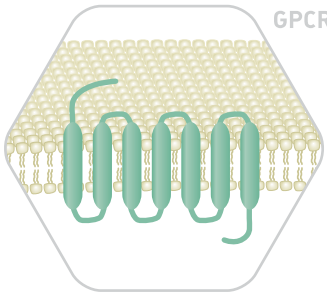
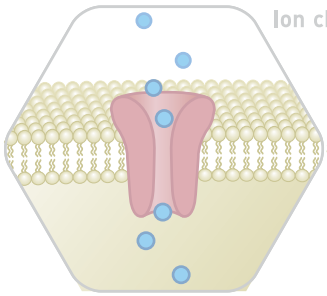
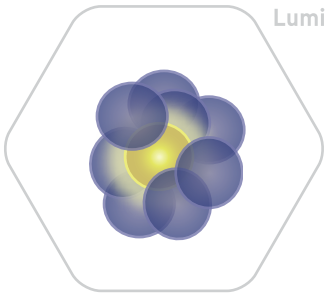
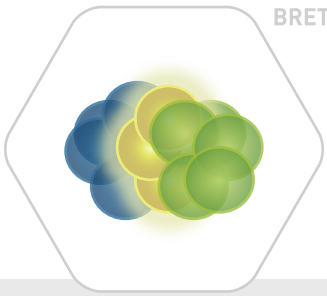
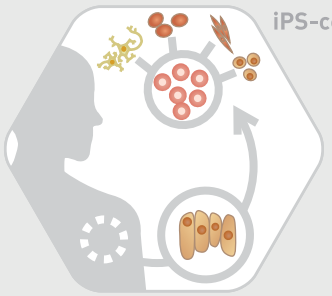










Fluorescence/luminescence plate imager using
a high sensitivity two-dimensional sensor (camera)

FDSS®/μCELL

Kinetic Plate Imager C13299

HAMAMATSU

PHOTON IS OUR BUSINESS

Measurement under uniform conditions with no time lag by simultaneous addition and reading in all 96 or 384 wells.

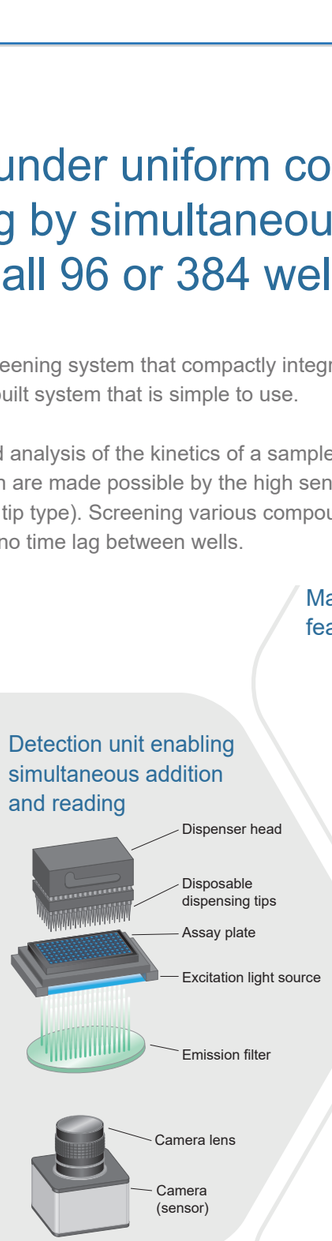
FDSS/µCELL is a laboratory screening system that compactly integrates technologies developed in drug discovery screening, enabling a purpose-built system that is simple to use.

Simultaneous measurement and analysis of the kinetics of a sample's fluorescence or luminescence intensity in all wells at the time of compound addition are made possible by the high sensitivity two-dimensional sensor (camera) and dispenser head (96 tip type/384 tip type). Screening various compounds at high throughput is enabled by measurement under the same conditions with no time lag between wells.

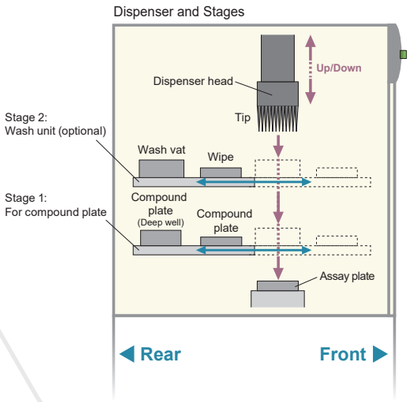
Main features

- Suitable for fluorescence/luminescence analysis
- Simultaneous addition and reading in 96 wells/384 wells
- Enables a wide range of measurements with excitation light sources of various wavelengths
- Long life, high power LED excitation light source
- Suitable for FRET or BRET by changing wavelength
- High speed data capture of 5 ms maximum (optional)
- Simultaneous electrical stimulation and reading in 96 wells (optional)
- External control option available for automation
- Temperature can be maintained at +35 ºC to +37 ºC by installing heater unit (optional)
- CO_2 incubation (optional)
- Waveform analysis (optional)

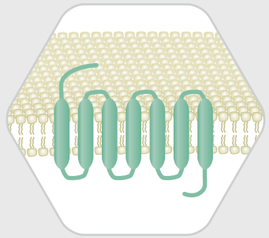
Detection unit enabling simultaneous addition and reading



Automatic wash and wipe functions



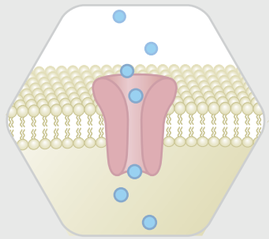
Applications



1. GPCR

GPCRs (G protein-coupled receptors) play a major role in cell signaling, and many GPCR-targeted medical drugs have been developed. FDSS/µCELL is capable of detecting messengers, such as Ca^{2+} and cAMP, which are major contributors to the GPCR signaling system by using fluorescence and luminescence probes. FDSS/µCELL allows simultaneous dispensing and kinetic measurement of compounds in whole microplate wells, thus realizing high throughput screening.

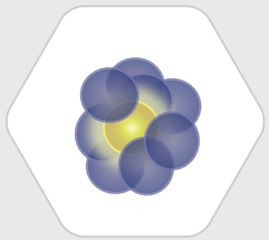
- Ca^{2+} measurement: Fluo-4, Fluo-8, Cal-520, Aequorin
- cAMP measurement: Glo-Sensor



2. Ion channel

Ion channel, a class of transmembrane proteins that allow certain ions to pass through the cellular biomembrane (in or out of the cell), regulate cellular functions and are involved in the development of cardiovascular, neurologic and metabolic diseases. FDSS/µCELL performs high throughput drug screening using voltage-sensitive fluorescent dyes or fluorescent indicators for different ions.

