
**Technical Note 172**

# DS-11 Series Fluorometer vs. Qubit® Comparison

## Introduction

The DeNovix® DS-11 Series Fluorometer and the Qubit® 3.0/4 Fluorometer are commonly used for fluorescence quantification of nucleic acids, proteins and other biomolecules. This note presents a comparison of instrument features and system performance of the DS-11 Series Fluorometer and the Qubit® 3.0/4. A performance comparison of DeNovix dsDNA Quantification Assays and Qubit® dsDNA Assays is also presented.

The DS-11 Series Fluorometer enables precise fluorescence quantification using a proprietary optical core and a versatile set of four fluorescence channels. The DS-11 Series Fluorometer, combined with DeNovix dsDNA Fluorescence Assays, provides the highest sensitivity and widest dynamic range for quantification available. When compared to the Qubit® 3.0/4 and Qubit® dsDNA Assays, the DS-11 Series Fluorometer provides a detection limit 20X below Qubit® and an upper range 2X higher.

## DeNovix dsDNA Quantification Assays

DeNovix offers three dsDNA Fluorescence Quantification Kits that enable quick, sensitive and reproducible measurements of dsDNA, ranging from 0.5 pg/µL to 4000 ng/µl in a simple mix-and-measure protocol. DeNovix Broad Range, High Sensitivity and Ultra High Sensitivity Assays provide significantly enhanced dynamic range over the Qubit® Assays (Figures 1).

The DeNovix Ultra High Sensitivity dsDNA Assay delivers unmatched sensitivity, measuring concentrations as low as 0.5 pg/µL. Qubit® has no equivalent assay.

Due to DeNovix's 20X greater sensitivity over the Qubit® HS dsDNA Assays, scientists are more equipped for research than ever. Single cell analysis, laser captured samples, circulating DNA and tumor heterogeneity studies are among the applications that can now benefit from faster and more accurate quantification.

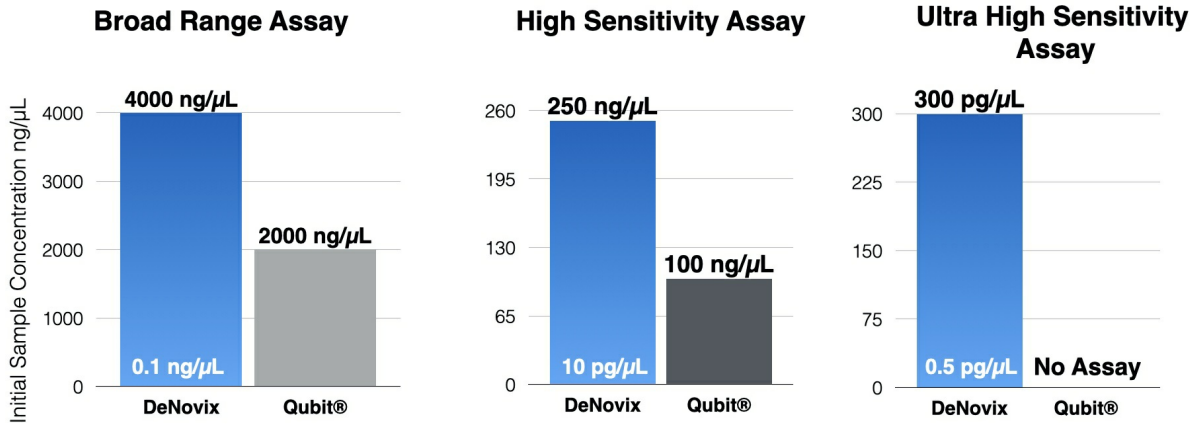


Figure 1: Comparison of dsDNA Fluorescence Assay Concentration Ranges

## Feature Comparison

The DeNovix DS-11 Series Fluorometer includes features equivalent or superior to Qubit® 3.0/4. Table 1 summarizes each system. DeNovix provides scientists with the flexibility to choose DeNovix Assays or nearly any other fluorescence assay. Intuitive EasyApps® come preinstalled on this stand-alone instrument. The system includes an Android™ OS and a 7" HD touchscreen.

