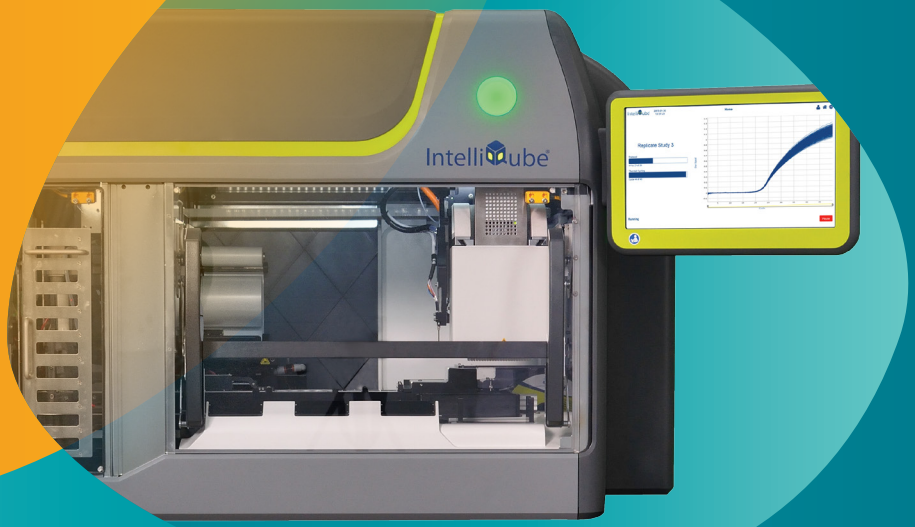
IntelliQube



Integrated PCR workflow.
Extreme lab efficiency.

BIOSEARCH™
TECHNOLOGIES
GENOMIC ANALYSIS BY LGC

Array Tape from LGC, Biosearch Technologies

Achieve high quality data with reproducible results in a flexible, high-throughput system at a dramatically lower cost per data point. Array Tape is a microplate replacement in the form of a continuous polymer strip, serially embossed with reaction wells in custom volumes and formats.

The product is thin (0.3 mm), which allows up to 50 arrays or up to 100 384-well microplate equivalents to be spooled onto a single, compact reel.

Revolutionise your lab with Array Tape®!

768-Well Array Tape

IntelliQube

Fully automated PCR setup, amplification, and analysis system.

The IntelliQube®* is the first fully automated, medium to high-throughput instrument featuring seamless integration of liquid handling, thermal cycling, detection and data analysis. The IntelliQube supports quantitative real-time PCR, end-point PCR, and isothermal chemistries, allowing you to realise the benefits of inline automation enabled by the innovative Array Tape consumable.

Integrated

The IntelliQube integrates the PCR process by combining multiple instruments into one, simplifying your workflow for walk-away operation. Simply load and go, freeing up lab space and allowing personnel to focus less on managing instruments and more on their research.

Efficient

The IntelliQube and Array Tape consumable offer a scalable solution for your laboratory. With our 768-well format, you will realise twice the PCR throughput compared to traditional 384-well qPCR instruments. For end-point genotyping, the IntelliQube combined with the Hydrocycler[2] allows processing of up to 65 microplate-equivalents or 24,960 reactions per day!

Economical

Substantially reduce your assay volumes with miniaturised reaction wells on the innovative Array Tape consumable. You can save up to a 90% in your assay costs with 1.6 µL reaction volumes!

Flexible

The IntelliQube is compatible with a broad range of chemistries and fluorogenic probes. Integrated liquid handling maximises your run flexibility and minimises waste compared to rigidly defined chips, microarrays or microfluidics.

Reliable

The integrated liquid handling delivers accurate and reproducible low-volume dispense of both samples and reaction mix. This automation eliminates the variability and significant time associated with manual pipetting.

High performance

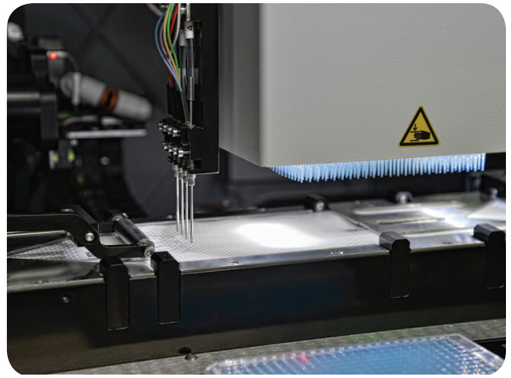
Industry-leading liquid handling, thermal cycling and optical systems come together in the IntelliQube to deliver the accurate and sensitive PCR results you expect, with the flexibility, efficiency and integration that your lab needs.