- Na^+ measurement: ANG-2, Corona-Green, Corona-Red, Sodium-Green
- K^+ measurement: FluxOR
- Cl^- measurement: MEQ, MQAE, YFP
- Membrane potential measurement: FluoVolt, Di-8-ANEPPS, DiBAC4 (3)



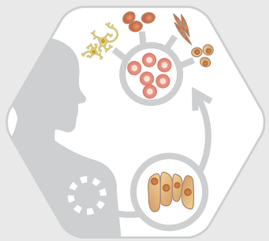
3. Luminescence

The merits, i.e., high sensitivity and low noise, of assays using luminescence probes have led to the wide application of such assays in various luciferase assay systems and Ca^{2+} assays using aequorin. FDSS/µCELL simultaneously performs different assays using luminescence probes on a single microplate with the use of highly sensitive two-dimensional sensors (camera), allowing for high throughput screening without bothersome time lags after substrate addition.

4. BRET/FRET

Biosensors based on the principle of resonance energy transfer that use GFP (green fluorescence protein) or Luc (luciferase) are utilized as a tool to measure various intracellular signal transmissions including ionic concentrations and signaling molecular activities. FDSS/µCELL simultaneously performs BRET (bioluminescence resonance energy transfer) measurements, a luminescence-based approach, and FRET (fluorescence resonance energy transfer) measurements, a fluorescence-based approach, on a single microplate using highly sensitive two-dimensional sensors (camera) and an automatic filter changer.

- BRET: BRET1, BRET2, NanoBRET®
- FRET: C/Y FRET, VSP, Cameleon



5. iPS-cell

Various differentiated cells have recently been created from iPSC (induced pluripotent stem cell), and this increasingly allows for the conduct of cell-based assays using human-derived native cells. In particular, iPS Cardiotoxicity, iPS Neurotoxicity, and iPS Hepatotoxicity assessments have been increasingly performed as safety evaluation of compounds. FDSS performs high throughput toxicity screening.

System components

Combinations of components support wide range of applications.

* Computer table is not included.

Fluorescence optical unit Patented

An optical system for fluorescence measurement that is integrated with a unique illuminator glass wave excitation optical system. It is used in combination with an LED excitation light source unit. It provides high S/N fluorescence detection that is maintenance-free with a long life. A complete line of excitation light source units can be easily replaced according to the purpose.

Fluorescence optical unit

Light source array unit (B,G)

A LED excitation light source that can output two wavelengths: Blue (480 nm) and Green (530 nm). Blue LED or Green LED can be used alone, and 2 wavelength measurement using a fluorescence filter changer or optogenetics by channelrhodopsin are also possible.

Light source array unit (B,G)

Dispensing unit (96/384 tip type)

A dispenser head that can dispense compounds simultaneously into all wells of 96/384 microplates. Since all wells are dispensed at once, kinetic assays such as Ca^{2+} assays are performed at high throughput.

Dispensing unit (384 tip type) A10118-26

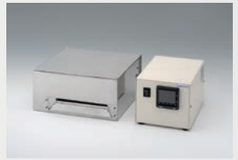
EFS pacing system

Electric field stimulation using electrodes is an effective technique for pacing of cardiomyocyte and skeletal muscle cell pacing and neuronal oscillation.
FDSS/μCELL simultaneously stimulates all wells of a 96 microplate with a pacing head using 96 multi-EFS electrodes. It can be used in contraction timing control of muscle cells such as cardiomyocytes and skeletal muscle cells, or in Ca oscillation control of nerve cells, etc.

EFS pacing system M13040-01

Heater unit

When iPSC differentiated cells and other native cells are used, it is important to maintain a stable temperature environment in maintaining physiological functions. The heater unit can keep temperature near the assay microplate at +35 ºC to +37 ºC, and is effective for systaltic analysis of cardiomyocytes.



Heater unit A11529-15

Highly sensitive two-dimensional sensor (camera)

A high sensitivity/high speed camera with a wide sensitivity range from fluorescence to luminescence. Performs various assays with high throughput as a fluorescence/luminescence plate imager. Because all wells of the microplate are read simultaneously, there is no time lag in the fluorescent indicator or in measurement between wells after substrate addition. To measure rapid fluorescence kinetics, data can be captured at intervals of up to 5 ms by using the high-speed data capture function (optional). It is effective when sampling in a short time is required, such as with high-speed voltage sensitive fluorescent dyes and evaluation of iPS cell derived cardiomyocytes.

Luminescence/fluorescence sensor unit C17037-01

Luminescence sensor unit C17040-01

CO_2 incubator

The assay plate is simply enclosed and CO_2 mixture is supplied inside. This keeps the CO_2 concentration around the plate at 5 % to 6 %.

Robot connection (automation)

Automated assay by robot connection is an important function for consecutive execution of various measurement sequences. Stable automatic measurement is realized by loader designs considering each company's robot. Please contact us to learn about compatible models.

Applicable to each company's robot

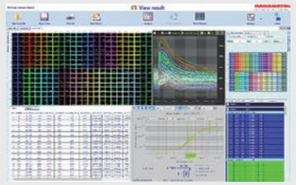
Fluorescence filter changer unit

For measuring fluorescence and luminescence, measurement of dual wavelengths by energy transfer such as FRET and BRET is an effective method for ion channel and protein kinetic analysis. Dual wavelength measurement is performed with high throughput by the fluorescence filter changer installed in front of the sensor.

Fluorescence filter changer unit A8472-07

Dedicated software

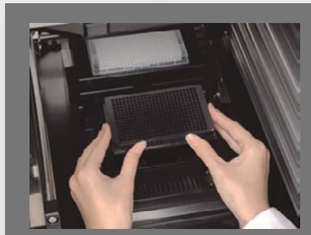
An assay design is easily constructed as a sequence from measurement to data analysis with easy-to-use measurement software. By using the waveform analysis function (for cardiomyocyte), it is possible to numerically analyze cardiomyocyte pulsation and the effects of drugs. All of the wells of a microplate can be analyzed at once, and it is effective for toxicity screening of compounds and evaluation of efficacy.



Measurement flow

Provides flexible assay design and simple assay workflow

Plate setting



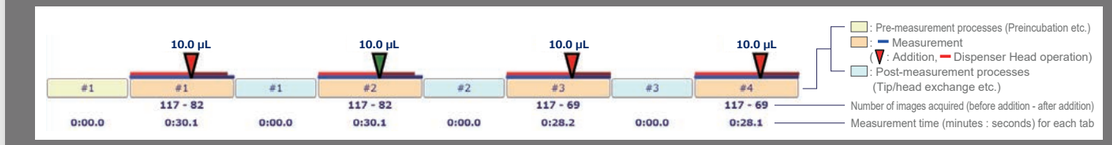
▲Simple-to-use manual settings

▲Automatic setting for each company's robot

Data acquisition

Protocol setting

Call the assay protocol and set the number of measurements, measurement interval (measurement time), dispensing and washing conditions in the Kinetic Protocol mode. Operations from measurement to data output can be automated.



