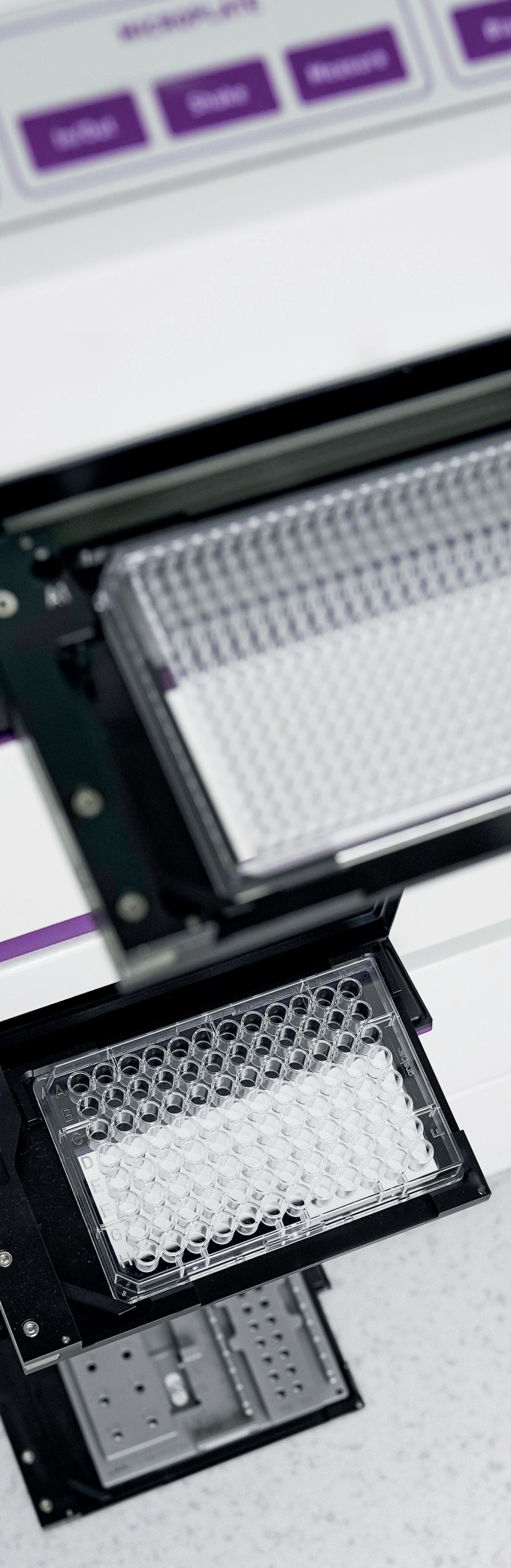


Accelerating your nucleic acid quantification for NGS



Ensuring high-quality NGS data

Next Generation Sequencing (NGS) technologies are incredibly powerful tools that have enabled scientists to quickly sequence entire genomes, further expanding the capabilities of personalized medicine.

The information generated from these tools however, is only as good as the quality of the nucleic acids used. Precise DNA and RNA quantification hence plays a crucial role to ensure high quality NGS data.

BMG LABTECH offers a range of microplate readers able to quantify DNA and RNA efficiently and in high-throughput, using any commercially available kit format.

Fluorescence and absorbance-based detection

BMG LABTECH instruments can be purchased as single or multi-mode microplate readers to read DNA purity and quantity in absorbance and fluorescence modes.

For absorbance, an ultra-fast UV/vis spectrometer is used across all instruments. This dedicated technology enables the collection of spectra or multiple wavelengths simultaneously for the rapid quantification and quality assessment of nucleic acids.

For fluorescence detection technologies such as Qubit™, Quant-iT, PicoGreen®, AccuBlue®, Hoechst, etc., our fluorometers use either filters or a Linear Variable Filter (LVF) Monochromator™ for wavelength selection to provide the best-in-class sensitivity and assay performance.

Compatible with all kits:

- Quantifluor dsDNA and RNA
- Qubit dsDNA and RNA kits
- AccuBlue dsDNA and RNA kits
- Quant-iT dsDNA and RNA kits

...ask us if you cannot find your specific assay in the list!

Throughput depending on your needs

Whether measuring just a few or thousands of samples with different dilutions and replicates, we have the right solution for you. BMG LABTECH microplate readers can handle sample sizes from 1 to 1536. Combined with high-sensitivity measurements, even smallest sample volumes result in accurate quantifications.

