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Functional Drug Screening System
FDSS7000EX

May 2011

HAMAMATSU PHOTONICS K.K.
SYSTEM DIVISION

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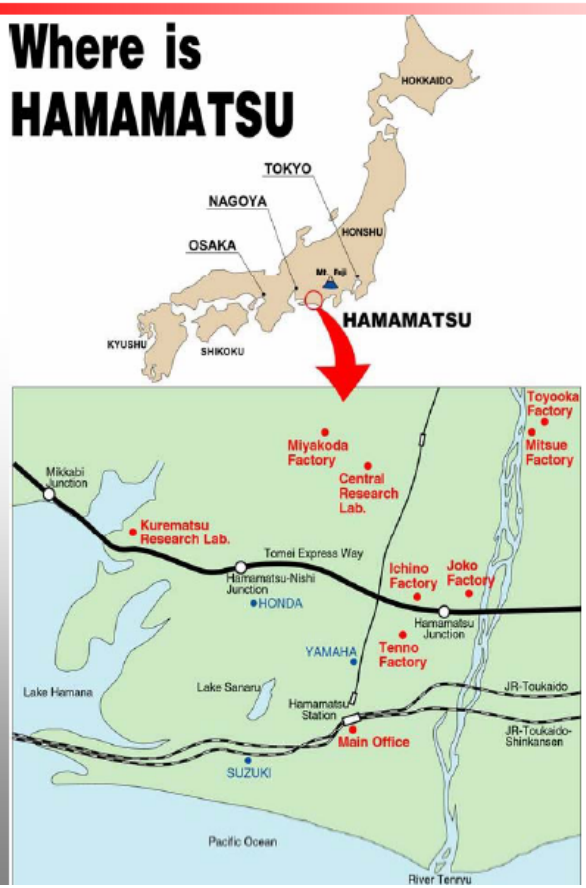
Hamamatsu Overview



- **Established in September 1953**
- **Tokyo Stock Exchange (1st Section)**
- **Number of Employees : > 3,000**
- **World-wide Sales Organization**
- **R & D Expenses : > 12% of Net Sales**

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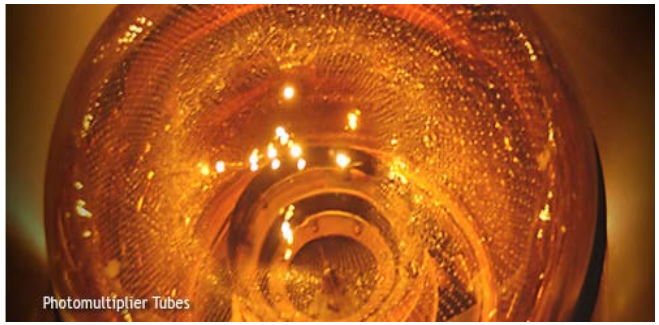
Hamamatsu Photonics is an optoelectronic company that designs, develops, manufactures and markets a broad range of optoelectronic devices and systems, for a wide range of applications in various fields, including:



- Pharmaceutical industries
- Telecom industries
- Semiconductor industries
- Automation
- Non destructive testing
- Medical
- Research in Physics and Life Sciences

FDSS series

Fluorescence Drug Screening System

FDSS series

FDSS2000 for Fura 2

FDSS4000 with 96PMT

FDSS6000 fluo and lumi

RayCatcher

FDSS7000

Functional Drug Screening System

FDSS7000EX

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FDSS - Applications

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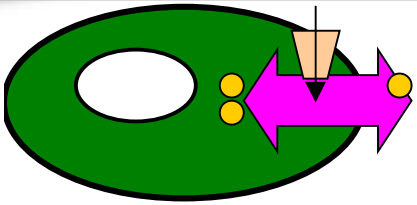
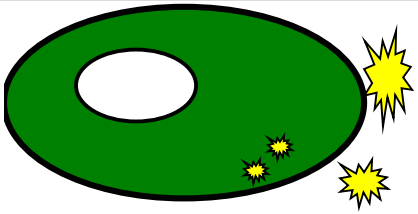
Intracellular Ion Measurement



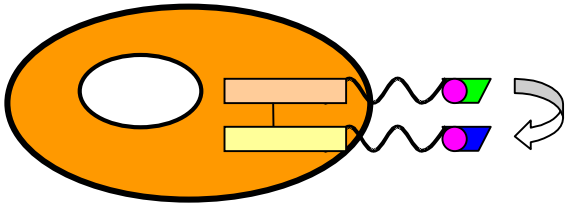
Ca2+ (Fura-2,Fluo-3)
Na+ (SBFI,)
K+ (PBFI)
Cl- (MQAE)
pH (BCECF)