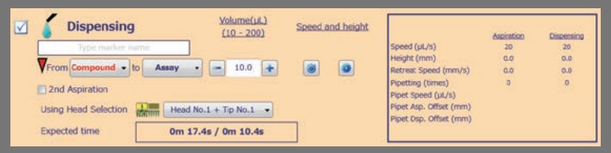
Protocol settings and display can be easily understood by combining the task tabs.
Detailed measurement, dispensing and washing settings can be made for each task tab.

*Some tasks are washing, dispensing only, without measurement.

Set number of measured plates and interval (measurement time)

Number of measured plates (Sampling Number) and measurement interval (Interval) can be set separately before and after dispensing.

*If there is no dispensing, only the number of measured plates and measurement interval are set.



Settings for dispensing during measurement

The amount of liquid to be dispensed during measurement, the height from the bottom of the plate well, the speed, tip mixing, the source plate (source), and destination (plate position) are set.

Settings for tip washing after dispensing

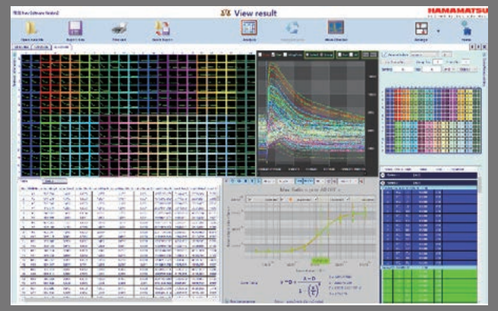
Tip washing is set after liquid dispensing.

Settings of electric field stimulation during measurement (EFS: Electric Field Stimulation)

Parameters (voltage, pulse width, frequency, number of pulses) of electrical stimulation. It is also possible to set by changing the voltage for each column.

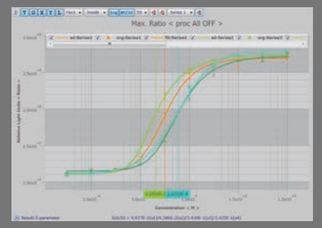
*This function is available when electric field stimulation (EFS) pacing system M13040-01 is added.

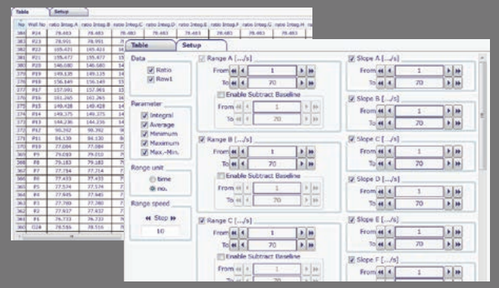
Data analysis

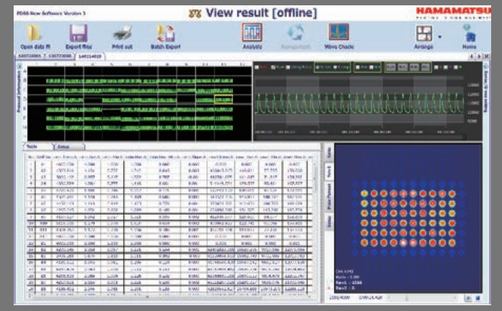


Various data processing and analysis are possible from the results of measurement

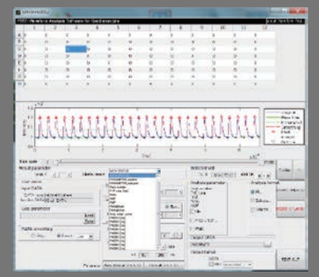
- Spatial correction between wells (spatial uniformity)
- Negative control correction
- Positive control correction
- Baseline subtraction correction (subtract bias)
- IC/EC graph calculation from multiple series (4 or 5 parameters may be selected)
- IC/EC graph calculation using Max, Min, Average and Max-Min in up to three time ranges in the same series
- Slope calculation to maximum range of 8
- Max, Min, Max-Min and Ratio calculation to maximum range of 8







Analysis of calcium transient waveform of iPS cardiomyocyte

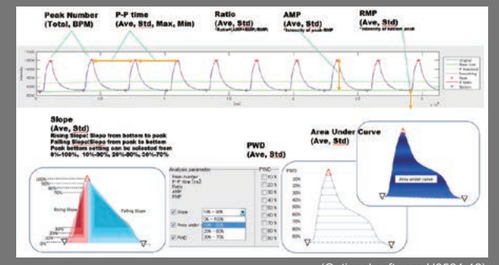


(Optional software U8524-12)

The items below can be output as text files in plate format.

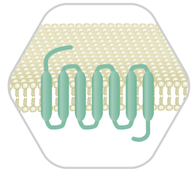
Main analysis items

- Waveform peak number (Peak Number: Total, BPM)
- Peak-to-peak time (p-p time: Ave, Std, Max, Min)
- Peak luminance value/bottom luminance value ratio (Ratio: Ave, Std)
- Peak amplitude {peak luminance value - bottom luminance value} (Amplitude: Ave, Std)
- Bottom luminance value (RMP: Ave, Std)
- Rise and fall slope (Rising/Falling Slope: Ave, Std)
- Peak pulse width 10 % to 90 % (PWD10, 20, 30, 40, 50 ,60, 70, 80, 90)
- Peak total area (Area Under Curve: Ave, Std)



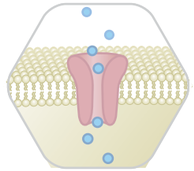
(Optional software U8524-12)

Examples of measurement and analysis in typical applications



1. GPCR

GPCR screening can be performed by intracellular Ca^{2+} assay, cAMP assay and β-arrestin assay.

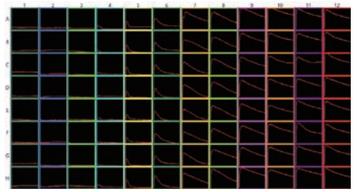


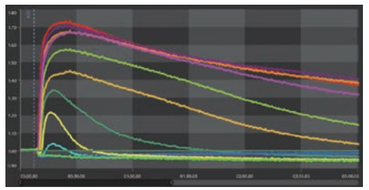
2. Ion channel

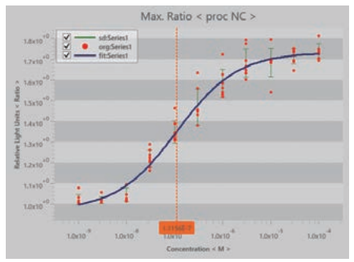
Ion channel screening can be performed using intracellular ion fluorescence indicators.

