIOSYS technician.
3. Report on the CIP multimer proficiency panel ID09_2010_ELI European CIMT Immuno-guiding Program. Available on request.
4. An overview of analytical performance of Bioreader® 7000 -E Alpha with T-Spot®.TB (CPSR / ISO 20916) is available under document TD-305- E.

EazyReader® 7000

Versatile research
FluoroSpot/Elispot/Plaque/FFU/CFU/FOCI
Reader for Microscopic slides, 384/96/48/24/12
and 6 well Microfilter/Multiwell plates

Unique design, modular, easy-to-upgrade. The core unit has following features:

- Manual zoom
- Inverted optics for plate visualization from the bottom of the plates.
- Universal plate adapter
- 2 white light sources with over 300 LEDs
- No Fluoro channels
- 5 MPixel camera

Upgradable options:

- Motorized zoom
- Up to 12 Fluoro channels^{1.)}
- Fluoro LED power and wavelength selector
- Up to 4 objectives (1x - 50x) for magnifications between 6 – 384 wells and down to 400 x 400 µm full field of view.
- Up to 25 MPixel camera

Upgrade on-site possible ^{2.)}

High sensitivity, low noise for Fluorospot

The 7th generation technology stands for a **higher sensitivity** for fluorophores and an even better signal noise ratio.

Harmonized Elispot reading

Our reader was used as central analyzer and did demonstrate the capability of harmonized Elispot reading worldwide.^{3.)} Also, a recent clinical performance study documents the excellent accuracy and reproducibility of our readers.^{4.)}

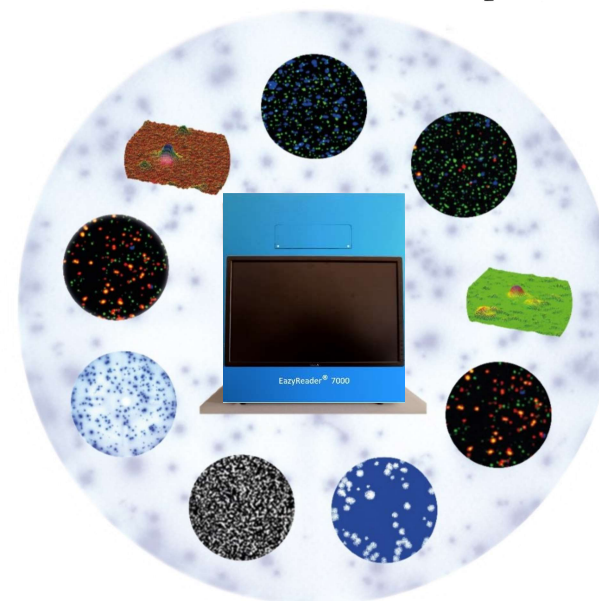


Figure 1: Symbolizes the versatility of our EazyReader® 7000

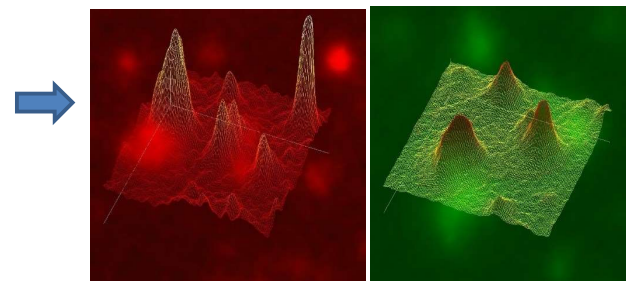


Figure 2: Fluoro 3D highly sensitive spot quantification

Cytokine volume quantification for enzymatic and fluoro assays

By use of the dual transmission/reflection illumination for enzymatic spots the quantification quantifies the 'volume' of each single spot and is more accurate. Total cytokine secretion (TOD) is monitored to determine drug and vaccine efficiency.

Full-field-of-view for Multiwell/Multifilter plates.

The EazyReader® 7000 provides an automatic zoom range for full-field-of-view of 35mm Petri dishes, 6 - 384 well plates and max. 400 x 400 µm zoom factor on microscopic slides or hemocytometer.

Optical resolution for good shape recognition:

- Single cells in the range of 5-15 µm⁽¹⁾
- FOCI 10 - 2000 µm
- Plaque 100 - 5000 µm
- Cell clones 50 - 2000 µm

⁽¹⁾ Depending on the selected front lens on the microscopic zoom (1x - 50x).

One plate analyzed with more variant protocols

You may apply more than one measure protocol /well, in case of extreme varying donors' signals.

The 'Quality Management' tools

The 'Quality Management' tools allow to reanalyze groups of wells or the entire plate, step by step. You may modify the measure protocol and after that apply it to the entire plate or groups. Manual count (+ and -), remove and extrapolate nonspecific regions, set to zero, set comments, visualization without the margin is implemented.

Quality criterion like background intensity, 'borderline spots' characteristic of spots may be monitored within the well images.

Certificates and declarations

BIOSYS is ISO 13485:2016/2021 certified.

