

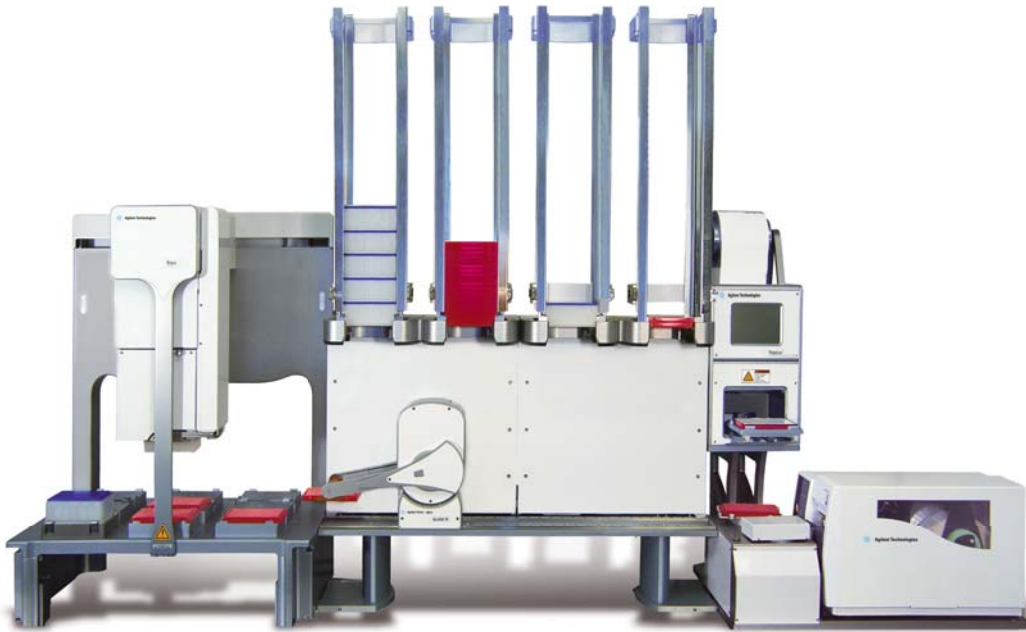


Genomics in Motion

Automation Solutions
from Agilent



Agilent Technologies



The Power of Automation

Moving you faster from ideas to answers you can trust

Genomics research is changing. New technology has enabled the collection of data from increasing numbers of samples for many widely used assays, including:

- Gene expression profiling
- Next generation sequencing
- RNA interference & siRNA knockdown screens
- Comparative genomic hybridization (CGH)

Collecting these larger data sets can be challenging and labor-intensive, increasing the time it takes to move from research questions to the data that can decisively answer them. As experimental needs expand to take advantage of these new approaches, traditional manual methods are becoming increasingly impractical and ineffective. Agilent Automation Solutions put high-throughput, high sample-sized experiments into the hands of the basic genomics research lab, opening new fields of data for exploration, and shortening the time from idea to answer.

Agilent's automation portfolio allows you to increase the number of reactions you can perform in parallel, drastically reducing the amount of sample processing time and increasing the number of samples each researcher can process while reducing the amount of sample-to-sample variability. And they're simple to use. Users interface with each instrument in Agilent's automation portfolio through the same intuitive, workflow-based VWorks Automation Control Software.

Supporting your research

In addition to proven machines and compatible consumables and accessories, we provide the expertise you need to ensure optimal results in your work. As with all of our products, Agilent Automation Solutions is backed by knowledgeable scientists who can provide customized support and services for your specific applications.