Intracellular Ca^{2+} assay

Evaluation of ATP dose response using Fluo-8 AM-stained CHO

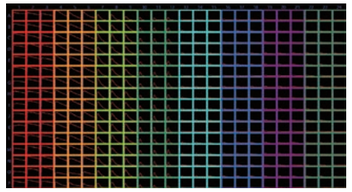


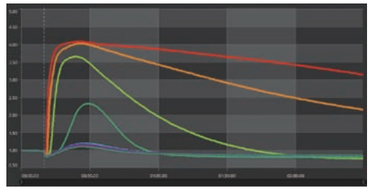


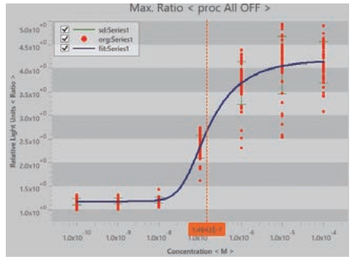


Cell: CHO cell
Dye: Fluo-8 AM (AAT Bioquest)
Compound: ATP final 100 μM – 1 nM

Evaluation of ATP dose response using CHO cells: 384 format



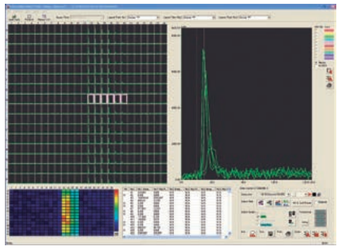




Cell: CHO 4000 cells/well
Dye: Calcium Kit iCellux (Dojindo Laboratories)
Compound: ATP final 10 μM – 10 pM

Aequorin assay

Intracellular Ca^{2+} assay by luminescence using an aequorin-expressing cell line

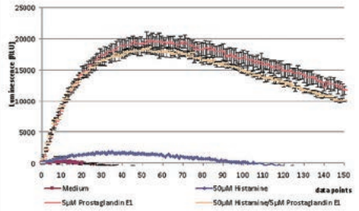


- Cell: Aeg-CHO (8000 cells/well)
- Substrate: coelenterazine
- Ligand: ATP (500 nM, 100 nM, 20 nM)

Measurements that are not affected by autofluorescence of the compound to be dispensed are enabled by using luminescence. Moreover, measurements with excellent S/N can be performed.

cAMP assay

Analysis of time course of cAMP using HUVEC expressing GloSensor (Promega)

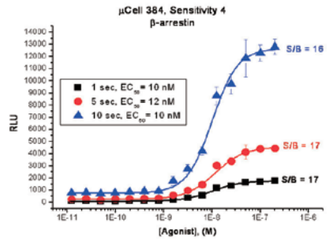


Measurement for 25 minutes at 10 second intervals after adding Histamine and Prostaglandin.

- Cell: HUVEC
- KIT: GloSensor

β-arrestin assay

Evaluation of β-arrestin internalization by compounds, using cells expressing PathHunter eXpress β-arrestin (DiscoveRX)

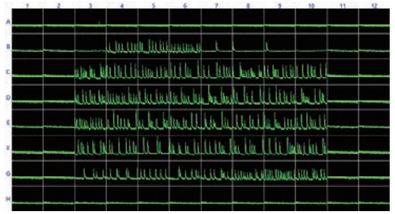


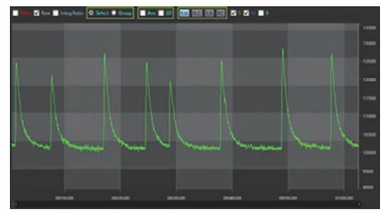
Verification of S/B at exposure times of 10 seconds, 5 seconds, 1 second

- Cell: Harvest Cells
- KIT: PathHunter eXpress β-arrestin

Ca^{2+} channel assay

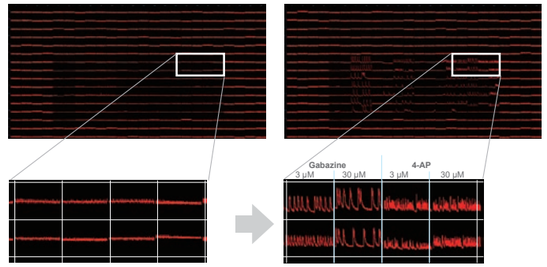
Measurement of Ca^{2+} oscillation using primary neurons





- Cell: Primary neuron
  (Rat embryonic day 17, cerebral cortex)
  (Rat Cortex Neuronal Cell, Wako Pure Chemical Industries)
- Dye: Cal-520 AM
- FDSS: FDSS/μCELL
  ImagEM 1×1binning
  exposure time 31 ms,
  Interval 31 ms, +37 ºC

Evaluation of Ca^{2+} oscillation using primary neurons



Before compound addition
17031011 G17-H20 Ratio 0.-8-1.5 Time 1 min

10 min after compound addition
17031013 G17-H20 Ratio 0.-8-1.5 Time 1 min

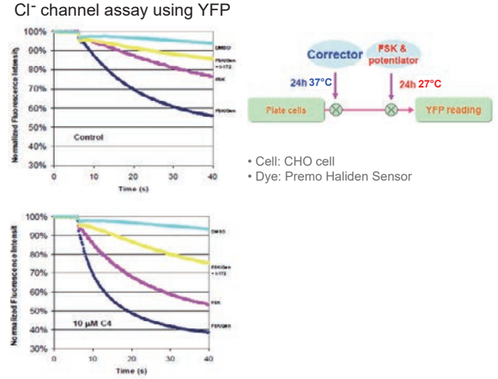
Cells:
- Hippocampus from Rat (embryonic day 19)
  (#085-10301, Wako Pure Chemical Industries, Lot LKE0386)
- 2.0×10^4 cells/well
- Poly-D-Lysin corting 384 well microplate

Calcium probe:
- Cal-520AM (AAT bioquest) final 2 μM

FDSS/μCELL:
- ImagEM 2×2 binning
- exposure time/Sampling rate 31 ms

Cl^- channel assay

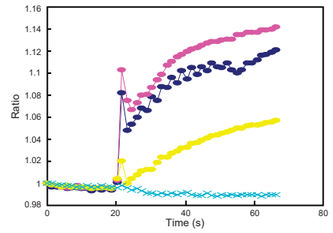
Cl^- channel assay using YFP



- Cell: CHO cell
- Dye: Premo Haliden Sensor

Na^+ channel assay

Na^+ channel assay using fluorescent probe

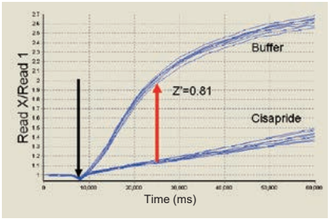


- Cell: CHO cell
- Dye: CoroNa Red

	CoroNa Red	Sodium Green
MW	773.32	1543
Molecular Probe Cat	C-24430	S-6901
Kd(K+free)	~ 200 mM	6 mM
Kd(K+Sat.)	~ 200 mM	21 mM
Excitation wavelength	540 nm	480 nm
Emission wavelength	590 nm	540 nm

