



FDSS[®]7000

Functional Drug Screening System

Calcium ion measurement

Membrane potential measurement

Ion channel measurement

Aequorin measurement

Luciferase measurement

FRET measurement



HAMAMATSU

HTS-compatible dispensing and imaging system accelerates cell-based assays for drug discovery



Reliable imaging based plate reader for HTS cellular assays and assay development

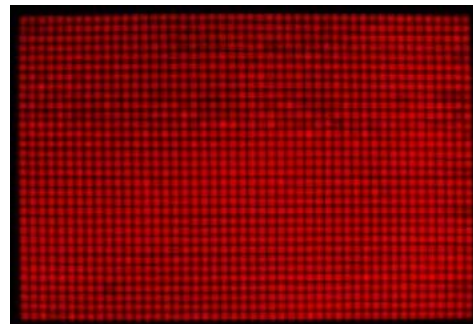
The cell-based assay has become a more and more important technique in drug discovery screening since it effectively evaluates potential drug candidate compounds using cultured cells transformed with receptor genes and reporter genes and various types of fluorescent and luminescent probes. The FDSS (Functional Drug Screening System) series is a powerful, high throughput screening device that optically detects complicated signal transmissions within a living organism to develop or discover new drugs and lead compounds. Based on the current model FDSS6000 that has received world-wide acclaim, Hamamatsu introduces the FDSS7000 - the top-rated model with the addition of diverse new functions including 1536 dispensing tips and multiple wash tanks. The FDSS7000 continues to offer real-time kinetic analysis of various types of both nonadherent and adherent cells. Field upgradable components including the 'FRET attachment', robotics integration, additional heads, and more allow for a customized system for you now and in the future.

Dual dispenser

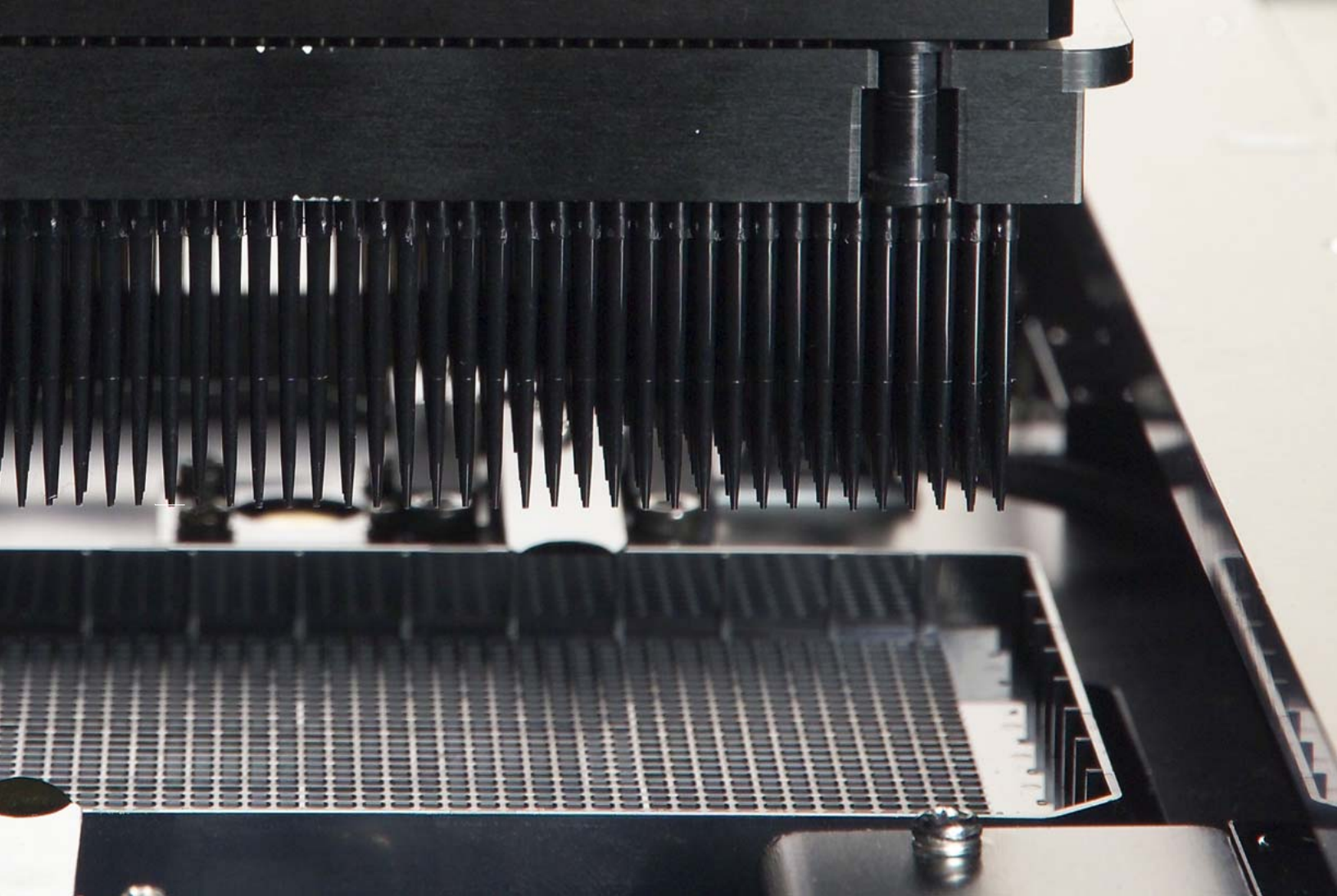
- Newly released 1536 disposable tip head
- High speed movement of dispenser head
- Protocols support two heads