Table 1: Feature Comparison of the DeNovix DS-11 Series and Qubit® 3.0 / 4.0

| Feature | DeNovix DS-11 Series | Qubit® 3.0/4 |
|---|---|---|
| Fluorescence Channels | 4 (UV, Blue, Green, Red) | 2 (Blue, Red) |
| dsDNA Assay Concentration Range | 0.5 pg/µL – 4000 ng/µL* | 10 pg/µL – 2000 ng/µL** |
| Minimum Sample Volume | 1 µL (in 200 µL assay volume) | 1 µL (in 200 µL assay volume) |
| Measurement Time | 2 seconds | 5 seconds |
| Standard Curves Options | 2-point standard or customizable 2 – 8 standards | 2 or 3 point standard |
| Pre-Programmed Assays | Commonly used DeNovix, Qubit®, and Promega Assays | Qubit® Assays |
| UV Assays | Possible including: Alexa Fluor 405, Hoechst 33258, DAPI, eBFP, 7-hydroxy 4-methylcoumarin and 4-Methylumbelliferyl B-D-Galactopyranoside | None |
| Display | 7" HD Touchscreen | 5.7" Touchscreen |
| Password Protected Accounts | Yes | Not Available |
| Method Development | Easy method development | Requires use of online tool & subsequent import |
| Accessory Support | USB keyboard, mouse, barcode reader | Not Available |
| Data Export | WiFi/ethernet to network drives, Email results, USB; LIMS compatible | USB |
| Networking | WiFi and Ethernet | Not Available |
| Printing | WiFi printing or local label printer | Not Available |
| Onboard Sample Storage Capacity | 32 GB storage, >8 million samples | 4 GB storage, 1000 samples |
| Software Updates | WiFi, ethernet, USB; Automatic notifications | USB |
| Colors | Arctic White, Brazilian Blue, Tungsten Silver, Fire Red | White |
| Warranty | 2 years | 1 year |
| Country of Manufacture | USA | Malaysia |

* *Using DeNovix dsDNA Assays*
** *Using Qubit® dsDNA Assays*

## Methods

Comparison data for DeNovix dsDNA Quantification Assays and correlating Qubit® Quantification Assays were obtained on a DeNovix DS-11 Series Fluorometer and Qubit® 3.0 respectively. Each assay was prepared as described in the manufacturer's protocol. Samples were mixed and incubated at room temperature for five minutes. Three replicate measurements were taken for each sample. The DeNovix Assays were measured on the DeNovix Fluorometer, and the Qubit® Assays were measured on the Qubit® 3.0 Fluorometer.

### DeNovix Broad Range, High Sensitivity and Ultra High Sensitivity Assays

For Broad Range and High Sensitivity, a series of dilutions of calf thymus DNA was prepared in TE buffer. Working solution (190 µL) was added to a thin-walled, clear UV-transparent 0.5 mL PCR tube (DeNovix cat #TUBE-PCR-0.5-500). dsDNA (10 µL) was added to each tube in the standard range, and volume was adjusted for total mass in the extended range.

For Ultra High Sensitvity, working solution (200 µL) was added to a thin-walled, clear UV-transparent 0.5 mL PCR tube. dsDNA (10 µL) was added to each tube.

## Qubit® Broad Range and High Sensitivity Assays

A series of dilutions from phage lambda DNA was prepared in TE buffer. Working solution (190 µL) was added to a thin-walled, clear UV-transparent 0.5 mL PCR tube. dsDNA (10 µL) was added to each standard tube, and volume was adjusted for total mass within the core range of the assay. The extended range of the Qubit® Assays increases the total mass limitations of the assay. The appropriate total mass for the extended range was added to each assay tube using 200 µL total volumes.