K^+ channel assay

K^+ assay in CHO cells using Flux-OR



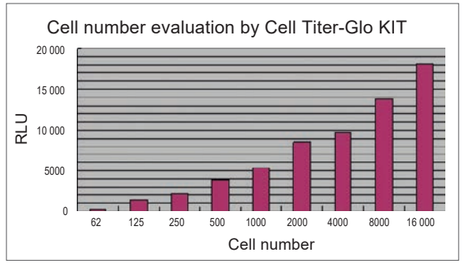
- Cell: CHO cell
- Dye: Flux-OR Potassium

3. Luminescence

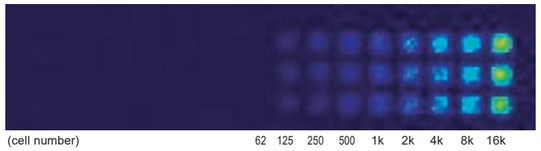
Luminescence screening can be performed using luminescent probes such as luciferase or aequorin.

Luciferase assay

Cell number evaluation using luciferase luminescence



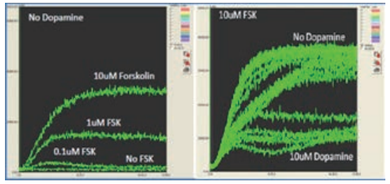
• Cell: CHO-K1(16 000, 8000, 4000, 2000, 1000, 500, 250, 125, 62 cells/well)
• Kit: Cell Titer - Glo (Promega)

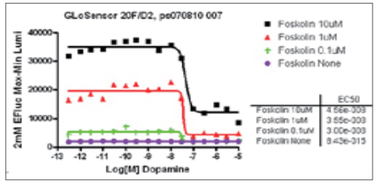


It has high linearity and high sensitivity that can detect luminescence even with a small number of cells.

cAMP assay

cAMP evaluation using GloSensor

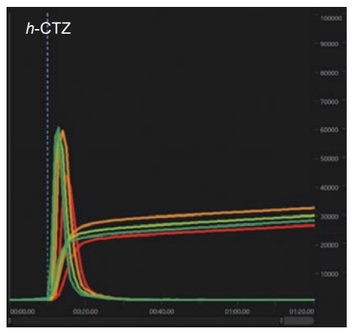


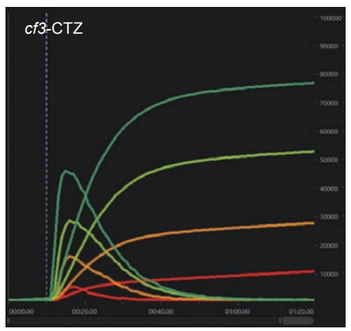


• Cell: CHO cell
• Kit: GloSensor

Aequorin assay

Ca²⁺ assay using aequorin-expressing cells





Cell: CHO-K1 stably expressing apoaequorin with a mitochondrial targeting signal
Substrate: h-coelenterazine (*h*-CTZ), *cf3*-coelenterazine (*cf3*-CTZ)
Compound: acetylcholine final 30 nM – 1 μM

S. Inoue, R. Iimori, Y. Sahara, S. Hisada, T. Hosoya, Application of new semisynthetic aequorins with long half-decay time of luminescence to G-protein-coupled receptor assay, Analytical biochemistry 407.2 (2010) 247-252.

4. BRET/FRET

Screening of protein-protein interaction can be performed using fluorescence/luminescence energy transfer.

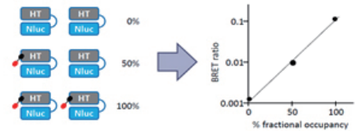
BRET assay

Control protein evaluation using NanoBRET

NanoBRET control protein calibration panel

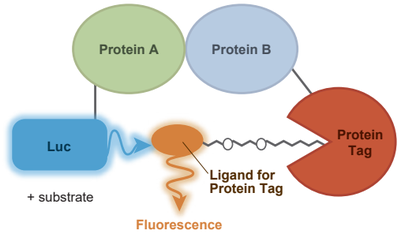
• A control protein in which a HaloTag NanoBRET ligand is bound to a NanoLuc-HaloTag fusion protein
• Five types of controls with different ligand binding rates

By drawing the calibration curve, it is possible to check how much the coupling rate can be detected



NanoBRET Control protein panel
— 5 vials representing the following amounts of fractional occupancy:

a. NanoBRET Control Protein 1: 0 % NL-HT NanoBRET fractional occupancy
b. NanoBRET Control Protein 2: 0.1 % NL-HT NanoBRET fractional occupancy
c. NanoBRET Control Protein 3: 1 % NL-HT NanoBRET fractional occupancy
d. NanoBRET Control Protein 4: 10 % NL-HT NanoBRET fractional occupancy
e. NanoBRET Control Protein 5: 100 % NL-HT NanoBRET fractional occupancy



BRET assay using CHO cells

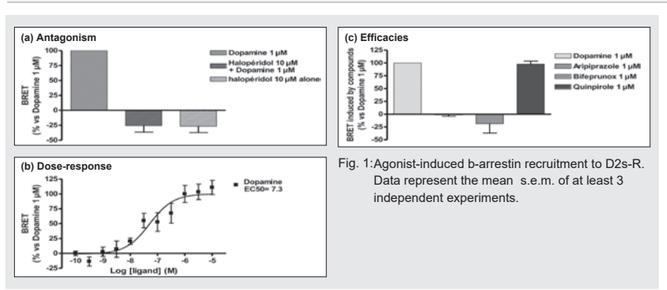
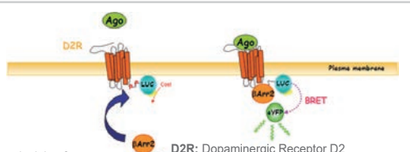


Fig. 1:Agonist-induced b-arrestin recruitment to D2s-R. Data represent the mean s.e.m. of at least 3 independent experiments.



principle of β-arrestin BRET'- assay

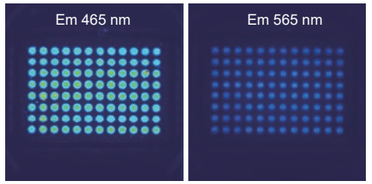
D2R: Dopaminergic Receptor D2
Ago: Agonist
Arr: Arrestin
Coel: Coelenterazine h
eYFP: enhanced Yellow Fluorescent Protein
P: phosphorylation Sites

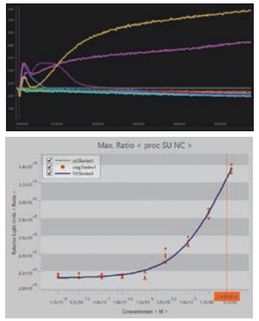
Data courtesy: Frederic Finana
Biologie Cellulaire et Moléculaire, Centre de Recherche Pierre Fabre
Finana F, De Vries L, Rauly-Lestienne I et al. 10th European Functional Drug Screening Symposium Poster No. 8 (2014)

Rluc - D2s receptors and eYFP - β-arrestin 2 are expressed in CHO cells, and Rluc and eYFP BRET occurring in cells when Ligand is added are detected.

