

OCTOPLUS QPLEX

4 color fluorescence | chemiluminescence | vis detection fast & powerful large area imaging

HIGH QUALITY - MADE IN GERMANY



Octoplus QPLEX

The Octoplus QPLEX sets a novel standard for high power multiplex fluorescence large area imaging as well as sensitive chemiluminescence. It combines the sensitivity of laser-based systems with the rapid image acquisition of CCD cameras. The system introduces the latest improvements in fluorescence excitation and emission detection technologies.

The Octoplus QPLEX is developed for the specific 4-color multiplex (QPLEX = quadruplex) fluorescence imaging of e.g. gels and Western blots and other objects with a maximum size of 25×20 cm.

In order to meet you specific needs, the Octoplus QPLEX can be configured in different fittings according to your needs (e.g. 2, 3 or 4 different fluorescent LED modules, specific filters, white light transmission module). These parts can also be installed at a later point of time.

The robust setup of the device is designed for daily use and is easy in maintenance.

Made in Germany



Application Pool

The Octoplus QPLEX is a versatile instrument designed for large area high sensitivity multiplex fluorescence, chemiluminescence and optional VIS applications.



Multiplex Fluorescence 1D Gels



52 sample SDS-PAGE (VELUM Gold Precast 1D Gel + SPL)



Multiplex Fluorescence Western Blots



25 sample Western Blot (VELUM Gold Precast 1D Gel + SPL)





25 sample Western Blot (VELUM SAR Precast 1D Gel, ECL + SEPO)



25 sample Western Blot (VELUM SAR Precast 1D Gel, ECL)



24 cm 2D DIGE gel analysis (Refraction-2D QPLEX)



Multiplex Fluorescence 2D Gels

Chemiluminescence

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Optional: White Light Transmission



²⁵ sample SDS-PAGE (VELUM Silver Precast 1D Gel + Coomassie)

Large Image Detection Area

The Octoplus QPLEX comes with a 39 x 37 cm pull-out sample tray. The area of homogenous fluorescence image detection is 25 x 20 cm. The system can be equiped with imaging trays for 1D or 2D gels and blots. Customized sizes are available, too.





"The combination of the Octoplus QPLEX and the customized fluorescent labeling kits from NH DyeAGNOSTICS saves us much time and effort in the daily routine protein diagnostics."

Dr. Jan Bartel, Labor Limbach, Heidelberg

Fluorescence Chemiluminescence Western Blot imaging

- epi blue high power fluorescence
 - epi green high power fluorescence
 - epi red high power fluorescence
 - epi infrared high power fluorescence
 - sensitive chemiluminescence

Western Blot target detection

Target detection by immunoblotting ususally demands a very sensitve detection of either signals from fluorescent-conjugated antibodies or, if the target is very low abundand, from chemiluminesce. The Octoplus QPLEX is therefore equipped with both, powerful fluorescence detection (e.g. red and infrared) and a highly sensitive chemiluminescence detection.



Image acquired by Octoplus QPLEX



Image acquired by LiCOR Odyseey



Courtesey by Dr. M. Kappler, Medical University Halle (UKH), Germany

Smart Protein Layers (SPL) Kit for Real-time Normalization of Western Blots

The Problem of WB Normalization

Western blot analysis is a method to detect a target protein by immuno-chemistry in a complex sample.

The technique includes protein separation, its transfer to a membrane and diverse washing and antibody incubation steps.

Reliable comparison of detected target signal intensities between different samples requires an appropriate way of normalization.

Reported fold changes of the target protein must not be based on an artifact of a reference signal (e.g. saturated pixel) and/ or experimental errors.

The Solution

Smart Protein Layers (SPL) is an add-on kit for the detection of sample proteins present on the blot at the same time the target is immunodetected.

SPL is based on two components:

i) fluorescent SPL Labels bound to the total protein during the sample heating step prior separation,

ii) bi-fluorescent SPL Standards in the loading buffer monitoring sample load, sample content, labeling effiency, enable automated data evaluation.





Lane	1	2	3	
Signal intensity px (AU)				
Target	1.890	2.230	3.480	
Reference real-time total	42.640	44.240	35.770	
normalized Target	1,00	1,14	1,54	

Principle



SPL Benefits

- real-time total protein detection in gels and blots
- normalization of the protein content between samples
- step-by-step monitoring of the complete Western Blot workflow
- precise normalization of the target protein expression in Western Blots
- accurate comparison of target protein expression between different experiments





"Multiplex fluorescence 2D gel analysis helps us to identify novel protein biomarkers for cancer therapy." Prof. Dr. Dr. Jens Habermann, University of Lübeck

> "We very much appreciate the rapid 2D gel image acquisition by a highly specific and sensitive CCD camera based system." Dr. Christian Scharf, Medical University Greifswald

Quadruplex fluorescence 2D gel imaging



Ultra-sensitive 4-color fluorescence detection

High resolution 2D gel imaging

Rapid image acquisition

Quadruplex fluorescence 2D gel imaging

The Octoplus QPLEX is a very powerful device for multiplex 2D gel imaging such as Refraction-2D[™] and Saturn-2D[™] analysis. The powerful combination of carefully developed system components for fluorescence light excitation and detection create a perfect system for sensitive image acquisition.