1 sample



1536 samples

Throughput and sensitivity for an effortless DNA quantification

Effortless data generation and analysis

Increased throughput invariably leads to large amounts of data to be processed and a need for effortless data analysis. BMG LABTECH's software package provides all the requirements needed to both effectively operate the reader and extensively analyse the data with both automated and one-click solutions for data export.

Regardless of your preferred detection method, predefined protocols and assay buttons help make day to day running easier.

Assay protocols include all measurement settings required for a specific assay. Assay buttons (fig. 1) allow you to simply start data acquisition with one mouse click. New protocols or buttons can be created for any needed assay.

Assay buttons can be further linked to data analysis templates, enabling immediate and automatic data processing. Templates automatically perform all required calculations and display all processed results ready to export as a final report either in Excel, .csv, pdf or HTML.

The software provides all components required for an integration into FDA CFR Part 11 or GxP regulated environments.

Our multi-user software package is provided free of charge with every instrument. The number of user installations is not subject to any license restriction, making it highly suitable for multi-user laboratories.



Fig. 1: assay buttons start data acquisition with one mouse click.

Automation compatible

An automated extraction process can be extended to DNA quantification. Our plate readers can be integrated with any robotic system.

Automation companies have pre-existing drivers for BMG LABTECH instruments making integration easy. Flexible automatic ASCII data output allows a seamless reader integration by providing raw or calculated data to a robotic software or LIMS system as part of the automation workflow.

Our goal is to provide a resource that will get you the necessary high-quality information about your samples as quickly and easily as possible.

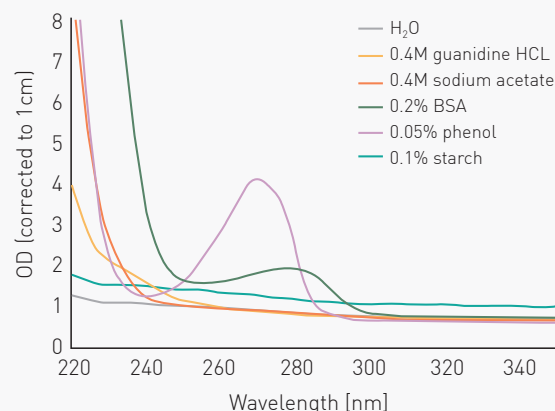


Fig. 2: Absorbance spectra of DNA samples, pure or with potential contaminants, blank corrected.

Ultra-fast detection of absorbance spectra

Measurement speed is important to decrease overall run time and to avoid evaporation issues when measuring low-volume samples. BMG LABTECH plate readers are equipped with a UV/vis spectrometer, enabling the acquisition of full absorbance spectra from 220 - 1000 nm in <1 second/well. Optical densities at the wavelengths needed to determine DNA concentration, protein, phenol and thiocyanate contamination left after the purification process (fig. 2) are all acquired in one measurement. A well-to-well path-length correction to correct for different well volumes is also available to ensure robust measurements in a microplate format.

Save on precious DNA samples

Scarce or precious DNA samples have to be measured in small volumes to save material for further steps. Our LVis Plate with sixteen micro-drop (fig. 3) wells enables the determination of DNA concentration and purity, as well as spectral scanning in 2 µl samples. The LVis Plate can also be equipped with NIST-traceable optical density and holmium oxide filters for quality control checks to validate the instrument for GLP-based work.

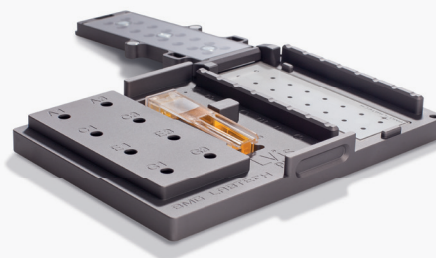


Fig.3: LVis Plate for detection of small volumes and quality control checks.

A_{260}/A_{280} : absorbance-based dsDNA quantification

Measure up to sixteen 2 µl samples in parallel on the LVis Plate

Double stranded DNA absorbs light at 260 nm. Absorbance based DNA detection allows concentration measurement in the lowest volumes. As proteins absorb light at 280 nm, absorbance spectra can be used to further determine protein impurities in DNA samples. BMG LABTECH microplate readers quantify DNA samples with a UV/vis spectrometer and a low volume microplate. The LVis Plate enables the measurement of sixteen samples with 2 µl volume in 20 seconds.

...or use a 384 well plate for high throughput

Absorbance-based DNA quantification can also be performed in high throughput in high-density plates. A full 384-well microplate can be measured in less than 4 minutes. Detection can be combined with upstream automation, resulting in an automated and hands-off process.