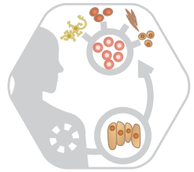
FRET assay

Evaluation of Nav 1.5-CHO cells using FRET-type voltage sensitive dye (VSP)





• Cell: Nav1.5-CHO cells (Ion Chat Research Corporation)
• Dye: Donor: CC2-DMPE (Invitrogen) final 5 μM
Acceptor: DiSBAC4(3) (Invitrogen) final 10 μM
• Compound: Veratridine (Sigma)
final 100 μM – 10 nM

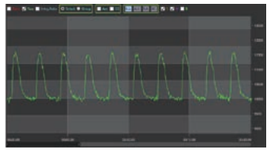


5. iPS-cell

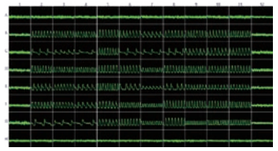
Toxicity evaluation and drug discovery screening using iPS cell-derived cardiomyocytes and neurons can be performed.

Ca^{2+} transient and membrane potential measurement using iPS cell-derived cardiomyocytes

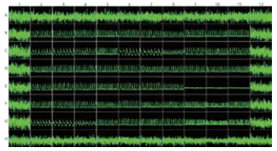
- Cell: iCell Cardiomyocytes² (CDI)
- Dye: Cal-520AM
- Plate format for various compounds



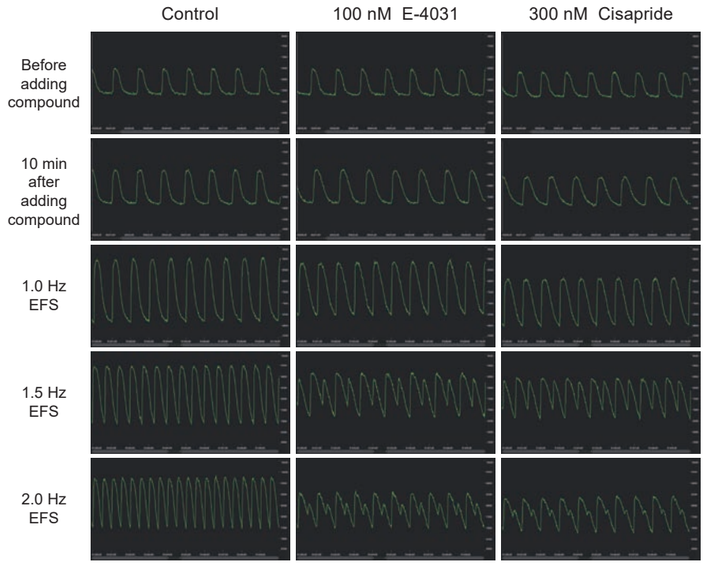
- Cell: iCell Cardiomyocytes² (CDI)
- Dye: Cal-520AM
- Ca^{2+} transient after addition of various compounds



- Cell: iCell Cardiomyocytes² (CDI)
- Dye: FluoVolt
- Action potential after addition of various compounds

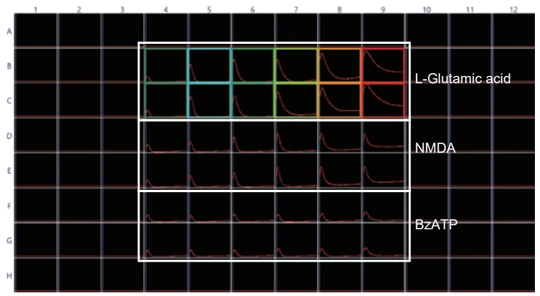


Ca^{2+} transient measurement <EFS (Electric Field Stimulation) pacing evaluation after drug addition>

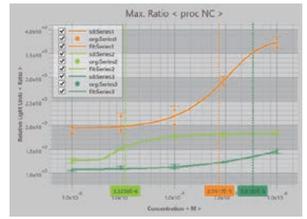


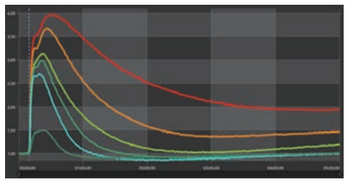
- Cell: Cardiomyocytes
- Dye: Cal-520
- EFS: voltage 5 V, pulse duration 10 ms, Height 0.0 mm, frequency 1 Hz – 2 Hz

Drug evaluation using iPS cell-derived neurons

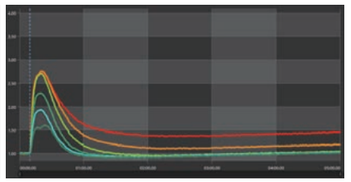


- Cell: iCell Neurons
  40 000 cells/well
  96 well Half Volume plate (Corning, #3882)
- Dye: Cal-520
- Compound: L-Glutamic acid potassium salt monohydrate (Sigma G1501)
  NMDA (N-methyl-D-aspartate)
  (Tocris Bioscience cat.no0114)
  BzATP (Prototypic P2X7 receptor agonist)
  (Abcam,ab120444)

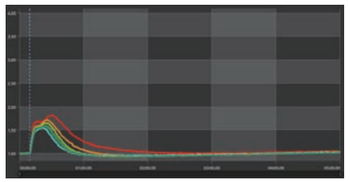




L-Glutamic acid

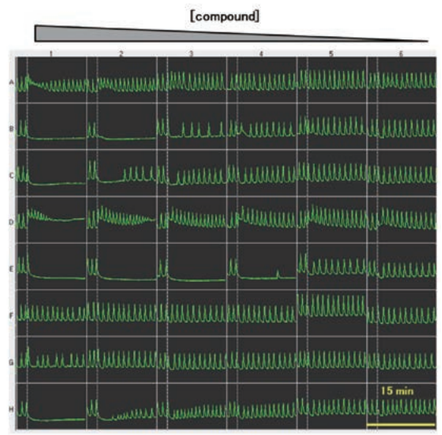


NMDA



BzATP

Evaluation of efficacy of Ca^{2+} oscillation using iPS cell-derived Dopa-Neuron



Cyclothiazide (targets AMPA-R)

D-AP5 (NMDA-R antagonist)

DNQX (targets AMPA-R)

Thapsigargin (inhibits SERCA)

Lidocaine (blocks Na_v channels)

Gabapentin (targets VGCCs)

trans-ACPD (targets mGluR1)

SA-4503 (61 receptor agonist)