Membrane Potential



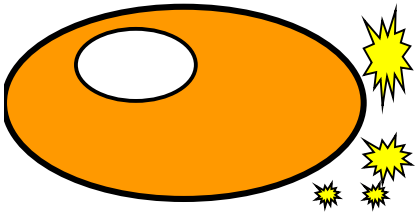
Membrane Potential
(DiBAC4(3))
Mitochondrial M.P.
(JC-1)

FRET



Ca2+ (Yellow Cameleon)
cAMP (FlCRhR)

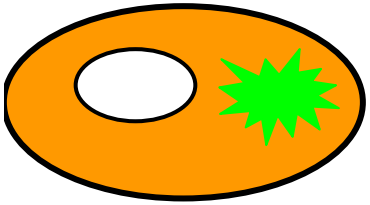
Fast Response Assay



MembranePotential
(Di-8-anepps)

Membrane Potential (FRET VSP)

Luminescence



Aequorin
Luciferase

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Expandable Modular System

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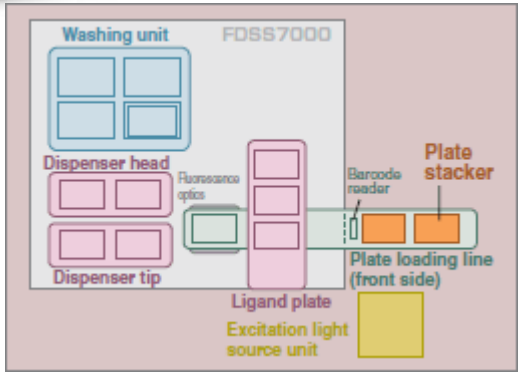
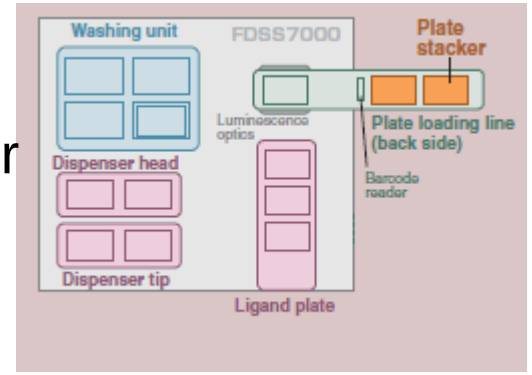