Supports a variety of applications

- Gene expression
- Genotyping and copy number
- Variants (CNVs)
- Microbial detection and quantification
- miRNA analysis
- Melt curve analysis
- Zygosity and GMO

Liquid handling

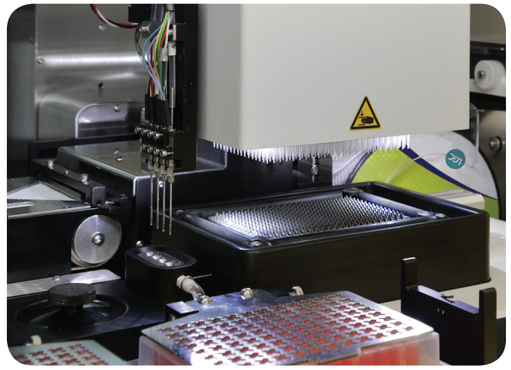
The IntelliQube leverages best-in-class multi-functional dispensing for high speed liquid handling in 384- or 768-well Array Tape. Precise sample dispensing into Array Tape is handled by the FeliX 384-channel pipette head from CyBio® Product Line. Reagent dispensing is performed by the Dispense Jet, a 4-channel, non-contact dispense head that loads the assay mixtures required for your protocols. With CVs less than 5%, the liquid handling on the IntelliQube offers exceptional reproducibility and data quality.



Dispense Jet

Pipette Wash

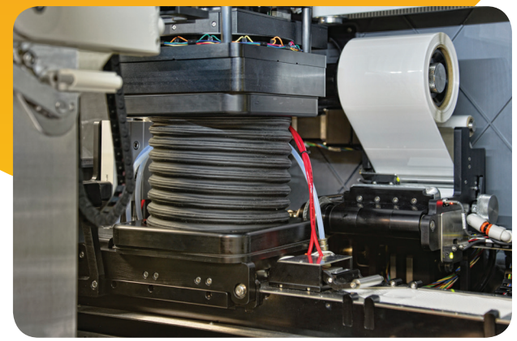
The Pipette Wash reduces tip waste and associated consumable costs while mitigating the risk of cross contamination. The process uses fluid agitation around the dispense tips to ensure complete interior and exterior cleaning of the tips, while a touch-off feature is used to counteract surface tension and remove residual droplets. Complete evacuation of the wash basin contents after each wash cycle combined with the ability to incorporate a wash additive, such as bleach, ensures testing integrity and minimises the risk of cross-contamination.



Pipette and jet washes

Thermal cycling

Inline amplification is supported with a Peltier thermal cycling block designed specifically for Array Tape. Due to the unique block design and surface geometry, both 384- and 768-well Array Tape are supported without requiring a block change. Excellent ramp rates, temperature uniformity, and accuracy enable broad compatibility with amplification methodologies, including fast PCR and isothermal chemistries.



Thermal cycling and detection chamber

Hydrocycler²™

Labs performing end-point PCR can benefit from concurrent thermal cycling and higher-throughput with the Hydrocycler². This off-instrument water bath is optimised to rapidly thermal cycle up to 50 arrays per run.

Hydrocycler²

Detection

The IntelliQube features an advanced optical system for inline fluorescence detection in Array Tape. Filtered LEDs are optimised for a variety of commonly used fluorophores within the excitation range of approximately 480-620 nm. A high-resolution CCD camera supports detection of fluorescence intensity with five detection channels for dyes within the range of approximately 510-705 nm. Multiplex data capture for all five optical channels can occur in as little as 15 seconds.

Dye channel	1	2	3	4	5
Excitation filter (nm)	478	525	548	580	625
Emission filter (nm)	520	563	580	628	708
Common dyes	FAM™	JOE™ VIC®/HEX™ CAL Fluor® Orange 560	NED™ TAMRA™ CAL Fluor Red 590	ROX™ CAL Fluor Red 610 Texas Red®	Cy5® Quasar® 670

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Software and data analysis

The IntelliQube is preloaded with the innovative Intellics® Software Suite. Intellics provides centralised data management, instrument monitoring, run optimisation, protocol generation, and streamlined data analysis.

Intellics supports a variety of PCR analyses:

- Absolute quantification with standard curve
- Relative quantification (relative standard curve and comparative Cq)
- End-point genotyping
- Presence/absence testing
- Melt curve analysis

Optional accessories

Reservoir Tank

All system liquid, including water for washing, is supplied to the IntelliQube through the Reservoir Tank. Spare Reservoir Tanks are available for purchase to provide uninterrupted instrument run time.