Multi-washing units with ultrasound

- Up to 3 tip washing stations
- Ultrasound cleaning
- Wiping stage to dry tips



▲ 1536 well simultaneous



New sensor for detecting weak luminescence

- Improved sensitivity over current photon detector
- Best luminescence detection available on the market

Excitation and emission wavelength flexibility

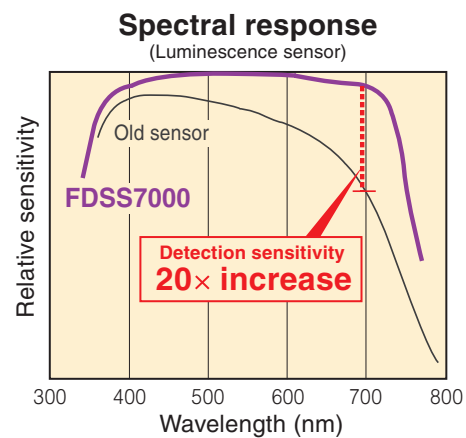
- Dual excitation ratiometric dyes (Fura-2)
- Dual emission dyes (VSP-1, Premo™)
- Multiplexing calcium and membrane potential

Plate shaking function

- Throughout assay to improve compound dispersion immediately after addition
- Useful with nonadherent cells

User-friendly software

- Fast and easy protocol design
- Multiple parameters are color coded



Hardware



Fully integrated system with flexible design



Plate stacker

- Possible to stack up to 50 plates
- Easy-to-set plates by using stacker cassettes
- Lid remover
- Barcode reader

High speed loading

- High speed loading
- Up to 2 loading lines
- Front side line: for fluorescence measurement
- Back side line: for luminescence measurement
- Plate mixing function



Luminescence optics

- Combining 2D photon counting sensor directly coupled with high efficiency fiber optics results in ultrasensitive signal detection
- Aequorin flash luminescence detection

Fluorescence optics

- Dual excitation wavelength changer (i.e. Fura-2)
- Homogeneous exposure of excitation light over microplate