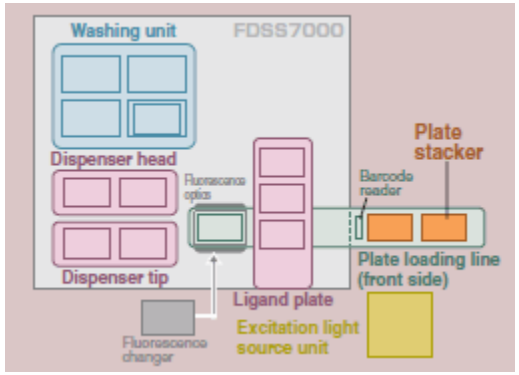
Basic Fluorescence

Rear loader& Lumi sensor

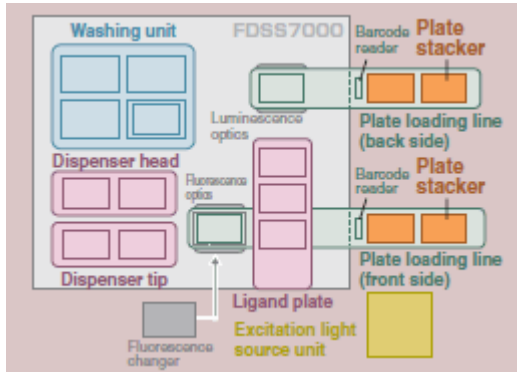


Luminescence System

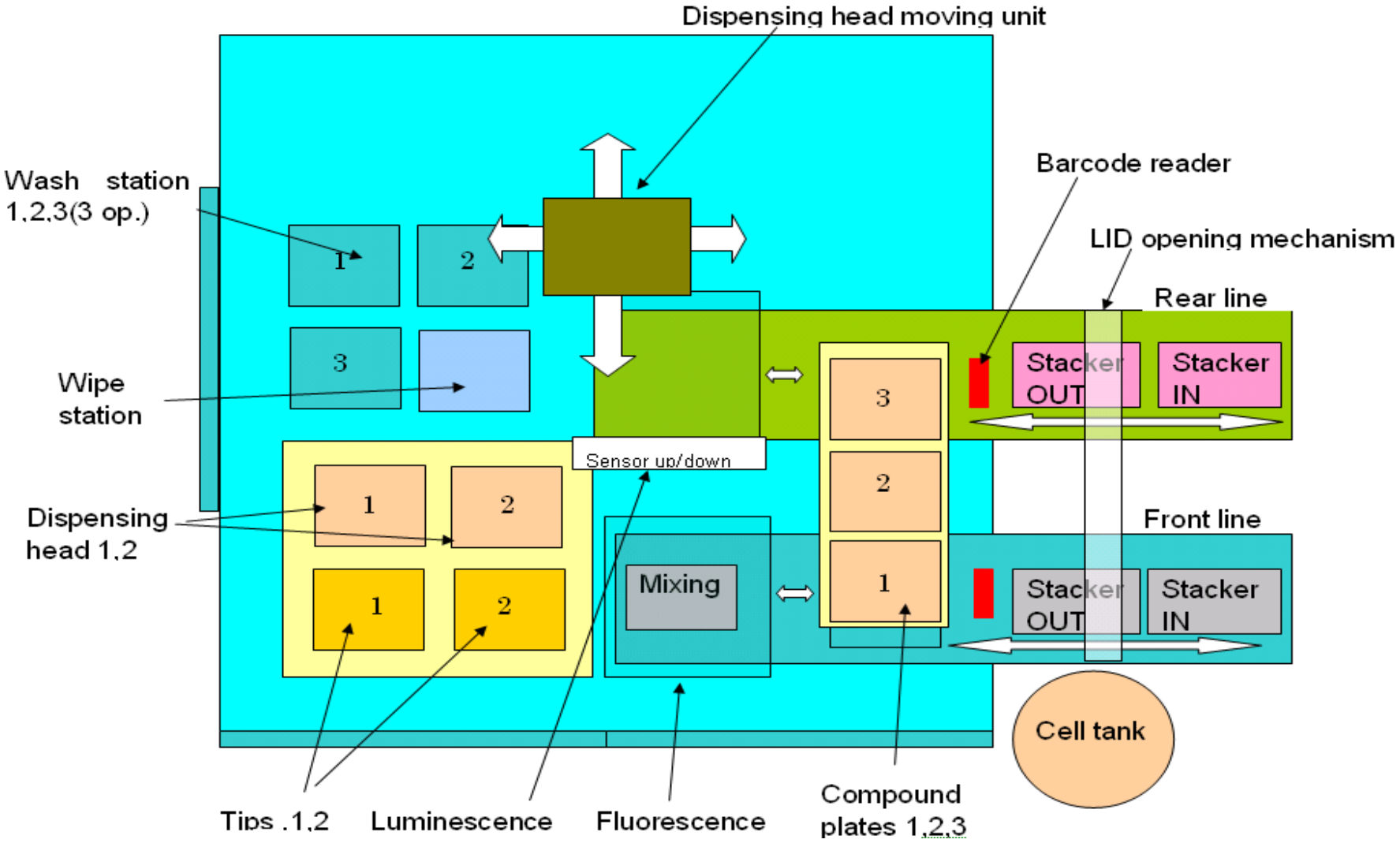
FRET with filter changer



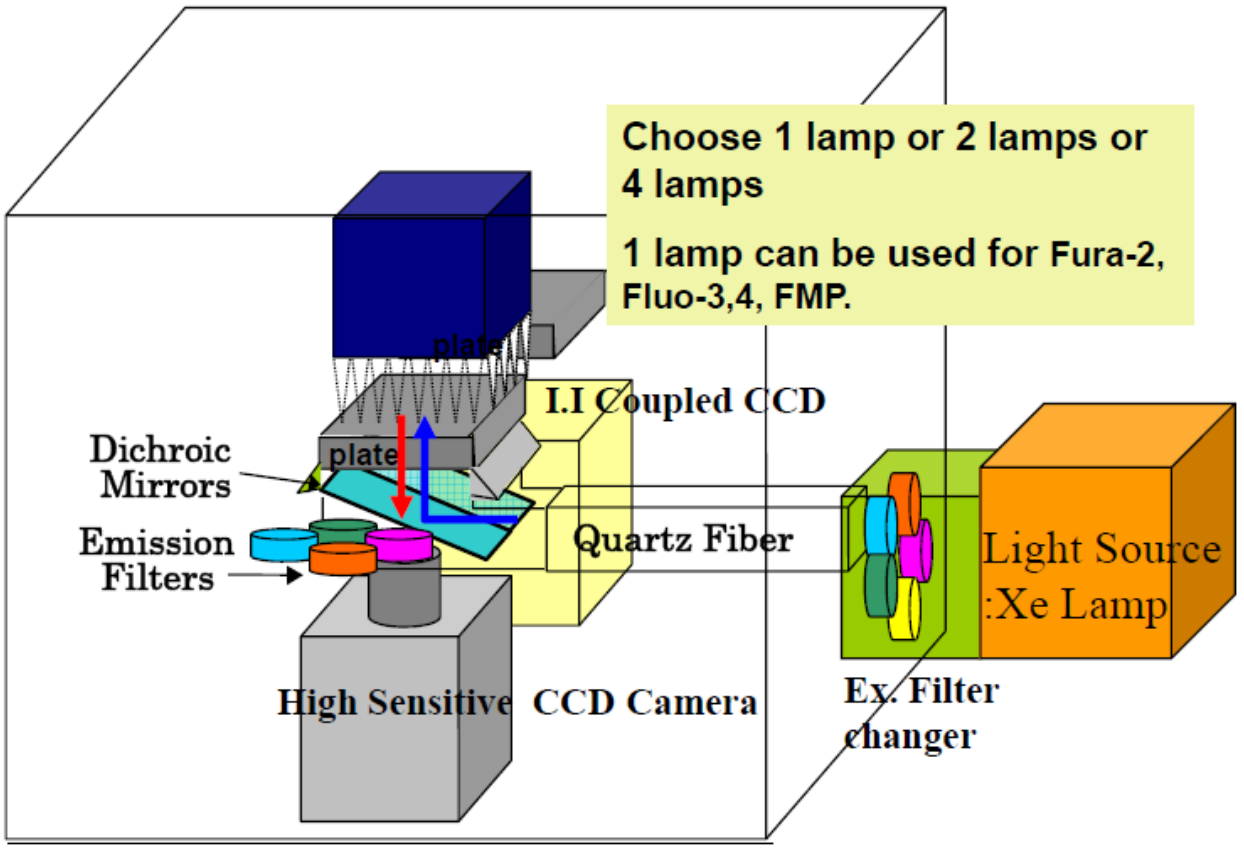
Fluo&Lumi with FRET



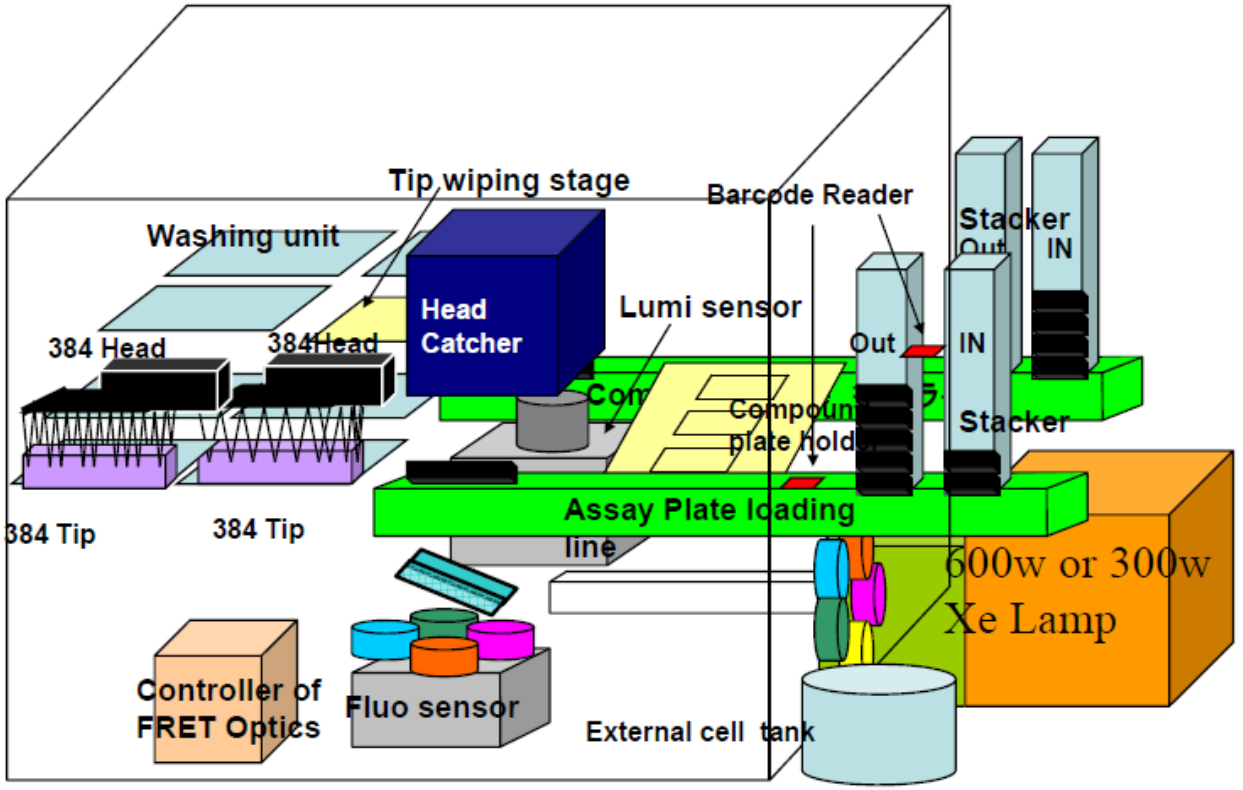
FDSS7000EX Inside



FDSS7000 Optical System



FDSS module structure



Future upgrade options

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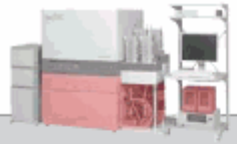
- Various filter combination for Assay Development
- Luminescence Sensor for weak luminescence signal detection
- FRET Filter changer



