

QFX Fluorometer vs Qubit® Comparison

Technical Note 167

Introduction

The DeNovix QFX Fluorometer and the Qubit 3.0 Fluorometer are both 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 QFX and the Qubit 3.0. A performance comparison of DeNovix dsDNA quantification assays and Qubit dsDNA assays is also presented.

The DeNovix QFX Fluorometer enables precise fluorescence quantification using a proprietary optical core and a versatile set of four fluorescence channels. The QFX combined, with the DeNovix family of dsDNA Fluorescence Assays provides the highest sensitivity and widest dynamic range for quantification available. When compared to the Qubit 3.0 and Qubit dsDNA assays, the DeNovix QFX provides a lower detection limit 20X below Qubit's and an upper range 2X higher.

DeNovix dsDNA Quantification Assays

DeNovix offers three dsDNA fluorescence quantification kits which enable quick, sensitive and reproducible measurement of dsDNA 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, as shown in Figures 1-3. The DeNovix Ultra High Sensitivity dsDNA Assay delivers unmatched sensitivity, measuring concentrations as low as 0.5 pg/μL. Qubit has no equivalent assay. Single cell analysis, laser captured samples, circulating DNA and tumor heterogeneity studies are among the applications that can now benefit from fast and accurate quantification thanks to a 20X greater sensitivity over the Qubit HS dsDNA assay.

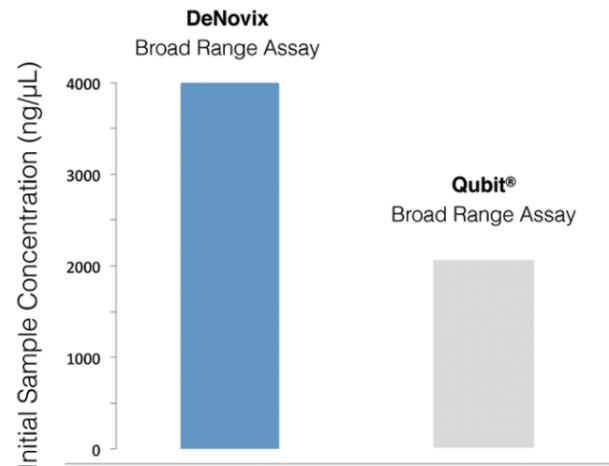


Figure 1. Broad Range assay
0.1 ng/μL to 4000 ng/μL

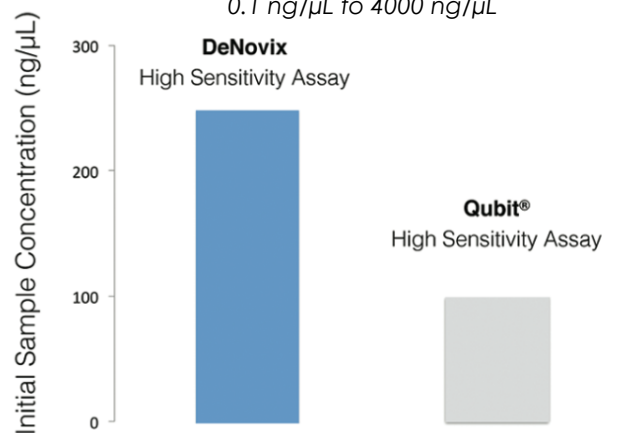


Figure 2. High Sensitivity assay
5.0 pg/μL to 250 ng/μL

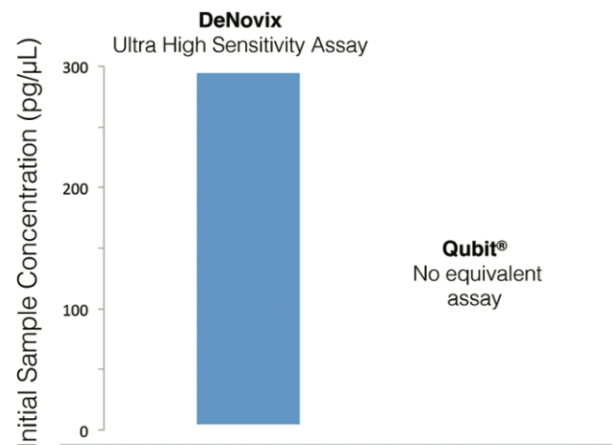


Figure 3. Ultra High Sensitivity assay
0.5 pg/μL to 300 pg/μL



Feature Comparison

The DeNovix QFX Fluorometer includes features equivalent or superior to Qubit 3.0. The table below summarizes each system. The QFX provides scientists with the flexibility to choose DeNovix assays or nearly any other fluorescence assay. Intuitive EasyApps® come preinstalled on the stand-alone instrument. The system includes an Android OS and a 7" HD touchscreen.

Feature	DeNovix QFX	Qubit 3.0
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, Fire Red, Tungsten Silver	White
Warranty	3 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 QFX Fluorometer and Qubit 3.0 respectively. Each assay was prepared as described in the manufacturers' protocol. Samples were mixed and incubated at room temperature for 5 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 and High Sensitivity Assays: A series of dilutions of calf thymus DNA was prepared in TE buffer. Working solution (190 μ L) was added to a thin-walled, clear UV-transparent 0.5 mL PCR tube (DeNovix cat# TUBE-PCR-0.5-500). dsDNA (10 μ L) was added to each tube in the standard range, and volume was adjusted for total mass in the extended range.

Ultra High Sensitivity Assay: Working solution (200 μ L) was added to a thin-walled, clear UV-transparent 0.5 mL PCR tube. dsDNA (10 μ L) 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 μ L) was added to a thin-walled, clear UV-transparent 0.5 mL PCR tube. dsDNA (10 μ L) 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 extends the total mass limitations of the assay. The appropriate total mass for the extended range was added to each assay tube using 200 μ L total volumes.

Performance Data

Broad Range dsDNA Assay				
Expected	DeNovix Assay measured on QFX		Qubit Assay measured on Qubit	
ng/ μ L	ng/ μ L	%CV	ng/ μ L	%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	



High Sensitivity dsDNA Assay				
Expected	DeNovix Assay measured on QFX		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
0.01	0.005	2.000	0.019	2.859
0.005	0.004	5.000	0.008	4.619

Ultra High Sensitivity dsDNA Assay				
Expected	DeNovix Assay measured on QFX		Qubit Assay measured on Qubit	
pg/μL	pg/μL	%CV	ng/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 QFX and DeNovix dsDNA quantification assays provides fast and accurate measurement with unmatched sensitivity. The QFX and DeNovix assays enable superior accuracy, higher sensitivity and a broader range of dsDNA quantification (0.5 pg/μL to 4000 ng/μL) compared to the Qubit 3.0 and Qubit assay range (10 pg/μL - 2000 ng/μL).

The DeNovix FX Series of instruments includes the QFX and the DS-11 FX+ combined Spectrophotometer and Fluorometer. DeNovix dsDNA quantification assays are available for purchase at denovix.com and through DeNovix authorized distributors.

Qubit® is a registered trademark of Thermo Fisher Scientific and its subsidiaries.

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