EC declaration of conformity with required product standards/norms like EMC and safety norms available.

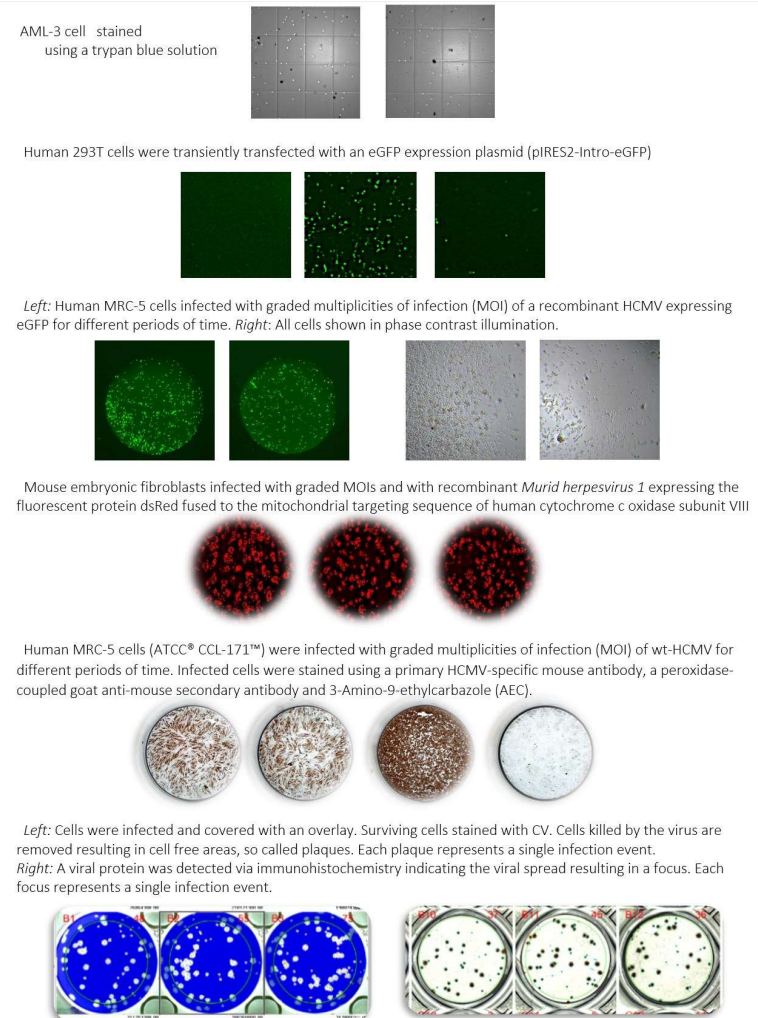
Long lifetime

The Power LED excitation and unlimited free software update during lifetime of the software generation support warranties long live time.



Experiment	Well	Spots/Well	Average Values		Cumulated values		TOD***
			Intensity *	Area [µm²]	Area ** [µm²]		
MOCK	A1	98	77	1.652	21.749	16.647	
CMV	A2	406	148	8.920	506.163	750.868	
FLU	A3	295	90	2.694	158.181	142.250	
EBV	A4	379	108	4.201	281.427	303.713	
MOCK	A5	236	69	743	25.506	17.628	
CMV	A6	516	153	6.800	491.605	753.905	
FLU	A7	263	113	5.516	266.509	302.021	
EBV	A8	456	113	3.820	326.013	367.749	
MOCK	A9	302	71	864	36.018	25.648	
CMV	A10	459	154	7.595	467.946	719.518	

Figure 3: Please compare well A2 and A3. A2 creates significant more cytokine / spots



Automatic cluster separation and differentiation between 'true' and 'false' spots
 Based on the patented ^{1.)} dual illumination that combines transmission and reflection, a better **separation of spots cluster** is achieved.

An additional effect is that 'true' spots that do have a 'halo' are recognizable to an unknown quality.

Export of Data and Images

Reanalyze/Export individual wells, groups of wells (for instant donor 1, 2, etc.) to Excel (preferred), Word, PowerPoint or PDF.

Total spot area, well description and size distribution may be exported too.

A triple Fluoro-assay creates a maximum of 7 * 96 well = 672 images of very good quality. In this case 7 results spreads with counts and images may be created

		1	2	3	4	5	6	7	8	9	10	11	12
A													
B													
C													
D													
E													
F													
G													
H													
		137	137	180	176	69	61	55	46	35	22	48	48

Quadro Fluoro-assays may additionally create 2 new results spreads with counts and images.