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

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

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Suitable Quantity of the lamps corresponding to each application

1 lamp:Fura2, Fluo3, FMP （96 or 384）

2 lamps: Fura2, Fluo3, FMP, VSP, CoroNaRed（96 or 384）

4 lamps: Fura2, Fluo3, FMP, VSP, CoroNaRed (1536)

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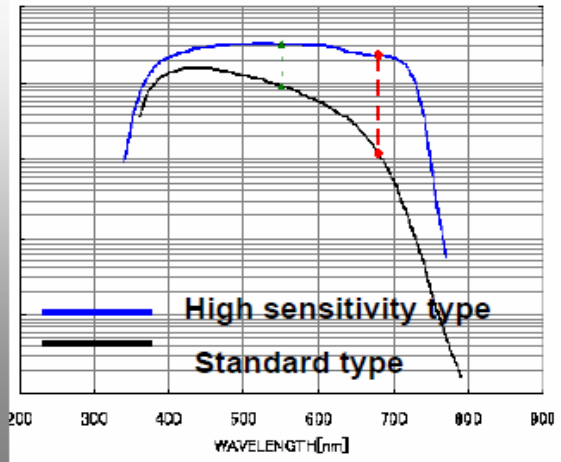
FDSS7000 Sensor

◆**Fluorescence ; Cooled CCD Camera**

◆**Luminescence**

1.Standard type ; I.I (Bi-Alkali photocathode) coupled CCD

2.High sensitivity type ; I.I (Multi-Alkali photocathode) coupled CCD



Wavelength Range 350nm ～ 720nm

Compared to standard type

3 times at 550nm

15 times at 680nm

Low cross talk

Better than 1% at 384

(2～3% ; Standard type)

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FDSS7000 Dispensing System

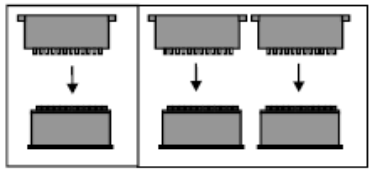
- Dual-Head, Dual-Tip
- Automatic tip loading

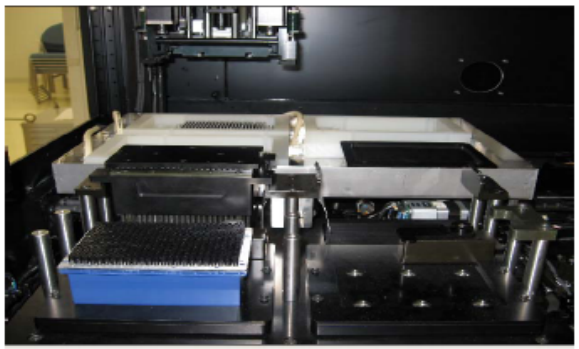
(When both agonist and antagonist dispensing are performed during one assay, this function is efficient)

- CV

384: 5%CV at 5ul
96: 3%CV at 10ul

head	1	2
tip	1	2





FDSS7000 New function

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Multi-solvents washing

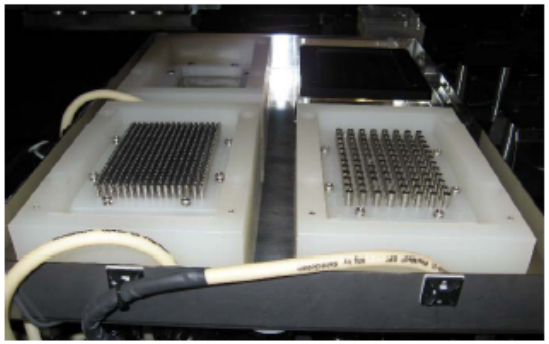
Up to 3 solvent washing (Option)
Ultra-sound function, Tip wiping stages

External cell (reagent) tank

(Option)

Wide range of plate selection

Various manufacturer's plate
Small volume plate…
(Low – Profile plate)



Washing Unit

Features of FDSS7000EX

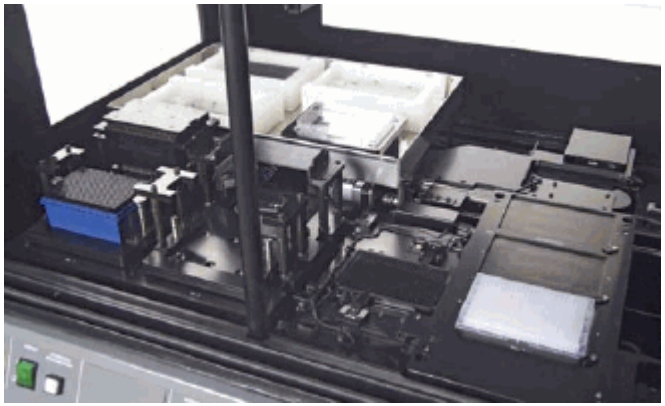


Plate stacker

- 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

Up to 3 solvent wash vat with wipe stage

3 compound plate stages

Currently available filter options

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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	-