## Performance Data

Table 2: Performance Comparison of DeNovix Broad Range Assay Measured on DS-11 FX+ and Qubit® Broad Range Assay Measured on Qubit® 3.0 / 4.0

**Broad Range dsDNA Assay**

| Expected | DeNovix Assay measured on DS-11 FX | | Qubit® Assay measured on Qubit® | |
|---|---|---|---|---|
| ng/µL | ng/µL | %CV | ng/µL | %CV |
| 4000 | 3551.61 | 0.010 | Out of Assay Range | |
| 3000 | 3123.24 | 0.008 | Out of Assay Range | |
| 2000 | 1974.53 | 0.007 | 1826.33 | 3.340 |
| 1000 | 1050.92 | 0.007 | 896.67 | 1.897 |
| 400 | 358.08 | 0.073 | 481.33 | 2.288 |
| 200 | 195.70 | 0.140 | 196.67 | 1.471 |
| 100 | 106.10 | 0.089 | 90.53 | 2.053 |
| 50 | 53.75 | 0.095 | 45.20 | 2.341 |
| 25 | 26.83 | 0.112 | 21.00 | 1.905 |
| 12.5 | 13.48 | 0.126 | 12.37 | 1.683 |
| 6.25 | 6.65 | 0.301 | 5.91 | 2.493 |
| 2 | 2.39 | 0.460 | 2.04 | 0.980 |
| 1 | 1.12 | 1.339 | 0.810 | 2.506 |
| 0.5 | 0.542 | 0.000 | 0.625 | 1.293 |
| 0.2 | 0.237 | 4.641 | 0.345 | 6.083 |
| 0.1 | 0.116 | 4.310 | Measured Out of Range | |

Table 3: Performance Comparison of DeNovix High Sensitivity Assay Measured on DS-11 FX+ and Qubit® High Sensitivity Assay Measured on Qubit® 3.0 / 4.0

**High Sensitivity dsDNA Assay**

| Expected | DeNovix Assay measured on DS-11 FX | | Qubit® Assay measured on Qubit® | |
|---|---|---|---|---|
| ng/µL | ng/µL | %CV | ng/µL | %CV |
| 250 | 261.62 | 0.006 | Out of Assay Range | |
| 100 | 98.07 | 0.027 | 112.67 | 1.025 |
| 25 | 24.78 | 0.016 | 26.33 | 1.096 |
| 10 | 10.57 | 0.360 | 10.13 | 1.140 |
| 3 | 3.04 | 0.197 | 3.17 | 2.026 |
| 1 | 0.790 | 0.101 | 1.476 | 0.889 |
| 0.3 | 0.245 | 0.163 | 0.703 | 0.164 |
| 0.1 | 0.070 | 0.000 | 0.119 | 1.788 |
| 0.03 | 0.019 | 0.000 | 0.072 | 1.520 |

| High Sensitivity dsDNA Assay | | | | |
|---|---|---|---|---|
| 0.01 | 0.005 | 2.000 | 0.019 | 2.859 |
| 0.005 | 0.004 | 5.000 | 0.008 | 4.619 |

Table 4: Performance Comparison of DeNovix Ultra High Sensitivity Assay Measured on DS-11 FX+ and Qubit®

| Ultra High Sensitivity dsDNA Assay | | | | |
|---|---|---|---|---|
| Expected | DeNovix Assay measured on DS-11 FX | | Qubit® Assay measured on Qubit® | |
| pg/µL | pg/µL | %CV | pg/µL | StDev |
| 300 | 304.40 | 0.108 | No Equivalent Assay | |
| 150 | 142.91 | 0.182 | | |
| 50 | 45.18 | 0.398 | | |
| 10 | 8.519 | 1.056 | | |
| 2 | 1.832 | 2.238 | | |
| 1 | 1.085 | 8.750 | | |
| 0.5 | 0.360 | 6.890 | | |

## Summary

The combination of the DeNovix DS-11 Series Fluorometer and DeNovix dsDNA Quantification Assays provides fast and accurate measurements with unmatched sensitivity. The DS-11 Series Fluorometer and DeNovix Assays enable superior accuracy, higher sensitivity and a broader range of dsDNA quantification (0.5 pg/µL – 4000 ng/µL) compared to the Qubit® 3.0/4 and Qubit® Assay range (10 pg/µL – 2000 ng/µL).

The DeNovix DS-11 Series includes the QFX and the DS-11 FX+ combined Spectrophotometer / Fluorometer. DeNovix dsDNA Quantification Assays are available for purchase here and through DeNovix authorized distributors.



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