	UV/vis spectra		DNA concentration		A_{260}/A_{280}	
	10	11	10	11	10	11
A			131,495	130,165	1,89	1,89
B			71,135	70,745	1,90	1,90
C			39,63	40,405	1,89	1,85
D			24,905	24,265	1,92	1,85
E			17,335	16,965	1,89	1,97
F			13,955	13,555	1,95	1,87
G			11,44	10,865	1,93	1,75
H			10,21	10,635	1,73	1,80

Fig. 4: DNA quantification and analysis using 2 µl in the low volume plate (LVis Plate) and absorbance detection on a BMG LABTECH microplate reader. Green and red boxes indicate samples that passed or not passed purity check (A_{260}/A_{280} between 1.8 - 2.0), respectively.

For more information please refer to BMG LABTECH application note 352.



Qubit™ fluorescence-based DNA quantification

Fluorescence-based DNA quantification for NGS

Fluorescence-based DNA quantification using intercalator dyes allows the specific measurement of low concentrations of DNA or RNA. Qubit assays are commonly used for the quantification of input samples and libraries in the NGS workflow.

Kits are available in two formats depending on the expected sample concentration: a broad range or a high sensitivity version. Both are typically measured one by one in a reagent tube in 200 µl volume using a dedicated instrument.

Faster measurements and higher throughput

Microplate readers can measure Qubit assays faster and in higher throughput (e.g.: 96 samples in <45 seconds). Figure 5 compares DNA quantification performed on a Qubit handheld device with a BMG LABTECH plate reader. The Qubit BR dsDNA kit was used in a final volume of 200 µl and a sample volume of 2 µl. Microplate measurements were done in duplicates. Qubit measurements were done one by one without replicates. While measurements of both devices correlate very well, the microplate reader produces faster and more reliable results due to replicate measurements.

Using a microplate also offers the possibility to downscale assays, reducing sample volume and potentially reducing costs.

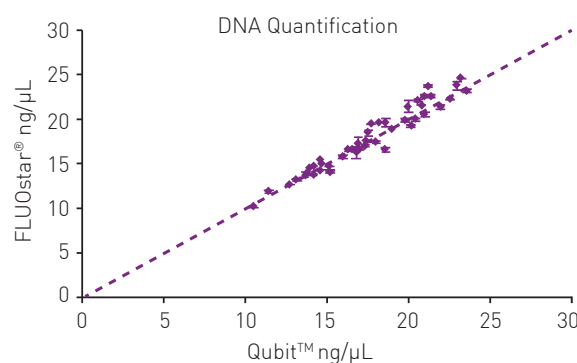


Fig. 5: comparison of DNA quantification using the Qubit dsDNA BR kit on the FLUOstar Omega microplate reader (y axis) with a single tube fluorometer (x axis).

For more information please refer to BMG LABTECH application note 325.



Quant-iT/ PicoGreen® DNA quantification

Sensitive dsDNA quantification

As genomic DNA sequencing techniques develop, greater sensitivity using lower sample volumes is desired for nucleic acid quantification in microplates. As sensitivity in absorbance techniques is limited, fluorescence intensity methods have arisen to achieve greater performance. The Quant-iT PicoGreen® dye provides a solution for measuring low concentrations of dsDNA in 96- to 1536-well micro-plates in a highly sensitive way.

Figure 6 shows how a concentration range from 0.1 ng/ml to 10 µg/ml is quantified in a 384 well plate with 10 µl samples.

A full 384-well plate is measured in only 100 seconds and the calculation of DNA concentrations is automatically performed by the MARS data analysis software. With the PicoGreen assay, any volume from 2 µl in the LVis Plate to larger volumes in 96- and 384-well plates, can be used to quantify DNA samples.