- Excitation 340nm&380nm, Dichroic Mirror UV, Emission filter 520nm to 560nm for Fura-2
- Excitation 480nm, Dichroic Mirror B, for Fluo-3 is attached in basic package

FDSS7000EX Specification 1

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

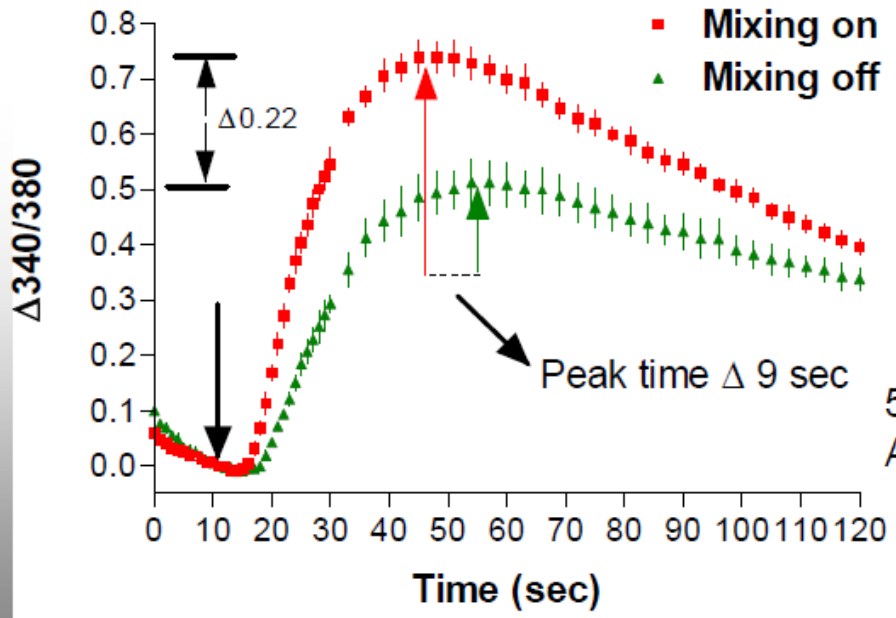
Plate loading line: Front side line, Back side line, Front and Back side line	
Plate stacker	Feeding/Storage, Up to 50 plates
	Cassette form
Plate mixing function	Variable speed
Trituration function in wells	By driving tip
Plate incubation function	Temperature setting is possible
Other function	Lid remover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

