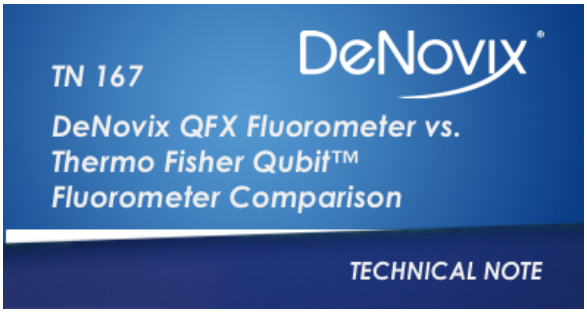

Technical Note 167

DeNovix QFX Fluorometer vs. Thermo Fisher Qubit™ Fluorometer Comparison

Introduction

The DeNovix QFX Fluorometer and the Thermo Fisher Qubit™ 3.0/4 fluorometers 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 DeNovix QFX Fluorometer and the Thermo Fisher Qubit™ 3.0/4 fluorometers. A performance comparison of DeNovix dsDNA Quantification Assays and Thermo Fisher 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 user-selectable fluorescence channels. The QFX, along with the DeNovix family of dsDNA Fluorescence Assays, provides the highest sensitivity and widest dynamic range for quantification available. When compared to the Thermo Fisher Qubit™ 3.0/4 fluorometers and Qubit™ dsDNA assays, the DeNovix QFX Fluorometer and assays provide a lower detection limit 20X below the 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 Thermo Fisher Qubit™ assays (Figure 1).

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

Due to DeNovix's 20X greater sensitivity over Thermo Fisher Qubit™ HS dsDNA assays, scientists are better equipped for quantification of low concentration samples 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.

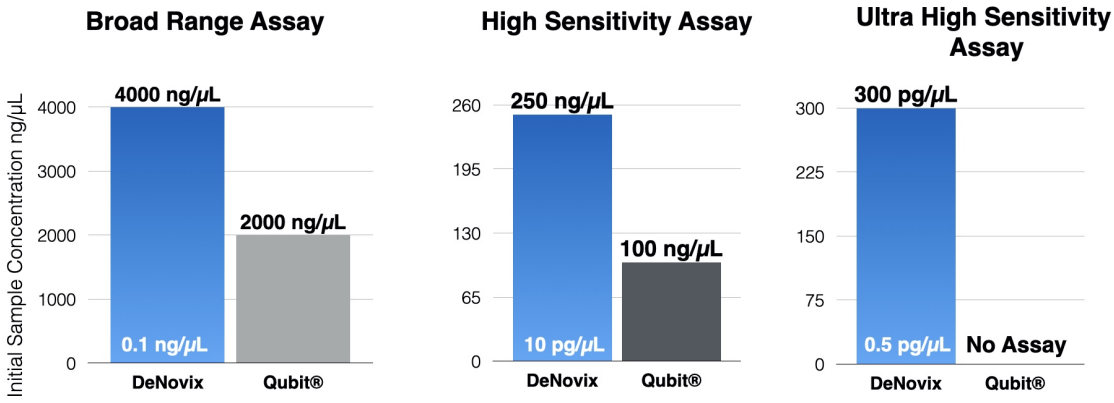

Figure 1: Comparison of dsDNA Fluorescence Assay Concentration Ranges

Feature Comparison

The DeNovix QFX Fluorometer includes features equivalent or superior to Thermo Fisher Qubit™ 3.0/4 fluorometers. Table 1 summarizes each system. The QFX Fluorometer is compatible with DeNovix RNA Assays, DeNovix dsDNA Assays or nearly any other fluorescence assay. Intuitive EasyApps™ software comes preinstalled on this stand-alone instrument. The system includes a custom OS and a 7" HD touchscreen.

Table 1: Comparison of Key Feature of the DeNovix QFX Fluorometer and Thermo Fisher Qubit™ 3.0 / 4 Fluorometers

Feature	DeNovix QFX Fluorometer	Thermo Fisher Qubit™ 3.0/4 Fluorometers

Feature	DeNovix QFX Fluorometer	Thermo Fisher Qubit™ 3.0/4 Fluorometers
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
Compatible Assays	Commonly used DeNovix, Thermo Fisher Qubit™, and Promega™ Assays	Thermo Fisher 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	White
Warranty	2 years	1 year
Country of Manufacture	USA	Malaysia

Methods

Comparison data for DeNovix dsDNA Quantification Assays and correlating Thermo Fisher Qubit™ quantification assays were obtained on a DeNovix QFX Fluorometer and Thermo Fisher Qubit™ 3.0 fluorometer respectively. Each assay was prepared as described in the manufacturer’s 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 Thermo Fisher Qubit™ assays were measured on the Thermo Fisher Qubit™ 3.0 fluorometer.

DeNovix Broad Range, High Sensitivity and Ultra High Sensitivity Assays

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 Sensitivity, 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.

Thermo Fisher 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 Thermo Fisher 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 µL total volumes.

Performance Data

Table 2: Broad Range Fluorescence Assay Performance Data

Broad Range dsDNA Assay

Expected	DeNovix Assay measured on QFX Fluorometer		Thermo Fisher Qubit™ Assay measured on Qubit™ Fluorometer	
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

Broad Range dsDNA Assay

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: High Sensitivity Fluorescence Assay Performance Data

High Sensitivity dsDNA Assay

Expected	DeNovix Assay measured on QFX Fluorometer		Thermo Fisher Qubit™ Assay measured on Qubit™ Fluorometer	
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

Table 4: Ultra High Sensitivity Fluorescence Assay Performance Data

Ultra High Sensitivity dsDNA Assay

Expected	DeNovix Assay measured on QFX Fluorometer		Thermo Fisher Qubit™ Assay measured on Qubit™ Fluorometer
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 – 4000 ng/µL) compared to the Thermo Fisher Qubit™ 3.0/4 fluorometers and Qubit™ assay range (10 pg/µL – 2000 ng/µL).

DeNovix dsDNA Quantification Assays are available for purchase at denovix.com and through DeNovix authorized distributors.

28-MAR-2024