^{1.)} US Patent 6,597,522 B2 / Euro Patent 1 122 576

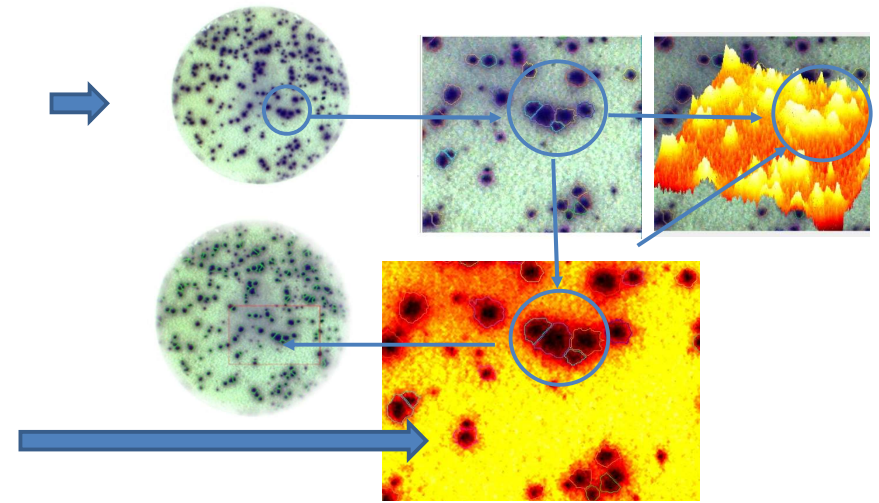


Figure 6: Intensity diagram visualizes 'true' spots by its 'Halo'. Cluster separation is achieved by the dual illumination.

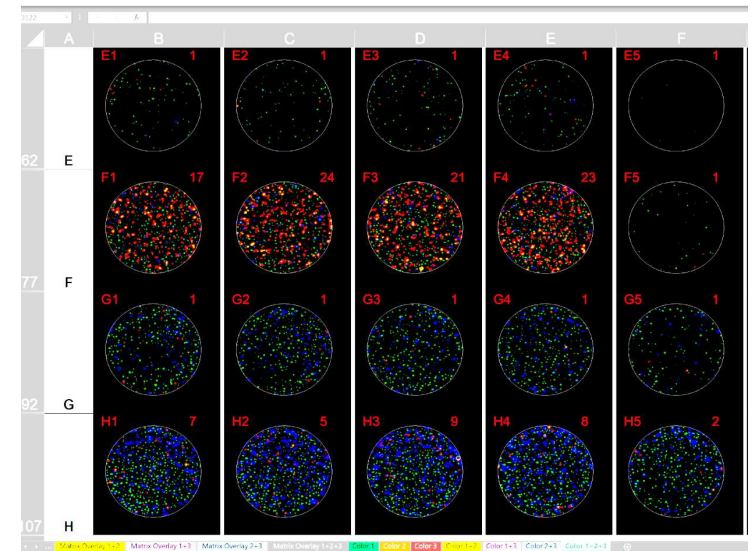
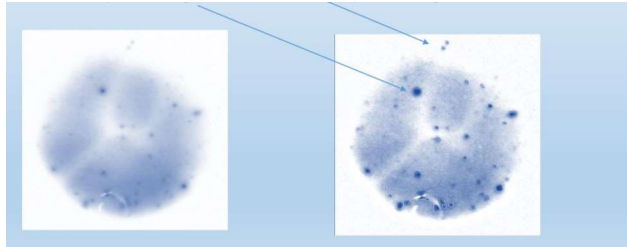


Figure 7: Excel spread with result matrixes and 7 worksheets with images and overlay images of triple Fluorospot.

Local neighborhood performs background-independent counting and cytokine/IHS quantification

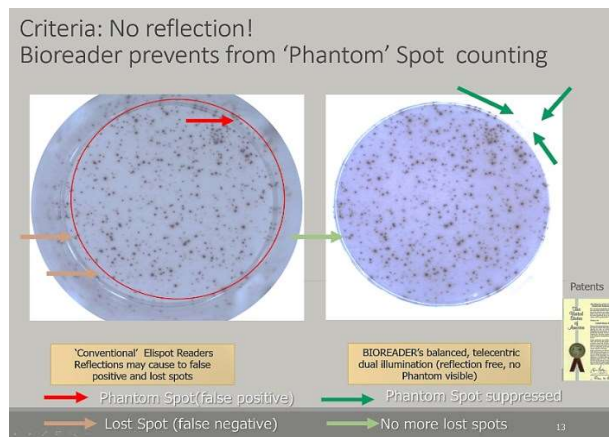
This technology considers the local background around a spot. This way 'low intense spots' in low background areas as well as intense spots in intense areas are recognized and quantified correctly.



Automatic well recognition/well centering by use of reflection suppression

Because of the molding process during the Multifilter/Multiwell manufacturing, the well-to-well distance is not equal. The patented dual illumination suppresses reflection on clear Multifilter plates.

For other plate types and fluorophores, we developed the **automatic well recognition** to capture the entire well automatically even on fluoro plates.



BIOSYS USA LLC

444 Brickell Avenue Suite 700 Miami, FL 33131 USA
Tel.: office +1 (305) 702-0029 direct +1 (305) 942-7279
Email: info@biosys.us Web: www.biosys.us

BIOSYS Scientific Devices GmbH

Kiefernweg 10 61184 Karben Germany
Tel: +49 (0)6039 / 9210-0
Email: info@biosys.de Web: www.biosys.de

Revision 2
Sept. 2024