Motorized Plate Mixing

Fura-2 AM



5 μL agonist to 45 μL cells
Addition height 45 μL

300 μM agonist

Motorized Plate Mixing

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MP No Wash Kit

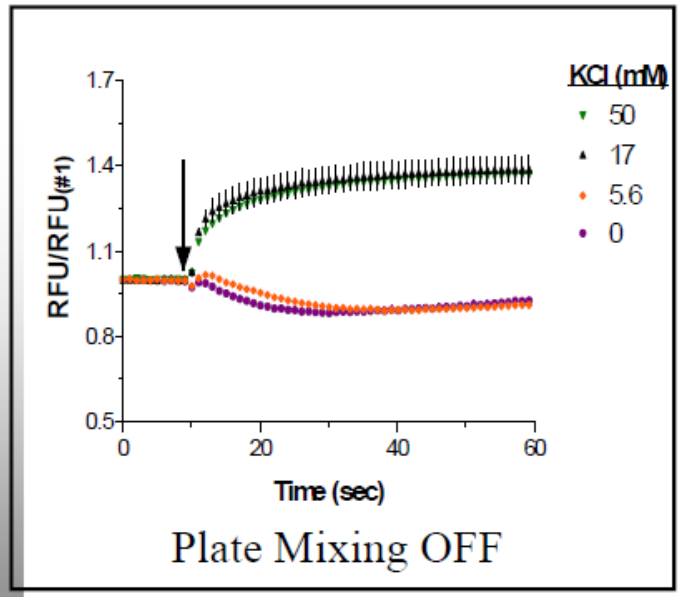

Plate Mixing OFF

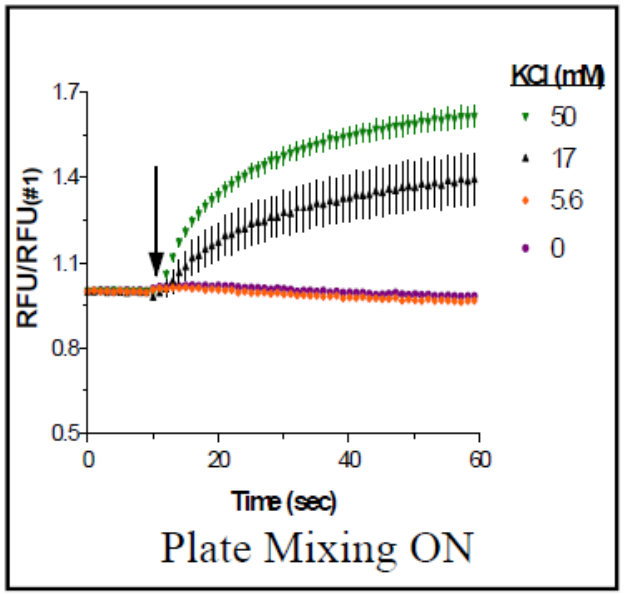

Plate Mixing ON

FDSS7000EX Measured Data

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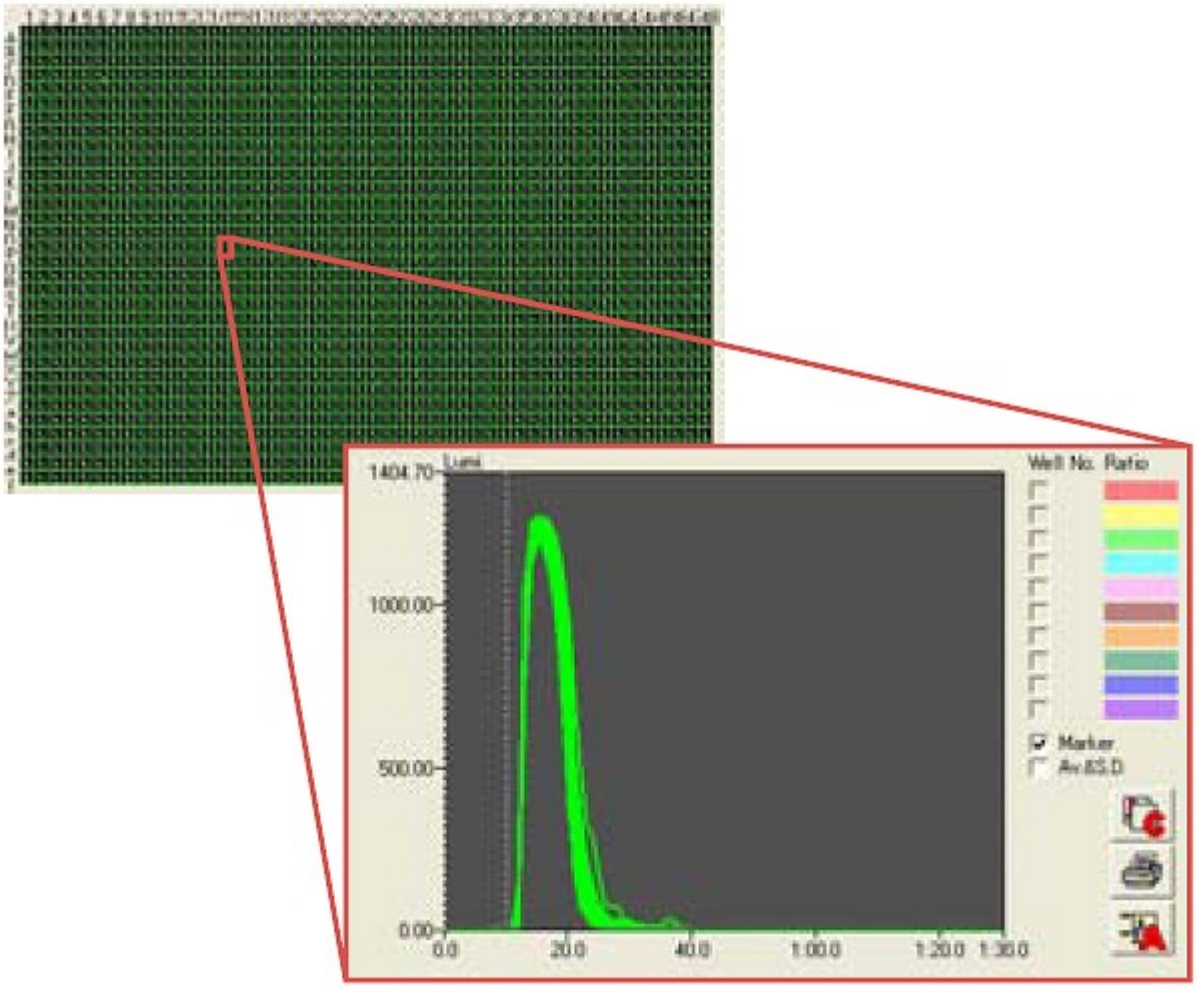
Aequorin measurement (Type 3)