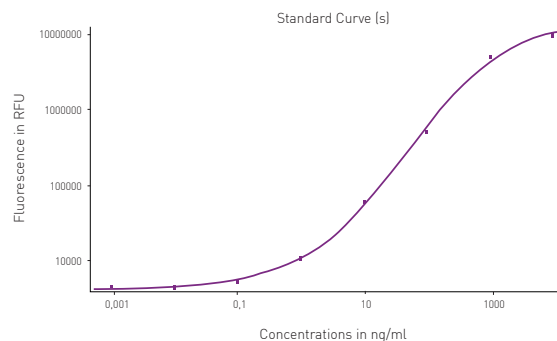
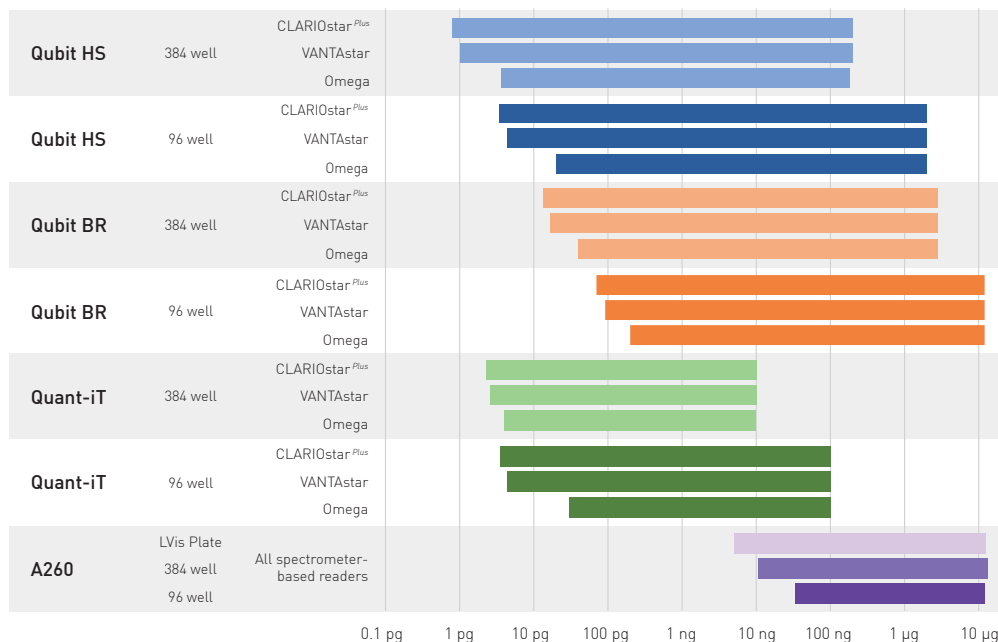


Fig. 6: standard curve of dsDNA quantified with the Quant-iT PicoGreen kit on the CLARIOstar Plus. Measurement was done in a 384 small-volume plate with 10 µl sample volume.

Assays and microplate reader comparison



Comparison of DNA quantification methods measured on CLARIOstar^{Plus}, VANTastar, FLUOstar Omega and SPECTROstar^{Nano} (only absorbance). Double-stranded DNA samples were quantified using either UV/vis absorbance (A260) or fluorescent assays, both in 96 or 384-well plates.

Data for the LVis Plate are also displayed. Coloured bars indicate the measurable DNA concentration range for each approach. DNA detection by UV/vis absorbance is comparable as performed on all readers by ultra-fast UV/vis spectrometer.

Absorbance detection with ultra fast spectrometer	➤	➤	➤	➤	➤	➤
Absorbance detection up to 1536-well microplates	➤	➤	➤	➤	➤	➤
Fluorescence detection up to 384-well microplates		➤	➤	➤	➤	➤
Fluorescence detection up to 1536-well microplates				➤	➤	➤
2 µl samples with LVIS Plate	➤	➤	➤	➤	➤	➤
Automation friendly	➤	➤	➤	➤	➤	➤
Multi-user package with MARS data analysis software	➤	➤	➤	➤	➤	➤
What else should you know	<p>Our innovative absorbance-only plate reader has the flexibility to perform assays quickly and easily in microplates or cuvettes. This spectrometer-based reader captures a full UV/vis spectrum in less than 1 sec/well. Its speed and simple push button operation make it the leading microplate reader for absorbance measurements.</p> <p>The Omega series offers true flexibility to provide you with the perfect reader to fulfil your requirements: from an absorbance-only SPECTROstar to a fully-equipped FLUOstar Omega with up to seven detection modes. Your instrument can also be upgraded at any time if you need more features or additional detection modes.</p> <p>Conceived for ease-of-use and flexibility, the VANTASTAR is a compact multi-mode microplate reader with simplified detection workflows and a combination of three detection technologies: LVF Monochromators, filter-based detection and an ultra-fast UV/vis spectrometer.</p> <p>The CLARIOstar^{Plus} is our most flexible multi-mode plate reader. It comes equipped with our patented LVF Monochromators™, filters, and spectrometer. Flexibility combined with the best sensitivity of its class, and our newly developed Enhanced Dynamic Range technology, make it the ideal reader for assay development.</p>					

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