Automated Rewind

The Automated Rewind attaches to the side of the IntelliQube and rewinds Array Tape onto a spool as it exits the instrument. This is ideal for labs performing high throughput end-point PCR with the Hydrocycler^2 water bath as the spool can then be placed directly into the Hydrocycler^2 for thermal cycling.

Instrument performance capabilities

Cq uniformity[1]

Users can expect minimal well-to-well variability in Array Tape, providing confidence in attaining highly reproducible qPCR results.

The IntelliQube demonstrated a total standard deviation (SD) of 0.087 cycles when 768 replicate wells each containing 2048 copies of a NIST calibrated human – gDNA reference standard were analysed for a non-transcribed locus in hgDNA (Figure 1).

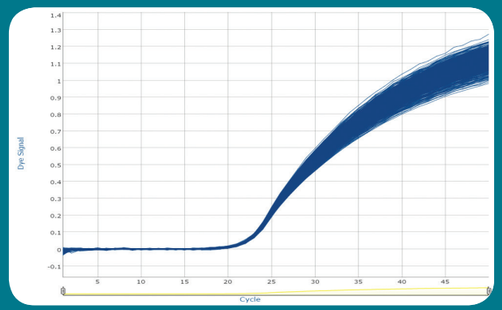

Figure 1. IntelliQube demonstrated a total standard deviation of 0.087 cycles within 768 replicate wells each containing 2,048 copies of NIST calibrated human gDNA.

Dynamic range[1]

The IntelliQube can support assays across a large range of input concentrations while maintaining data integrity. When analysing a 1000 bp synthetic target serially diluted across eight orders of magnitude, the IntelliQube demonstrated a linear dynamic range of quantification between $4x10^7$ to 40 copies/reaction (Figure 2).

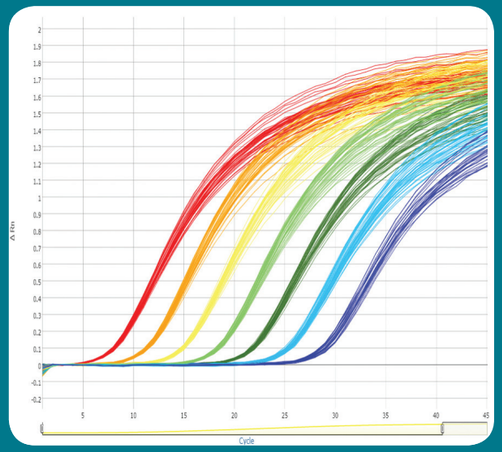

Figure 2. IntelliQube demonstrated a 6-log dynamic range from $4x10^7$ to 40 copies/reaction. A 10 fold serial dilution of a 1,000 bp synthetic target was performed.

Resolution[1]

Minimal differences in target quantity can be accurately resolved between reaction wells on the IntelliQube. Using a NIST calibrated hgDNA reference standard, reactions were prepared to represent 1.5 and 1.2 fold differences in template concentration. When analysed for a non-transcribed locus in hgDNA, the IntelliQube demonstrated the ability to resolve 1.5 fold differences with 100% sensitivity and specificity (Figure 3) and 1.2 fold differences with greater than 97% sensitivity and specificity (Figure 4).

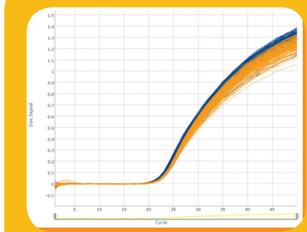

Figure 3. 1.5 fold resolution

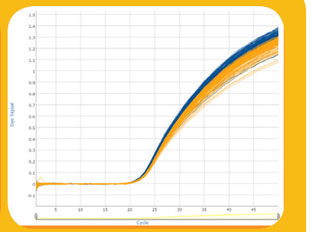

Figure 4. 1.2 fold resolution

Sensitivity[2]

The IntelliQube provides the sensitivity necessary to amplify and detect even 1-2 copies of target DNA in a reaction well. Although the theoretical limit of detection (LOD) provided by Poisson statistics is limited to 3 molecules, IntelliQube has demonstrated the ability to detect as little as 1-2 molecules of hgDNA per reaction.

For more information, refer to the IntelliQube Real-Time qPCR Performance and Sensitivity Application Notes.