FDSS7000EX Measured data

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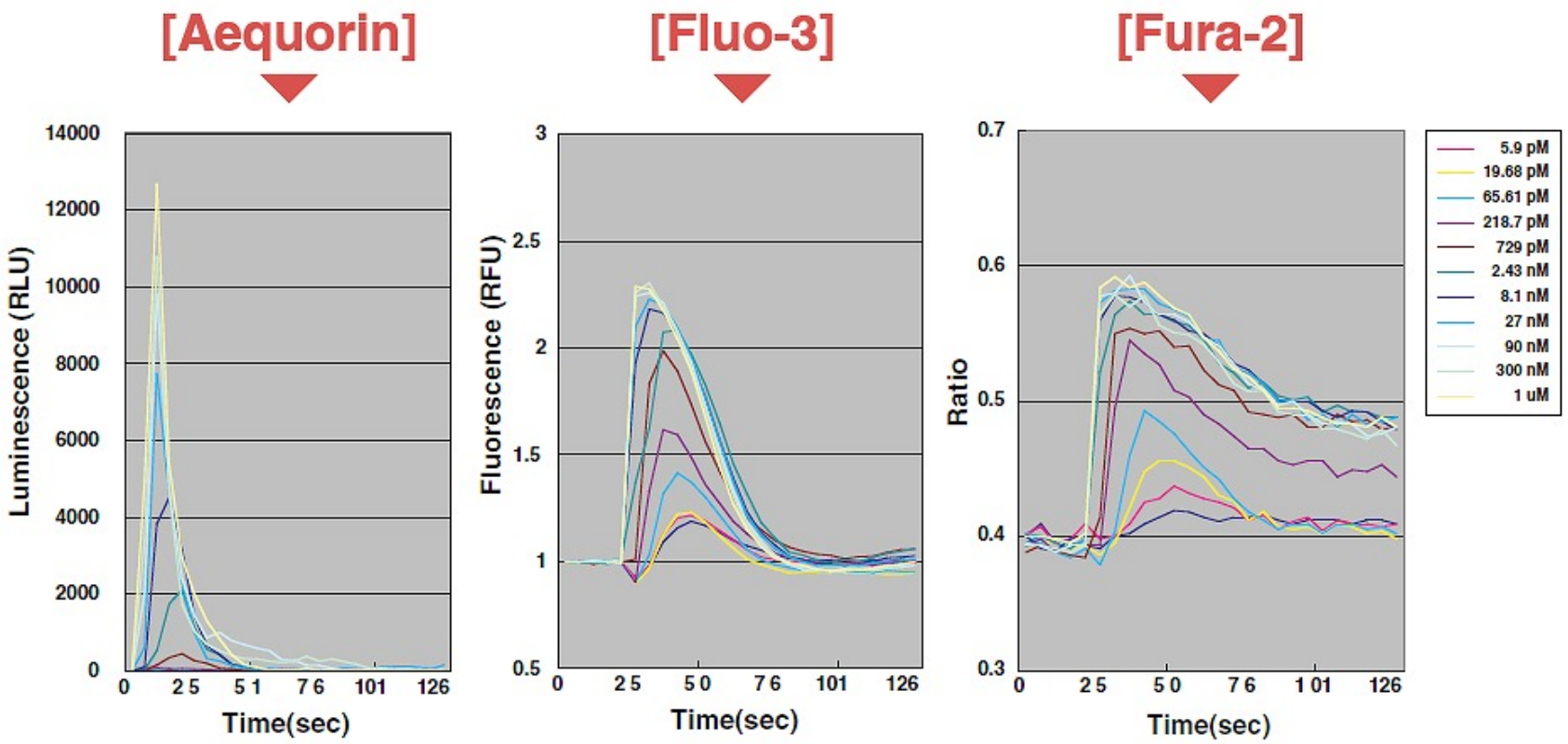
Ca ion measurement (Type 5)



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High Z value on assay with fulo-4

FLIPR Tetra	
GPCR1 (cells / well)	Z factor
5000	0.71
5000	0.70
3300	0.58
3300	0.59
1650	0.26
1650	0.30
GPCR2 (cells / well)	Z factor
5000	0.45
5000	0.22
3300	0.48
3300	0.48
1650	0.56
1650	0.52

FDSS	
GPCR1 (cells / well)	Z factor
5000	0.75
5000	0.80
3300	0.65
3300	
1650	0.60
1650	0.67
GPCR2 (cells / well)	Z factor
5000	0.63
5000	0.68
3300	0.60
3300	0.64
1650	0.66
1650	

Note:

This vale is got on a assay condition a customer used. This value is different depending on measurement condition

Johnson&Johnson
PHARMACEUTICAL RESEARCH & DEVELOPMENT

Footprint

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System footprint/weight	
FDSS7000 main unit	Approx. 1500 mm(W) x 1030 mm(D) x 1450 mm(H)
	Max. Approx. 300 kg
	AC 100 V to 230 V / 15 A
Data analysis system	600 mm(W) x 1511 mm(H) x 700 mm(D)
	Approx. 50 kg