

QuantStudio 6 and 7 Pro Real-Time PCR Systems



Greener by design™

 **Less waste:** made with up to 54% less material than comparable instruments; generates up to 91% less waste during calibration

 **More energy efficient:** consumes up to 26% less energy

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Introduction

We design our products with the environment in mind. Applied Biosystems™ QuantStudio™ 6 and 7 Pro Real-Time PCR Systems are made with fewer materials, generate less waste, and are more energy efficient than similar real-time PCR instruments.

Product description

The new QuantStudio 6 and 7 Pro Real-Time PCR Systems deliver a lab-changing qPCR experience with a smart workflow. This includes innovations that make qPCR more personalized, efficient, and productive. New settings allow you to log in with facial authentication and automatically load your preferences; no passwords required. Manual input for plate layout and protocol and assay information are minimized when using Applied Biosystems™ TaqMan® Array Plates with RFID. Hands-free operation through voice commands minimizes hands-on time, and push-button access to Smart Help and Smart Remote Support provides fast and efficient troubleshooting to maximize uptime. Enhanced connectivity with cloud-enabled services allows you to access your data from anywhere, anytime with an internet-connected device.



Green features

Less waste and fewer resources

When designing our products, we strive to minimize the amount of material they contain to use resources more efficiently and reduce waste. With the QuantStudio 6 and 7 Pro systems, our engineers focused on building the instruments' capabilities into a smaller form factor. As a result, they use up to 54% less material (in final weight) than the Applied Biosystems™ QuantStudio™ 6 and 7 Flex systems, the Applied Biosystems™ 7900HT Fast Real-Time PCR System, and the Applied Biosystems™ ViiA™ 7 Real-Time PCR System (Table 1). They also have a footprint that's 48–71% smaller than these instruments, promoting more efficient use of laboratory space and increasing freight density to help reduce emissions during transit.

The QuantStudio 6 and 7 Pro systems also have a smaller block and heated cover than other real-time PCR systems (Table 2). The heated cover and block in the QuantStudio 6 and 7 Pro systems are 2.8 kg compared to 6.1 kg for the QuantStudio 6 and 7 Flex systems and the ViiA 7 system, and 3.0 kg for the 7900HT system, allowing for easier installation. For added convenience, the block and heated cover for the QuantStudio 6 and 7 Pro systems can be changed while the instrument is powered up, so there is no need for tools or a power cycle.

In addition, we have reduced the amount of calibration materials needed, decreasing the amount of waste generated by calibration (Table 3). Dye calibration for the QuantStudio 6 and 7 Pro systems is recommended only once every two years and uses three plates to calibrate 10 dyes. The QuantStudio 6 and 7 Flex systems, by comparison, should be calibrated every six months and require

a calibration plate for each of the six pure dyes plus FAM™/ROX™ and VIC™/ROX™ normalization plates, or three plates every six months with the V1.6 software upgrade or higher. This means that over a two-year time period, the QuantStudio 6 and 7 Pro systems will generate up to 91% less waste from calibration materials and packaging when compared to the QuantStudio Flex systems.

Table 1. Real-time PCR instrument weights and footprints.

Instrument	Weight (kg)	Weight reduction	Footprint length x width (cm)	Footprint reduction with QuantStudio 6 and 7 Pro systems
QuantStudio 6 and 7 Pro systems	38	–	33.8 x 52.5	–
QuantStudio 6 and 7 Flex systems	70	46%	53 x 70	52%
7900HT system	82	54%	72 x 84	71%
ViiA 7 system	67	43%	53.5 x 63.5	48%

Table 2. Real-time PCR instrument block and heated cover weights.

Instrument	Weight (kg)	Weight reduction with QuantStudio 6 and 7 Pro systems
QuantStudio 6 and 7 Pro systems	2.8	–
QuantStudio 6 and 7 Flex systems	6.1	54%
7900HT system*	3.0	7%
ViiA 7 system	6.1	54%

* Block only; heated cover is not interchangeable on the 7900HT system.

Table 3. Real-time PCR calibration materials and waste reduction (includes packaging).

Instrument	Calibration plate weight (g)	Number of calibration plates needed	Number of plates used over 2 years	Waste production every 2 years (g)	Waste reduction with QuantStudio 6 and 7 Pro systems over 2 years
QuantStudio 6 and 7 Pro systems	60	3 plates every 2 years	3	180	91%
QuantStudio 6 and 7 Flex systems with Software Upgrade V1.6 or higher	60	3 plates every 6 months	12	720	75%
QuantStudio 6 and 7 Flex systems	60	8 plates every 6 months	32	1920	–

More energy efficient

The QuantStudio 6 and 7 Pro systems are more energy efficient, using 26% less energy to process one sample plate than the QuantStudio 6 and 7 Flex systems, and 23% less energy than the ViiA 7 system (Table 4). The energy consumption of the 7900HT system was not measured here because it requires a 220V plug configuration that is incompatible with the standard energy meter. Note that all measurements were made using a Kill A Watt™ model P4400.01 meter.

The QuantStudio 6 and 7 Pro systems also have features to help reduce energy consumption when not in use (Table 5). Other real-time PCR systems have an idle mode where the heated cover is kept at 105°C. The QuantStudio Pro systems, by contrast, have a feature enabling the heated cover to be turned off or the temperature reduced in idle mode to save energy, helping to reduce energy consumption by up to 25%. There is also a programmable sleep mode on the QuantStudio Pro systems to transition to idle mode at a user-determined time.

Energy-efficient lab equipment helps reduce greenhouse gas emissions and save money. In a typical lab that is running a real-time PCR system for eight hours a day, the QuantStudio 6 or 7 Pro systems could help save up to 640 kWh of energy over the course of a year, representing 0.453 metric tons of CO₂ equivalents [1].

A 2015 study on laboratory energy consumption by the Center for Energy Efficient Laboratories (CEEL) [2] determined that laboratories in the state of California alone use at least 800 GWh of energy each year—that's equivalent to the yearly greenhouse gas emissions from 127,489 passenger cars [1]. Designing our instruments to consume less energy is one step toward more efficient use of resources.

Table 4. Power and energy consumption of real-time PCR systems during use. Run conditions: 50°C for two minutes; 95°C for 10 minutes; 40 x (95°C for 15 seconds plus 60°C for one minute).

Instrument	Average energy consumption (kWh)	Energy reduction with QuantStudio 6 and 7 Pro systems
QuantStudio 6 and 7 Pro systems	0.37	–
QuantStudio 6 and 7 Flex systems	0.50	26%
ViiA 7 system	0.48	23%

Table 5. Power and energy consumption of real-time PCR systems in idle mode.

Instrument	Average power usage (kW)	Run time (h)	Average energy consumption (kWh)	Energy reduction with QuantStudio 6 and 7 Pro systems
QuantStudio 6 and 7 Pro systems	0.16	1	0.16	–
QuantStudio 6 and 7 Flex systems	0.22	1	0.22	25%
ViiA 7 system	0.21	1	0.21	20%

References

1. US EPA Greenhouse Gas Equivalencies Calculator. <http://epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed March 8, 2019.
2. Paradise, A (2015). "Market Assessment of Energy Efficiency Opportunities in Laboratories." www.etcc-ca.com/sites/default/files/reports/ceel_market_assessment_et14pge7591.pdf

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