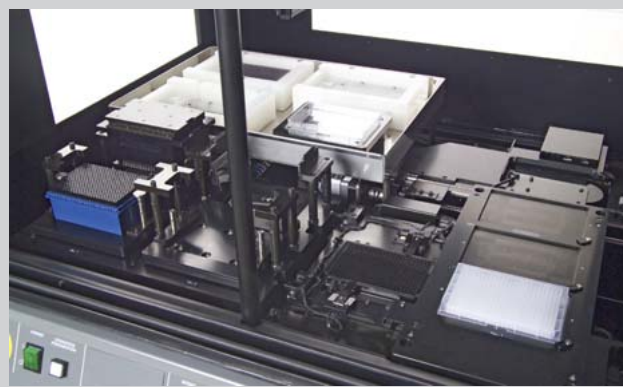


Dispenser

- Available for various assay protocols with dual dispensing head and single dispensing head
- Automatic tip loading
- Possible to place up to 3 ligand (compound) plates

Washing unit

- Up to three solvent washing stations plus ultrasound
- Wiping stage to dry tips

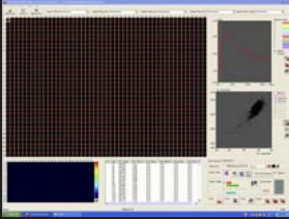


Excitation light source unit

- Excitation wavelength exchanger with spectro-filter
- 1 (150 W) and 2 lamps (300 W): for 96 and 384 well format
- 4 lamps (600 W): for 96, 384, and 1536 well format



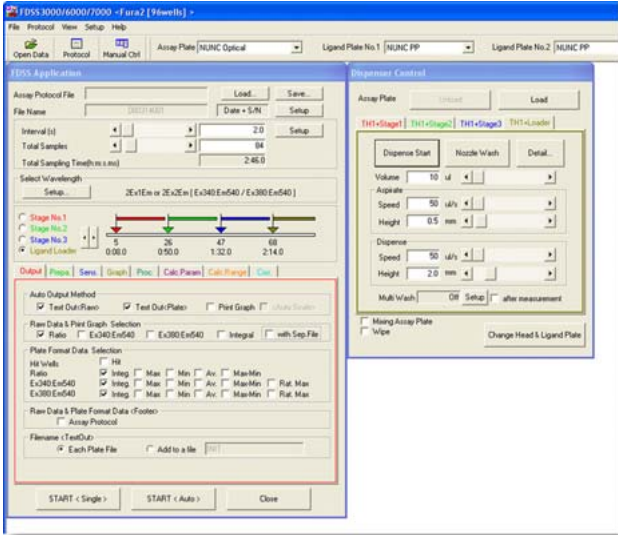
▲ 300 W type



Easy-to-program software protocols for complex experiments

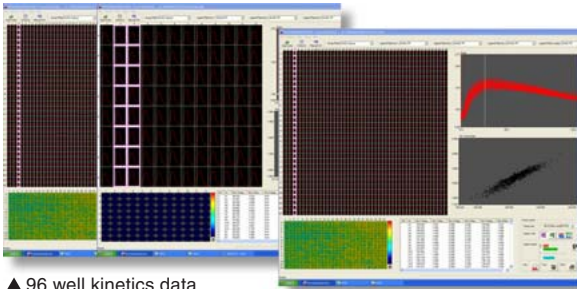
1. Setup protocol

- Program number of readings and reading interval
- Program up to 4 fluid additions from 4 positions
- Automatic data export following experiment



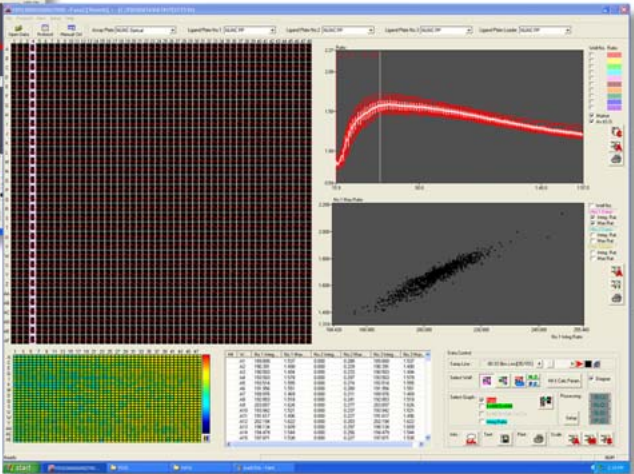
2. Measurement/Analysis

- Display live data during assay-auto scale, subtract bias, etc.
- User-defined control of wells and reading ranges of subtract bias, negative control, positive control **NEW**
- Calculation of peak and hit wells
- Capture of live image readings
- Batch output of raw data, calculated data in txt files



