

DeNovix SmartQC™ vs NanoDrop Acclaro™ Technical Note 178

Introduction

This document highlights the value of DeNovix SmartQC™ software found on DeNovix microvolume spectrophotometers and how it oversees the entire sample measurement process. Multiple algorithms ensure confidence in results while simultaneously providing important information to scientists about possible sample anomalies. This note also compares SmartQC to the Acclaro™ feature of the Thermo Fisher Scientific™ NanoDrop™ One.

Total Sample Confidence

Identifying co-extracted contaminants and having confidence in the quality control process is of great value in determining the suitability of a sample for downstream applications. DeNovix SmartQC is a unique suite of software features that ensures that users are alerted to potential sample contaminants and helps them avoid common sample measurements errors.

SmartQC Key Features

- Sample Contamination Alerts
- Measurement Surface Cleaning Monitor
- BridgeTesting® - ensures sample column is always formed
- SmartPath® - Always calibrated with no routine maintenance
- Spectral Analysis

Contamination Alerts

DeNovix SmartQC clearly flags samples that do not meet well established purity specifications with visual alert icons. Tapping on an alert icon on the Run screen will provide detailed information regarding the possible reasons for the high or low value. For nucleic acids, common contaminants such as phenol, protein, carbohydrates, guanidine and glycogen are often the major contributors and are identified by SmartQC. For proteins, the presence of nucleic acids or buffers that absorb highly in the UV range are typical factors affecting purity measurements.

SmartQC Custom Limits

One important element of the SmartQC software is the use of defined thresholds for the robust method of purity ratio determination.

To ensure that each investigator or lab identifies only samples that meet specific criteria important to their studies, DeNovix software enables users to define and save custom limits or use well-established default values. Users may also choose not to enforce any limits. This flexibility allows full compliance to laboratory and protocol standards across all users.

SmartQC Automated Quality Control Process

Surface Check	Check that previous sample has been removed.
SmartPath	Precisely select optimum pathlength for each sample.
BridgeTest	Dynamic monitoring and adjustment ensures sample column is formed.
Spectral Analysis	Analyse for negative spectra, absorbance within range, calculate purity ratios and quantify.
Alert	Check against threshold purity values. Flag contaminated samples. Display user guidance.
Report	Save and report data ready for export. Optional auto-save to network drive.

NanoDrop Acclaro software also uses a purity ratio alert feature. However, that software does not offer the option to customize or turn off the limits.

The Acclaro software presents only one icon on the screen whereas the DeNovix software presents separate icons for each nucleic acid ratio, making it immediately clear which ratio is out of specification. To add to possible confusion, the Acclaro ratio alert information icon is sometimes- but not always- used in conjunction with a deconvolution icon.



Deconvolution versus Alerts

The NanoDrop Acclaro software includes a deconvolution feature that attempts to present corrected concentration values for samples with significant contaminants levels. In the case of nucleic acids contaminated with protein, the sample needs to be grossly contaminated with 75% or more protein (<25% nucleic acid) for the deconvolution to be enabled. In addition, the deconvolution feature is only applied to samples within a limited dynamic range (25 to 3125 ng/ μ L). The DeNovix software focuses on notifying users when samples do not meet user-defined criteria, ensuring measurement integrity and enabling the user to make informed decisions.

SmartPath Technology with BridgeTesting

The NanoDrop One user guide indicates that the accuracy of the deconvolution algorithm instrument is dependent on whether the instrument maintenance schedule is followed. DeNovix' unique SmartPath Technology, a core innovation at the heart of the DS-11 FX Series, means instruments do not require scheduled maintenance procedures and are always in calibration. Scientists can have confidence that every measurement made using a DeNovix spectrophotometer accurately measures the absorbance of every sample.

In addition to potential contamination, SmartQC identifies potential methodological errors that can result in inaccurate absorbance measurements. The software monitors the sample measurement and cleaning process and warns users when a sample has not been removed by a previous user.

The DeNovix SmartPath Technology also includes the proprietary BridgeTesting algorithms. BridgeTesting detects if a sample is not bridging the optical surfaces and automatically compensates to provide a correct measurement in real time. The NanoDrop One may alert the user to a sample column anomaly but is not capable of making an adjustment to complete the column and will not report a measurement result. The user must reload and use additional sample.

Co-Extracted Nucleic Acids - The Importance of Fluorescence

Nucleic acids co-extracted with the molecule of interest e.g. fragmented DNA, oligo, RNA in a dsDNA prep, cannot be distinguished reliably using absorbance alone. The consequence of this is an overestimation of sample concentration as all nucleic acid species absorb maximally at 260nm.

Fluorescence quantitation using fluorophores specific for the molecule of interest is a complimentary method to absorbance quantitation for samples containing contaminants or buffers that interfere with the measurement wavelength in use. The DS-11 FX Series and FX Module enable both absorbance and fluorescence measurements in one instrument. The combination of absorbance and fluorescence provides greater confidence and accuracy when measuring samples and is a protocol requirement in applications such as Next Generation Sequencing.

Conclusions

DeNovix SmartQC monitors the complete measurement and quality control process and alerts users to potential sample contamination in real-time. Onscreen alert icons and specific guidance messages provide valuable insights for troubleshooting nucleic acid and protein extractions.

DeNovix software and the ability to run both absorbance and fluorescence measurements delivers unparalleled sample insight. DeNovix enables today's scientists to make informed decisions when using samples in expensive or time-consuming downstream applications.

Learn More

Related technical notes available at www.denovix.com

- 126 SmartPath® Technology Explained
- 130 Purity Ratios
- 135 SmartPath® Technology with Bridge Testing® Ensures Measurement Accuracy

Note: Comparison of DeNovix software v 3.17 vs NanoDrop One v 1.14 October 2017. NanoDrop and Acclaro are registered trademarks of Thermo Fisher Scientific.

DeNovix, Inc.

3411 Silverside Road
Wilmington, DE 19810 USA
Phone: +1.302.442.6911

Phone: +1.302.442.6911
Email: info@denovix.com
www.denovix.com