Performance capability summary

Cq uniformity	0.087 cycles SD
Linear dynamic range	$4x10^7$ to 40 copies/reaction
Resolution	1.2 fold (<5% FDR)
Sensitivity	1-2 copies/reaction

References:

[1] IntelliQube Real-Time Quantitative PCR Performance, LGC Douglas Scientific, July 2016

[2] Characterization of Real-Time qPCR Sensitivity on the IntelliQube, LGC Douglas Scientific, July 2016

IntelliQube specifications

Liquid handling specifications		
SAMPLE DISPENSING CYBIO FELIX PIPETTE HEAD	Mechanism	Air displacement
	Dispensing configuration	384-channel
	Dispense volume	800 nL
	Precision	≤5%
	Recommended input	Nucleic acid templates
	Source plate positions	10 (ambient temperature)
	Supported source plates	ANSI/SBS compliant 96/384-well formats ≤25 mm in height
ASSAY DISPENSING DISPENSE JET	Mechanism	Single jet solenoid micro-valve
	Dispensing configuration	4-channel
	Dispense volume	800 nL
	Precision	≤5%
	Recommended input	2X Primer + Probe + Master Mix
	Source plate positions	3 (temperature controlled)
	Supported source plates	ANSI/SBS compliant 96-well formats ≤30 mm in height
TOTAL DISPENSING TIME	Approximately 5 to 6 minutes per array	
Thermal cycling specifications		
BLOCK TYPE	Peltier	
BLOCK CONFIGURATION	384- or 768-well Array Tape	
TEMPERATURE RANGE	22 - 100 °C	
TEMPERATURE ACCURACY	±0.25 °C	
TEMPERATURE UNIFORMITY	±0.5 °C at 95 °C	
HEATING RAMP RATE	3.0 °C/sec	
COOLING RATE	2.0 °C/sec	
Detection specifications		
EXCITATION SOURCE	15 filtered LEDs	
EXCITATION RANGE	480-620 nm	
DETECTION METHOD	CCD	
DETECTION RANGE	510-705 nm	
MULTIPLEX DATA CAPTURE TIME	≤15 seconds	
Instrument control and software specifications		
SOFTWARE	Intellics Software Suite with IntelliScore®	
OPERATING SYSTEM	Microsoft Windows® Embedded Standard 7 (on instrument)	
INSTRUMENT CONTROL INTERFACE	Full HD touch screen display	
ANALYSIS AND PROTOCOL SET UP	Network access using Google Chrome™ or Firefox®	
SUPPORTED ANALYSIS MODES	Standard curve, relative standard curve, ΔΔCq, genotyping, presence/absence, melt curve	
DATA EXPORT AND LIMS INTEGRATION	Configurable comma separated values (CSV) files	
COMMUNICATION	RJ-45 gigabit LAN	
Physical specifications		
DIMENSIONS (W X D X H)	W: 123.9 cm (48.78") H: 191.2 cm (75.29") (with cart and door open) D: 84.9 cm (33.42")	
WEIGHT	410 kg (900 lbs)	
INPUT VOLTAGE	120/240 VAC, 15/7.5 A	
FREQUENCY	50-60 Hz	
OPERATING TEMPERATURE	59-86 °F (15-30 °C)	
OPERATING HUMIDITY	20-80% relative humidity, non-condensing	
AIR INPUT	80-100 PSI (5.5-6.9 bar), bursts up to 15 SCFM (424.8 LPM)	
WATER INPUT	• R.O. water (preferred) 3.96 GPM (15 LPH) Standard — Minimum grade ASTM standard (ASTM D1193-91) — Type III ISO standard (ISO 3696) — Grade 3 Clinical Laboratory Standards Institute (CLSI - CLRW) — Type 3 Note: Commercial/industrial R.O. water systems typically meet these requirements • DI water	
CERTIFICATIONS	CE	

IntelliQube service

When your laboratory is in high production, your instruments must perform as expected. At Biosearch Technologies, we deliver a range of pre-emptive and responsive services to ensure our instrumentation is a dependable performer in your operation.

Service plan offerings

Time and Materials

Offered for customers desiring Time and Materials service as needs arise. This plan does not provide discounts or loyalty incentives.

Comprehensive Plan

Ideal for customers who require around-the-clock service. Enjoy the fastest response times, having a Certified Operator on staff, the option of a dedicated response team, and significant discounts.

Premier Plan

This plan provides a strong blend of services including guaranteed response times, a Certified Operator on staff, and discounting.

Integrated tools.
Accelerated science.

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