▲ 96 well kinetics data

▲ 384 well kinetics data



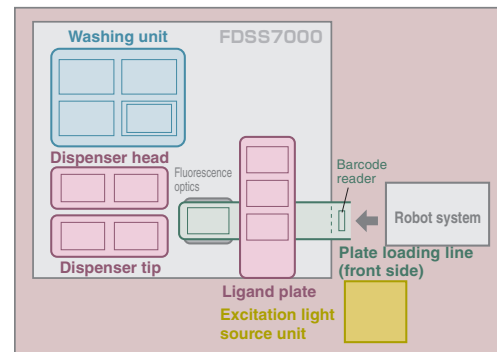
▲ 1536 well kinetics data

System configuration

Upgradable modular system suitable for both assay development and high throughput screening

Type 1 Measurements via robot connection

Connecting the FDSS7000 to a suitable robot system allows efficient operation in HTS assays that use luminescent genes and fluorescent dyes such as Fura-2, Fluo-3, Fluo-4, and CoroNaRed. Compared to former Hamamatsu products, the FDSS7000 delivers improved throughput by shortening the plate conveying and movement times. Besides batch ligand dispensing by the high-precision multi-position dispensing head, agonist-antagonist evaluations by multiple ligands can be performed in just one test. This will drastically cut the time needed for screening. The newly developed 1536 dispensing technique also saves large quantities of cells and reagents normally consumed during testing. When dealing with large numbers of plates, attaching a barcode to each plate allows automatic recognition and recording of the plates.

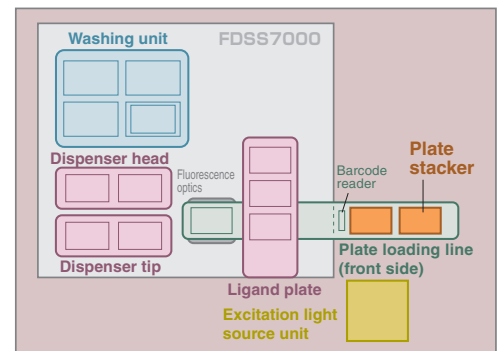


Type 2 Fluorescence measurements

Calcium ion assays are in ever increasing demand in areas such as lead discovery, pharmacological study, and food product function research. The FDSS7000 supports various types of ion channel assays such as Na^+ , K^+ , Cl^- , and pH, as well as calcium ion assays using fluorescent dyes such as Fura-2, Fluo-3, and Fluo-4.

By changing the optical filters, the FDSS7000 detects fluorescence that occurs in a spectral range from 370 nm to 750 nm by the excitation of ultraviolet to near infrared light.

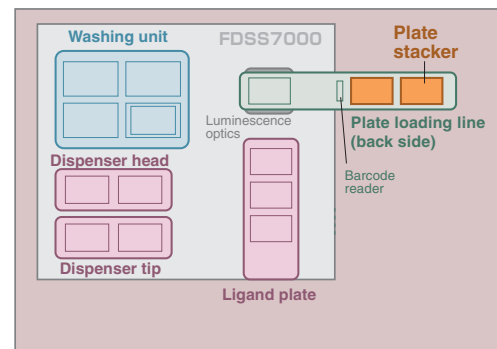
The graph of each well and plate images are displayed in real-time, so cell reactions can be checked during measurement, and the acquired kinetic data can be analyzed and output in text format.



Type 3 Luminescence measurement

The FDSS7000 is ideal for calcium ion assays using a calcium-sensitive photoprotein "aequorin" along with reporter gene assays that make use of luciferin-luciferase reactions, high-sensitivity protein interaction analysis (two-hybrid assays), and luminescence experiments where the amount of light emissions cannot be predicted.