- Cell: iCell Gluta Neurons
- Dye: Fluo-4 (1 μM) final conc.
- Dose response of various compounds

Components

Product	Model	Content
Basic configuration		
FDSS/μCELL Kinetic Plate Imager	C13299-01	Main unit of FDSS/μCELL system. Robot connection upgrade is possible. Includes the FDSS/μCELL main unit, dispenser tip loader, compound plate stage, washing stage, fluorescence optical unit, light source assay unit (B,G), FDSS software Online software license.
Luminescence/fluorescence sensor unit	C17037-01	High sensitivity CCD camera for luminescence and fluorescence measurement.
Data analysis unit	C7903-13	Data analyzer for FDSS/μCELL. For controlling camera and dispenser/light source (Computer table is not included).
FDSS software Additional offline software license	U8524-03A	Used to display, analyze, and output data on devices other than FDSS/μCELL. Windows 64-bit OS compatible.
Dispenser heads/Wash <options>		
Dispensing unit (96 tip type)	A10118-24	Dispenser head for dispensing reagents simultaneously into a 96-well microplate. Dispensing volume 10 μL to 200 μL, dispensing accuracy within 3 % CV (when dispensing 10 μL).
Dispensing unit (384 tip type)	A10118-26	Dispenser head for dispensing reagents simultaneously into a 384-well microplate. Dispense volume 1 μL to 30 μL, dispensing accuracy within 5 % CV (when dispensing 5 μL).
Washing unit	C17041-01	Unit for washing tips attached to the dispenser head. Includes bath/tube/control pump/washing liquid tank/waste liquid tank/chimney plate (96 tip type, 384 tip type).
Automatic tip loader <options>		
Automatic tip loader	A15623-07	Automatically loading/unloading tips on to dispensing unit.
Electric Field Stimulation (EFS) <options>		
EFS pacing system	M13040-01	Option to give 96 multichannel electrical stimulation to cells. Pace cellular activity and evaluate the effect of drugs added to the cells.
Vacuum wipe function	A14218	Wipe stage to always keep blotting capability by suction pump is available.
Washing attachment	A14236	Washing attachment for Ultrasonic Cleaning Bath.
Optical system <options>		
Fluorescence filter changer unit	A8472-07	Change the emission wavelength by automatically changing the four emission filters installed in front of the camera. Built-in fluorescent filter wheel.
Heater <options>		
Heater unit	A11529-15	Heater is compatible with robot automation. Install inside the main body to keep it at +35 °C to +37 °C. ON/OFF and temperature setting on are the operation panel.
Barcode reader <options>		
Barcode reader for assay plate	A11529-10	Option for reading the barcode attached to the assay plate. Reads the barcode on the right side of the assay plate on the stage.
Barcode reader for compound plate	A11529-11	Option for reading the barcode attached to the reagent plate. Reads the bar code on the right side of the reagent plate on the stage.
CO_2 incubator <options>		
CO_2 incubator with gas mixer *1	A11529-16	Adds CO_2 incubation function around the assay plate installed in FDSS/μCELL. Includes chamber unit, tubes and gas mixer.

*1 Option to maintain the CO_2 concentration around the assay plate at 5 % to 6 %. Cannot be combined with automatic door unit A11529-07 or automatic assay plate stage A11529-08.
When C11529-16 is added, the barcode reader may not function depending on the position of the barcode due to the structure.

Sensor <options>		
Fluorescence sensor unit	C17040-01	Fluorescence measurement camera. Equipped with CMOS image sensor for scientific measurement, it has high resolution of 4 million pixels and high-speed reading of 100 frames/sec.
Excitation light source <options>		
Light source array unit (Fluo-4)	L11601-01A	LED light source for Fluo-4 measurement, fluorescence filter. Excitation central wavelength: 470 nm, fluorescence central wavelength: 540 nm.
Light source array unit (FMP)	L11601-02A	LED light source for FMP measurement, fluorescence filter. Excitation central wavelength: 530 nm, fluorescence central wavelength: 593 nm.
Light source array unit (VSP-FRET)	L11601-03	LED light source for membrane potential measurement, fluorescence filter. Excitation central wavelength: 385 nm, fluorescence central wavelength: 465 nm and 565 nm.
Light source array unit (CFP/YFP-FRET)	L11601-04	C/Y LED light source for FRET, fluorescence filter. Excitation central wavelength: 450 nm, fluorescent central wavelength: 483 nm and 542 nm.
Light source array unit (Fura-2)	L11601-07	light source for Fura-2. Excitation central wavelength: 340 nm and 385 nm. fluorescent central wavelength: 540 nm.
Automation *2 <options>		
Automation unit	C17042-01	Option for robot connection. Includes self-operating door unit/Auto assay plate stage/FDSS external control software.

*2 A driver development fee separate from the above options is required to implement automation (automation integrator). Since we do not provide drivers for external control, we ask that you receive an estimate from an automation integrator.

Software <options>		
FDSS software Additional offline software license	U8524-03A	Offline software. Used to display, analyze and output data on devices other than FDSS/μCELL. 64 bit OS compatible.
FDSS software option High Speed acquisition option	U8524-11	Software module and protection key enabling high-speed capture. High-speed capture functions at 5 ms.
FDSS software option Waveform analysis software for cardiomyocyte	U8524-12	Software and protection key for multiwell analysis of waveforms obtained from cardiomyocytes.
FDSS software option Export TIFF image option	U8524-14	Add function to save TIFF (16 bit) image from FDSS software.
FDSS software option Light stimulus option	U8524-15	Add function of light stimulus measurement to FDSS software.
Consumables		
96 black tip (10 racks) for FDSS7000/μCELL/-GX	A8687-32A	Mounted on dispenser head (96 ch tip type) A10118-24, tip for aspirating liquid from a designated container and dispensing it to a microplate.
384 black tip (10 racks) for FDSS7000/μCELL/-GX	A8687-62C *3	Mounted on dispenser head (384 ch tip type) A10118-26, tip for aspirating liquid from a designated container and dispensing it to a microplate.

*3 Alphabet in the suffix of the model number may vary (Ex. A8687-62D).

Spare parts *4		
EFS pacing head (96 ch)	A13029-01	96 multi-channel pacing head for replacement. Option for EFS pacing system.
Dispensing unit (96 tip type)	A10118-24	Dispenser head for dispensing reagents simultaneously into a 96-well microplate. Dispensing volume 10 μL to 200 μL, dispensing accuracy within 5 % CV (when dispensing 10 μL).
Dispensing unit (384 tip type)	A10118-26	Dispenser head for dispensing reagents simultaneously into a 384-well microplate. Dispense volume 1 μL to 30 μL, dispensing accuracy within 5 % CV (when dispensing 5 μL).