The image acquisition of a Refraction- $2D^{TM}$ QPLEX gel size 24 x 20 cm (images for G-Dye100, G-Dye200 G-Dye300 and G-Dye400) is performed within minutes. A complete series of gels (e.g. six Refraction- $2D^{TM}$ QPLEX gels) can be acquired in less than one hour.



Refraction-2D[™] QPLEX analysis of three different *Arabidopsis thaliana* ecotypes.

G-Dye100 + G-Dye200 + G-Dye300 + G-Dye400 = 5 min image acquisition



G-Dye100 image

Octoplus QPLEX Blue HP LED, G100BP filter Bit depth: 16 bit Gel size: 24 x 20 cm, pH 3-10 Sample: 50 µg total protein from *E. coli* Fluorescent label: G-Dye200



G-Dye200 image

Octoplus QPLEX Green HP LED, G200BP filter Bit depth: 16 bit Gel size: 24 x 20 cm, pH 3-10 Sample: 50 µg total protein from *E. coli*



Octoplus QPLEX Red LED, G300BP filter Bit depth: 16 bit Gel size: 24 x 20 cm, pH 3-10 Sample: 50 µg total protein from *E. coli* Octoplus QPLEX Infra Red LED, G400BP filter Bit depth: 16 bit Gel size: 24 x 20 cm, pH 3-10 Sample: 50 µg total protein from *E. coli*

Sensitivity of fluorescence 2D gel imaging

Latest developments in high power LED technology (light emitting diode) combined with a high quantum efficiency CCD sensor (charge coupled device) over a spectrum from 470 to 780 nm enables the Octoplus QPLEX system to compete with laser based fluorescence imaging devices (fig. 1+2).

Octoplus QPLEX



Fig 1. Green HP LED; G200BP filter; bit depth: 16 bit; gel size: 24 x 20 cm, pH 4-7; Sample: 50 μg total protein from *E. coli* pre-labeled with G-Dye100 (minimal labeling); Detailed view of the 2D gel shown below.

Typhoon FLA 9000



Fig 2. 532 nm green SHG laser; LPG (575LP) filter; bit depth: 16 bit; gel size: 24 x 20 cm, pH 4-7; Sample: 50 µg total protein from *E. coli* pre-labeled with G-Dye100 (minimal labeling); Detailed view of the 2D gel shown below.

Image acquired by Octoplus QPLEX



Scan acquired by Typhoon FLA 9000



Acknowlegement: The 2D gel was provided by courtesy of Prof. Dr. Dr. J. Habermann, and Prof. Dr. T. Gemoll, University of Lübeck, Germany

Fluorescence Specificity (Crosstalk)

Multiplex fluorescence imaging requires highly specific fluorescence light excitation and emission. The Octoplus QPLEX is equipped with a fine tuned set of 4 highly specific excitation and emission band pass filters.

To test for detection specificity 4 x 5 µg of *E. coli* total protein was pre-labeled with G-Dye100, G-Dye200, G-Dye300 and G-Dye400 and separated by 1D SDS-PAGE (lanes 1-4, lane 5: QPLEX pre-labeled protein marker), figure right. To analyze filter specificity (crosstalk), the specific lane was detected by using the corresponding excitation (HP LED respectively laser) and emission filter set (figures below).



G-Dye100 - 400 overlay Image acquired by Octoplus QPLEX

| 100 200 300 400 M |
|-------------------|-------------------|-------------------|-------------------|
| G-Dye100 image | G-Dye200 image | G-Dye300 image | G-Dye400 image |
| Blue HP LED | Green HP LED | Red HP LED | IR HP LED |
| G100BP filter | G200BP filter | G300BP filter | G400BP filter |

Octoplus QPLEX

Typhoon FLA 9000

100 200 300 400 M	100 200 300 400 M	100 200 300 400 M	not available
G-Dye100 scan	G-Dye200 scan	G-Dye300 scan	
Blue LD laser	Green SHG laser	Red LD laser	
LPB (510LP) filter	LPG (575LP) filter	LPR (665LP) filter	

Signal linearity

The Octoplus QPLEX system detects fluorescent signals from minimally pre-labeled proteins (one fluorophore per protein) in the lower nanogram range. Even for this low amount of protein, the signal linearity remains at an ideal level (R^2 = 0.996 [fig.6.]).