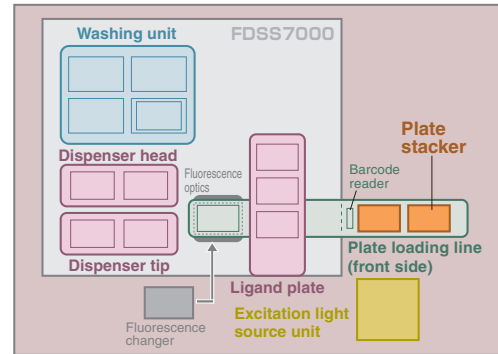
The sensor unit is capable of photon counting integration that enables detection in an extremely short time impossible until now using conventionally cooled CCD. The sensor unit also provides the highest detection level in this field, making it ideal for accurate quantitative measurement. Compared to prior Hamamatsu products, the resolution has been enhanced and the crosstalk between wells significantly reduced.





Type 4 FRET measurement

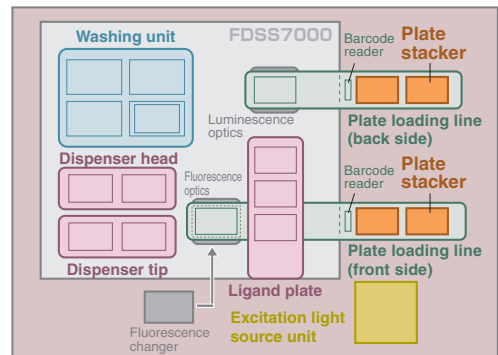
The FDSS7000 is utilized in assays where two different fluorescence wavelengths are measured, for example FRET probes (VSP-1, Premo™), cAMP dyes (FICRHR), simultaneous calcium and membrane potential dyes (multiplexing), and dual reporter gene assays (GFP and DsRed).



Type 5 Fluorescence and luminescence measurements

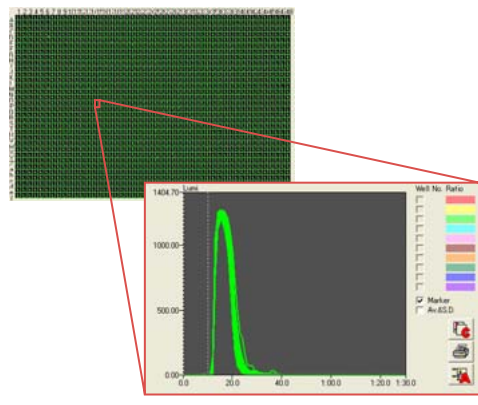
The FDSS7000 can also be used to measure reactions over a vast range of biologic interactions (receptors, enzyme activity, ligand interaction, second messenger level, DNA, RNA, proteins, peptides, sugars, low-weight molecules).

The FDSS7000 is a stand-alone system integrated with powerful functions for cell-based kinetic assays, being capable of detecting a wide variety of fluorescent and luminescent phenomena utilizing 96, 384, and 1536 well plates. Compared to previous Hamamatsu products, less time is now required for screening and the amount of reagents consumed during testing has been significantly reduced. Moreover, the newly developed dispensing heads (96, 384, and 1536 heads) are designed to be easily replaceable by the user. The high-power excitation light source yields a wide range of excitation wavelengths that allow setup of assay systems in applications other than the currently used calcium ion assays and membrane potential assays. The luminescence sensor used in the FDSS7000 features higher resolution and lower crosstalk between wells than in prior Hamamatsu products.