Get Your Research Moving

Solutions designed for your specific genomics applications

Faster time to results in next generation sequencing

Incorporating the Bravo Automated Liquid Handling Platform or the Vertical Pipetting Station into your research can greatly reduce the amount of time you spend preparing and checking the quality of your next generation sequencing libraries, and increase precision by reducing sample-to-sample variability. Bead-based target enrichment protocols like those used in the SureSelect Target Enrichment Kits and SureSelect Human All Exon Kits are easily implemented and highly scalable through the use of automated liquid handling platforms. Protocols for automating preparation of your next generation sequencing library using the Bravo Automated Liquid Handling Platform can also be found in the published literature.¹

Increased reproducibility in gene expression profiling

Automation of RNA purification can increase the reproducibility of your gene expression profiling studies and enable you to rapidly examine gene expression from multiple samples under multiple conditions. With automation, your RNA samples are clean, intact, and reproducible. Gene expression profiling can also be performed using next generation sequencing.²

Enhanced precision in PCR and qPCR

Any protocol that relies extensively on liquid handling is easily transferrable to automated platforms. The precision you gain from Agilent Automation Solutions is especially beneficial for sensitive, quantitative experiments such as PCR & qPCR (Table 1).

Comparison of C_t values obtained when preparing targets using the Bravo or by hand

Target	Fetal Lung			HeLa			Fetal Heart		
	Bravo	Hand	Δ	Bravo	Hand	Δ	Bravo	Hand	Δ
ACTB	20.37	20.04	0.33	19.87	20.09	0.22	19.52	19.54	0.02
B2M	23.86	23.6	0.26	22.64	22.93	0.29	20.21	20.15	0.06
GAPDH	22.74	22.44	0.3	19.28	19.36	0.08	18.6	18.43	0.17
GUSB	26.46	26.64	0.18	25.12	25.18	0.06	25.32	25.27	0.05
HPRT1	29.91	29.77	0.14	25.86	26.33	0.47	25.92	25.79	0.13
PGK	26.35	26.47	0.12	22.39	22.61	0.22	22.77	22.62	0.15
PP1A	22.53	22.28	0.25	20.94	21.37	0.43	20.5	20.44	0.06
RPL13A	20.67	20.13	0.54	20.21	20.36	0.15	18.77	18.55	0.22
TBP	28.85	29.03	0.18	28.55	28.85	0.3	27.85	28.11	0.26
TFRC	29.51	29.71	0.2	24.66	24.91	0.25	27.28	27.4	0.12
β-actin	20.78	20.83	0.05	20.53	20.84	0.31	17.52	17.75	0.23

Table 1. Quantitation of different mRNAs extracted from fetal lung tissue, HeLa cells, or fetal heart tissue using an Agilent Mx3005P Real Time Thermal Cycler (G5105A). RT-PCR reactions were prepared either by hand or using the Agilent Bravo Automated Liquid Handling Platform. Low Δ values demonstrate that the automated protocols perform as well as the manual protocols, but require less hands-on time.

Optimized transfection conditions for functional genomics

Using automation, you can now perform comprehensive genetic screening in eukaryotic systems by automating siRNA transfections and preparation of cells for gene expression analysis. Large-scale screening with siRNAs has previously been difficult because of the number of steps that require optimization. Using the Bravo Automated Liquid Handler, Thaker, et al (2010)³ were able to optimize transfection conditions for an siRNA screen of six different glioma cell lines in order to identify potential therapeutic targets for glioblastoma therapeutic development.

Better data quality with less work in CGH, SNP, genotyping

Increase your sample size and the power of your statistical analysis—while reducing your hands-on time—by automating DNA isolation and sample preparation for your genomic DNA assays. SNP analysis, CGH analysis, copy number variation (CNV) analysis, and other assays can be easily optimized without sacrificing the quality of your data (Figure 1).