Fig. 6. Serial dilution of BSA minimally labeled with T-Rex 330. Proteins were separated by SDS-PAGE and then imaged using Octoplus QPLEX. Signal intensities were analyzed by LabImage 1D analysis software.

Dynamic range

The dot blot experiment (Fig. 7) shows a linear dynamic range of 4-5 decades.



Fig. 7. Serial diluiton of G-Dye200 fluorescent label. The dye was directely spotted onto a low-fluorescent blotting paper and imaged by Octoplus QPLEX. Signal intensities were analyzed by LabImage 1D analysis software.

Chemiluminescence

With a superior CCD chip, a lab quality lens and a 4-5 orders of magnitude dynamic range Octoplus QPLEX captures chemiluminescence at the highest performance available on the market.



Fig. 8. Serial dilution of Casein. Proteins were separated by SDS-PAGE, then transfered by Western blotting onto a nitrocellulose membrane. The blot was subjected to a Casein antibody and then to a HRP-conjugated secondary antibody. The proteins were detected by ECL (Pierce) with an Octoplus QPLEX imaging time of 2.5 min.

Colorimetric applications (optional)

The optional white light transillumination module allows perfect imaging of silver or Coomassie® blue stained gels.



Fig.9a and 9b. Colorimetric image detection of Coomassie® blue stained 1D and 2D gels.

Octoplus QPLEX Instrument specifications I

RGB Power Fluorescence



Pulsed High Power LEDs (penta pattern) for excitation of blue (e.g. G-Dye100, Cy2, Alexa488,...), green (e.g. G-Dye200, Cy3, Alexa 532) and red (e.g. G-Dye300, Cy5, LiCOR CW700, Alexa 647) fluorophores. To prevent any crosstalk the emitted light is specifically filtered by LED and lens band pass filters.

IR Power Fluorescence



Pulsed High Power LEDs (penta pattern) for excitation of IR fluorophores (e.g. G-Dye400, LiCOR CW800). To prevent any crosstalk the emitted light is specifically filtered by LED and lens band pass filters.

Chemiluminescence Detection



High Sensitivity

High sensitivity chemiluminescence detection. Different binning and auto exposure modes.

High sensitivity due to strong fluores-

cent excitation and sensitive photon

detection using a Peltier cooled scientific CCD camera with 6.1 MP and

true 16 bit data acquisition.

Large Imaging Area



The special design of the device hard- and software allows for the large detection area of 25×20 cm for homogenous multiplex fluorescence imaging.

Rapid Image Acquisition



The acquisition of fluorescent images is very fast, e.g. Western Blots: 0.2 -1.0 sec per fluorophore, for 1D gels 1-2 sec per fluorophore, for 2D gels 10-45 sec per fluorophore.

Low Maintenance



Designed for daily usage the sytems robust inner and outer parts ensure for low maintenance costs and provide a long life time.

Expert Support



We provide remote- and hands-on technical and application support.

Made in Germany



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Octoplus QPLEX Instrument specifications II

CCD Camera	Scientific grade, 6.1 MP, true 16-bit, Peltier cooling (ΔT -35 K)
Quantum efficiency	525 nm ≈ 75%, 575 nm ≈ 77%, 665 nm ≈ 67%, 780 nm ≈ 60%
Dynamic range	> 4 orders of magnitude
Binning modi	1x1, 2x2, 3x3, 4x4, 5x5
Lens	Schneider-Kreuznach (F 0.95/ 25 mm)
Focusing	Precalibrated focus and image flat fielding
Fluorescence unit	IR + Red + Blue + Green high performance LED units including specific BP filters and diffusor lenses
Filters (standard)	G100BP (blue), G200BP (green), G300BP (red), G400BP (IR) other filters on request
Max. image area	20 x 25 cm
Sample tray	Pull-out sample tray 39 x 37 cm
Operating system	Windows 10, monitor 24 inch
Operating temperature	Up to 30°C
Operating voltage	230 V, 50 Hz
Size (w x h x d)	51 cm x 80 cm x 51 cm
Weight	Approx. 40 kg

Ordering information

PR435 Octoplus QPLEX

- Quadruplex HP LED module
- (specific blue, red, green & infra red fluorescence detection)
- Quadruplex emission filter set
- Chemiluminescence
- Image capture software
- Control unit and display
- PR132 White-light transmission module
- PR989 LabImage 1D SPL: software for quantitative 1D gel and Western Blot analysis
- PR994 LabImage L360: software for automated quantitative 1D gel and Western Blot analysis
- PR134 Delta2D: software for 2D gels and 2D Western Blot analysis

Related products

- PRA203 Imaging Tray for precise positioning of gels and blots (customized size)
- PR04 Low fluorescent glass cassettes, size 27.5 x 21.5 cm

Related consumables

Please refer to our website https://www.dyeagnostics.com/site/en/products/

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