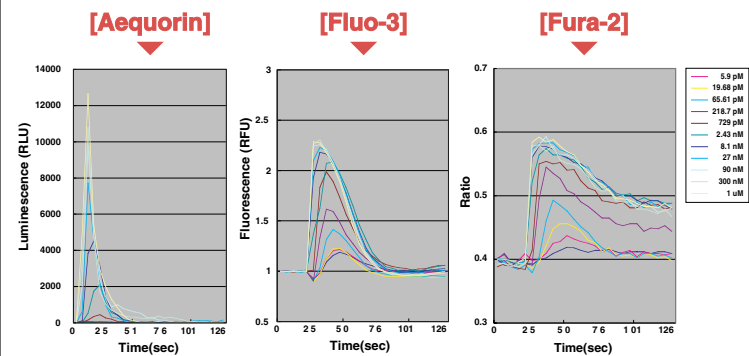


Measurement examples

Aequorin measurement (Type 3)



Ca ion measurement (Type 5)



Specification



Dispenser: Up to 2 dispensers (Selectable)	
1536 tip type	Please consult with our sales office for details.
384 tip type	1 μ l to 30 μ l (5%CV at 5 μ l)
96 tip type	10 μ l to 200 μ l (3%CV at 10 μ l)
Other function	Automatic tip loading

Washing unit	
Washing function	Up to 3 solvents washing / with ultrasound
Wiping stage	Automatic tip wiping

High sensitivity 2D sensor (Selectable)	
Sensor for fluorescence	High speed, high sensitivity digital CCD camera
Sensor for luminescence	High sensitivity 2D photon counting camera (option)

High power excitation light source unit	
Type 1	150 W Xe lamp
Type 2	300 W Xe lamp (150 W x 2)
Type 3	600 W Xe lamp (150 W x 4)
Excitation wavelength	340 nm, 380 nm, 480 nm (standard configuration)
Others	Other wavelength ranges are also available (option)

* It is impossible to change from Type 1 to Type 3 later

Plate loading line: Front side line, Back side line, Front and Back side line	
Plate stacker	Feeding/Storage, Up to 50 plates Cassette form
Plate mixing function	Variable speed
Trituration function in wells	By driving tip
Plate incubation function	Temperature setting is possible
Other function	Lid remover (option) Barcode reader (option)

Data analysis system	
Control	Plate loading, dispenser, high sensitivity 2D sensor, and high power excitation light source unit
OS	Windows XP
Data analysis software	1536, 384, and 96 well real-time display
Data output	Data filing and output in text format

System footprint/weight	
FDSS7000 main unit	Approx. 1500 mm(W) x 1030 mm(D) x 1450 mm(H)
	Max. Approx. 300 kg
	AC100 V to 230 V / 15 A
Data analysis system	600 mm(W) x 1511 mm(H) x 700 mm(D) Approx. 50 kg

User application					
	Excitation filter 1	Excitation filter 2	Dichroic mirror	Emission filter 1	Emission filter 2
Fura-2 (Ca ²⁺)	340 nm	380 nm	UV	520 nm to 560 nm	-
SBFI (Na ⁺)	340 nm	380 nm	UV	520 nm to 560 nm	-
PBFI (K ⁺)	340 nm	380 nm	UV	520 nm to 560 nm	-
MQAE (Cl ⁻)	360 nm	-	UV	440 nm to 470 nm	-
DAPI (DNA)	360 nm	-	UV	440 nm to 470 nm	-
VSP-1	387 nm	-	for VSP-1	465 nm	565 nm
CFP/YFP	440 nm	-	for C/Y	475 nm	535 nm
Fluo-3, Fluo-4 (Ca ²⁺)	480 nm	-	B	520 nm to 560 nm	-
Calcium Green (Ca ²⁺)	480 nm	-	B	520 nm to 560 nm	-
Sodium Green (Na ⁺)	480 nm	-	B	520 nm to 560 nm	-
BCECF (pH)	480 nm	450 nm	B	520 nm to 560 nm	-
GFP	480 nm	-	B	520 nm to 560 nm	-
FITC	480 nm	-	B	520 nm to 560 nm	-
YFP	500 nm	-	for Y	542 nm	-
Di-8-ANNEPS	480 nm	-	B	645 nm long pass	-
JC-1	540 nm	-	for JC-1	570 nm to 600 nm	-
CoroNaRed (Na ⁺)	531 nm	-	G	560 nm to 640 nm	-
Rhod-2 (Ca ²⁺)	560 nm	-	G	590 nm to 650 nm	-
Rhodamine	560 nm	-	G	590 nm to 650 nm	-

Options

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