*4 Dispenser unit performance (e.g. dispense uniformity, CV) is not covered under any warranty or guarantee offered from Hamamatsu representative and will gradually degrade as long as you use. Once exceeding the validation limit, dispenser head need to be replaced.

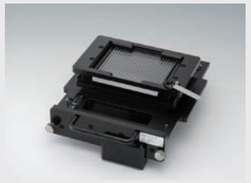
Maintenance and Validation service

Maintenance for the hardware and quality check of the dispenser head should be performed periodically to validate your instrument.. The maintenance service and validation service should be done within the first year after installation, and we strongly recommend signing up for a full-service contract that covers the maintenance service and validation service, to certify the instrument's performance. The full-service contract is only offered during the first year after installation.
Please contact your Hamamatsu representative for further information.

Basic configuration


FDSS/μCELL Kinetic plate imager C13299-01


Dispenser tip loader


Fluorescence optical unit


Light source array unit (B,G)


Luminescence/fluorescence sensor unit C17037-01

Dispenser heads <options>


Dispensing unit (96 tip type) A10118-24


Dispensing unit (384 tip type) A10118-26

Automatic tip loader <options>

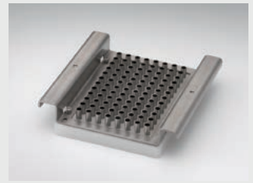

Automatic tip loader A15623-07

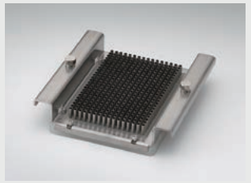
Electric Field Stimulation (EFS) <options>


EFS pacing system M13040-01

Wash <options>


Washing unit C17041-01

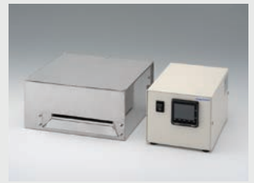

Chimney plate (96 tip type)


Chimney plate (384 tip type)

Optical system <options>


Fluorescence filter changer unit (US) A8472-07

Heater <options>

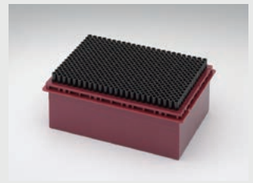

Heater unit A11529-15

Sensor <options>


Luminescence sensor unit C17040-01

Consumables/Spares

96 black tip (10 racks)
for FDSS7000/μCELL/-GX A8687-32A


384 black tip (10 racks)
for FDSS7000/μCELL/-GX A8687-62C*
*Alphabet in the suffix of the model number may vary (Ex. A8687-62D, - 62E).


EFS pacing head (96 ch) A13029-01

Appearance/Specifications

System appearance

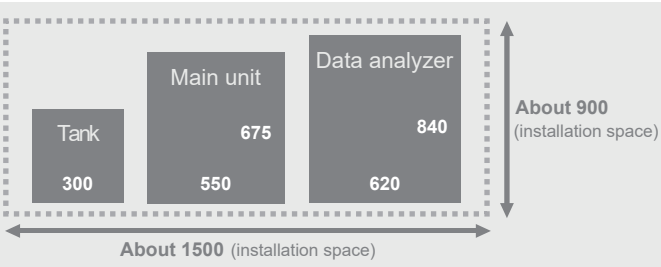
Standard type

Robot connection type

* To support the robotic integration, Automation unit C17042-01 is required.
Retrofitting is not supported. Please contact your Hamamatsu representative for further information.
* Computer table is not included.

System footprint

Unit: mm



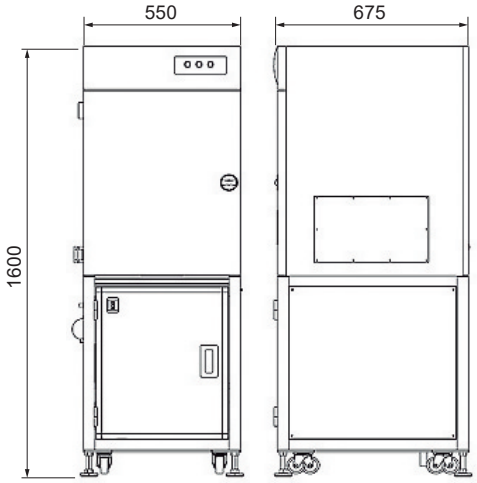
Specifications

Dispense	(96-tip type) A10118-24	10 μL to 200 μL
	(384-tip type) A10118-26	1 μL to 30 μL
Sensor (ImagEM)		High-speed, high-sensitivity digital EM-CCD camera for fluorescence and luminescence
Sampling rate		10 Hz (10 data point per second)
		200 Hz (200 data point per second) maximum with U8524-11 option
Sampling interval		0.1 s to 100 s interval
		0.005 s to 100 s interval with U8524-11 option
Light source (L11601-06)		470 nm excitation and 540 nm emission
		530 nm excitation and 593 nm emission
Plate positions		One stage for assay plate, two stages for compound plate
Adaptable microplate		Clear bottom black 96/384 plates (SBS format height 8 mm to 15 mm)
Tip/Plate loading		Manual loading
Number of sampling data point		1 to 50 000 sampling
Power supply specification		Input power supply: AC 100 V to AC 240 V, Frequency: 50 Hz/60 Hz
Power consumption when AC 100 V to AC 120 V (Data Analysis unit and FDSS/μCELL main unit with heater)		Approx. 1300 VA (Data analysis unit: approx. 500 VA, dispenser main unit: approx. 300 VA, heater unit, approx. 500 VA)
Ambient operating temperature		+15 ºC to +30 ºC
Dimension/weight	Main unit (Data analysis unit is not included)	550 mm (W)×675 mm (D)×1600 mm (H)/approx. 200 kg

Dimensional Outlines

Unit: mm

● Main unit



(Weight: Approx. 200 kg)

HAMAMATSU PHOTONICS K.K. **www.hamamatsu.com**

Systems Division
812 Joko-cho, Chuo-ku, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-433-8031, E-mail: export@sys.hpk.co.jp

U.S.A.: HAMAMATSU CORPORATION: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218
Germany: HAMAMATSU PHOTONICS DEUTSCHLAND GMBH.: Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de
France: HAMAMATSU PHOTONICS FRANCE S.A.R.L.: 19 Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr
United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court,10 Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk
North Europe: HAMAMATSU PHOTONICS NORDEN AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509 031 00, Fax: (46)8-509 031 01 E-mail: info@hamamatsu.se
Italy: HAMAMATSU PHOTONICS ITALIA S.R.L.: Strada della Moia, 1 int. 6, 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it
China: HAMAMATSU PHOTONICS (CHINA) CO., LTD.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R. China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn
Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 13F-1, No.101, Section 2, Gongdao 5th Road, East Dist., Hsinchu City, 300046, Taiwan(R.O.C), Telephone: (886)3-659-0080, Fax: (886)3-659-0081 E-mail: info@hamamatsu.com.tw

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