High Speed Acquisition Option

Specialized for iPS Derived Cell Assays

The method of creating iPS derived cells, invented by Dr. Yamanaka at Kyoto University, made a huge impact on the drug discovery field. This technology allows labs to create disease model cell lines, for example, and many other types of human cells. It is also expected to allow significant progress in disease research, drug discovery screening, and safety screening tests.

The FDSS series can conduct GPCR Ca^{2+} fluorescence assays measured at approximately 1-second intervals using 200 ms sensor exposure time. However, measuring cardiomyocyte Ca^{2+} transient levels requires a faster acquisition rate at shorter time intervals.

To make this faster acquisition rate possible in the FDSS system, Hamamatsu offers an upgrade kit for the FDSS7000, FDSS7000EX, and FDSS/µCELL. The high speed acquisition option upgrade kit consists of a high speed sensor, dedicated acquisition software, and a new computer. It enables the system to acquire data at very short time intervals to capture the fast oscillation levels of Ca^{2+} and membrane potential of cardiomyocytes.

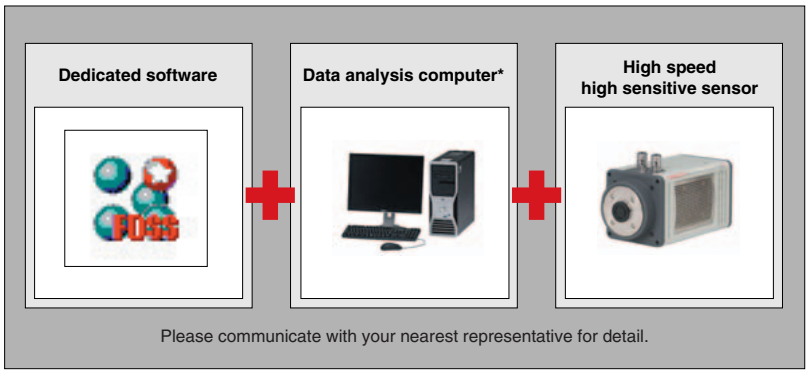
Overview

- **Fast and high sensitivity sensor (normally one but could upgrade to 2), dedicated software, and data analysis unit**
- **Shortest interval of 8 ms to 20 ms** (depends on the system and sensor configuration), maximum 4000 sampling points
- **Possible to have one dispense** (at a fixed timing)

Applications

- **ES/iPS derived cardiomyocyte measurement (human, murine, etc.)**
- **Heart disease model cell Ca^{2+} and membrane potential assay**
- **ES/iPS derived neuron assay**
- **Neuronal disease model cell Ca^{2+} and membrane potential assay**
- **Primary neuron cell Ca^{2+} and membrane potential assay**
- **Ion channel expressed cell screening**
- **Ca^{2+} luminescence peak detection in Aequorin-expressing cells**

Package with dedicated software & hardware



▲FDSS7000 · FDSS7000EX

▲FDSS/µCELL

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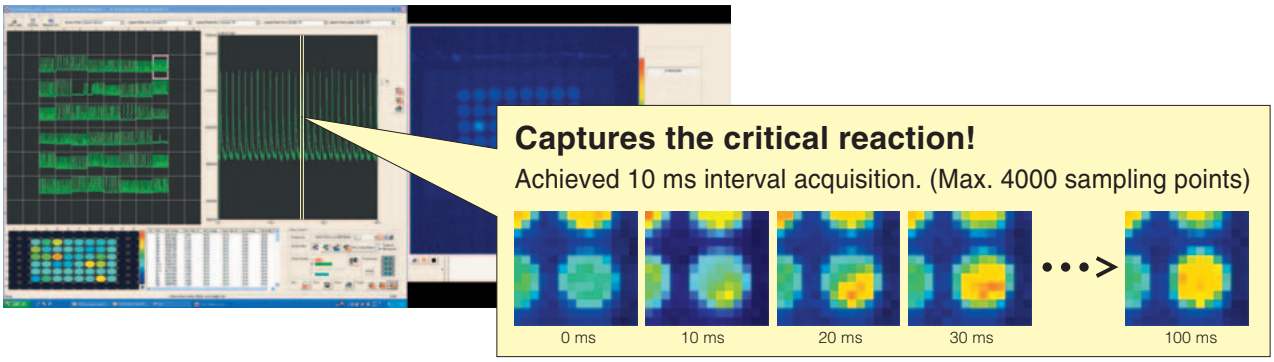
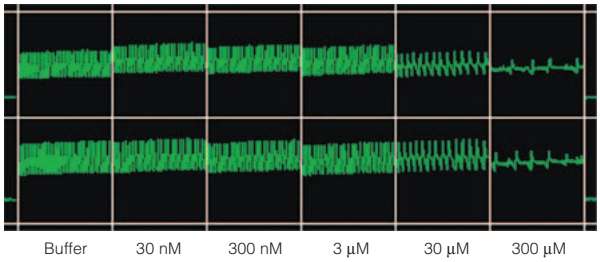
Measurement Example

Sheet type iPS cardiomyocytes were cultivated in a 96-well plate, 20 000 cells per well, and loaded with 2 μM Fluo-AM calcium reagent. A calcium oscillation assay was conducted.



Human derived iPS cardiomyocytes were cultivated in a 96-well plate, 20 000 cells per well. The calcium oscillation was measured a few minutes after dispensing Sotalol, and we found the waveform being affected.



Summary

By using the fast acquisition option, it is possible not only to measure the peak more accurately in human derived iPS, but also to measure faster Ca^{2+} oscillation in murine derived iPS cardiomyocytes. We expect that the fast acquisition could be used in heart disease models, neuronal disorder models, and more in ion channel (sodium, calcium, and potassium) related assays.

References

· Combination of Functional Cardiomyocytes Derived from Human Stem Cells and a Highly-Efficient Microelectrode Array System: An Ideal Hybrid Model Assay for Drug Development. Asai Y., Tada M., Otsuji TG, Nakatsuji N. Curr Stem Cell Res Ther. 2010 Mar 8. [Epub ahead of print] (PMID: 20214558)

· Direct measurement of the QT interval in stem cell-derived cardiomyocytes for the assessment of QT liability. Asai Y., Nippon Yakurigaku Zasshi. 2009 Dec; 134(6):320-4 Japanese. (PMID: 20009365)

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