Bravo Platform

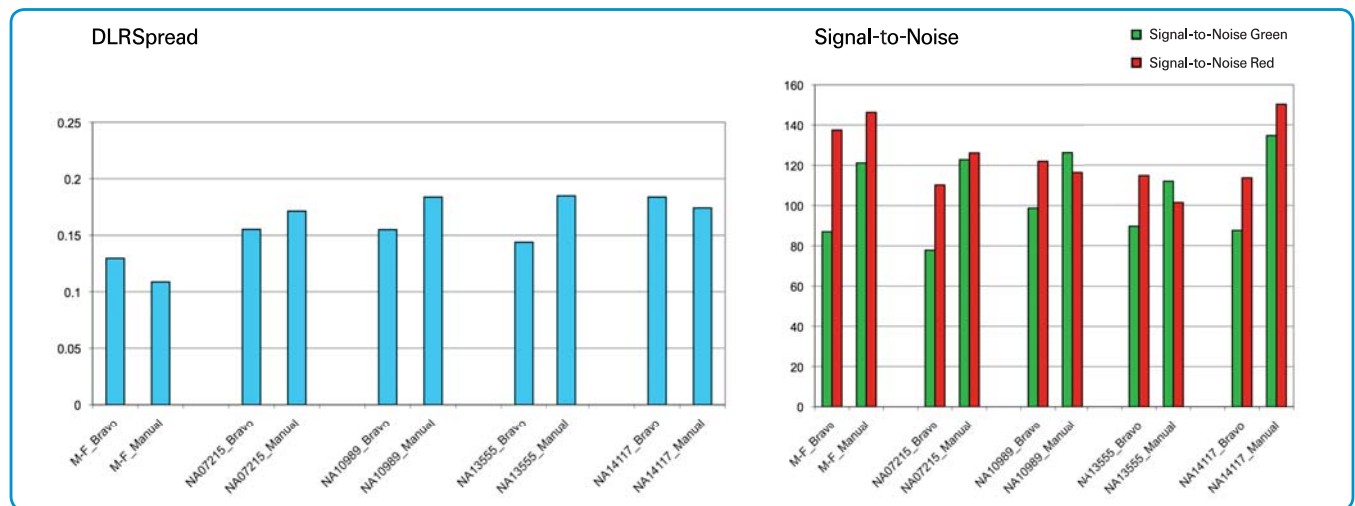


Figure 1. Comparison of CGH sample preparation using a manual versus an automated protocol. Derivative log ratio (DLR) spread and signal-to-noise metrics from six replicates of one human male and one human female genome sample show that the automated protocol is highly reproducible and consistent with manual processing.

Automate Reaction Setup and Processing

Agilent Automation Solutions—from modules to workflows

Liquid handling

Our automated liquid handling solutions span discovery applications. They incorporate advanced fluid delivery technologies to deliver precise, reliable performance, as well as our legendary reliability.

Bravo Automated Liquid Handling Platform—High accuracy pipetting over a wide volume range, with the flexibility to accommodate different plate formats. A unique, open design that easily fits in and is certified for use in laminar flow hoods and facilitates integration into automated workflows.

Vertical Pipetting Station—Ultra-compact, eight-plate position design with a three-plate footprint and reduced cycle-times through the ability to simultaneously pipet while processed plates are replaced.

Microplate handling

Agilent's microplate handlers, sealers, seal piercers, centrifuges and barcode labelers deliver outstanding performance in a variety of configurations: as stand-alone instruments, in versatile combinations, integrated into benchtop workstations, or free-standing automated systems.



Vertical Pipetting Station



Microplate Centrifuge

Automating the entire workflow

Custom systems for your benchtop or complete, free-standing systems allow you the flexibility to combine any of the Agilent Automation Solutions modules with other instruments, such as microplate fluorescence detectors and microplate incubators in order to automate and scale-up your entire workflow.

BenchCel Microplate Workstation—Automate your entire workflow on any benchtop by combining Agilent Automation Solutions instruments with a variety of plate readers, washers and incubators. The flexibility of the BenchCel allows you to design custom configurations for your specific application—RNAi, screening enzymes, proteins, antibodies, cells, bulk dispensing, plate reading, PCR setup/cleanup, genomic assays, and cell maintenance.

BioCel System—The ultra high-productivity, high-throughput, free-standing microplate automation system is enabled by the easily “teachable” Direct Drive Robot (DDR). Like the BenchCel, the BioCel is a highly flexible system that you can customize with different Automation Solutions modules or third-party instruments for your specific application.



BioCel 1800 System

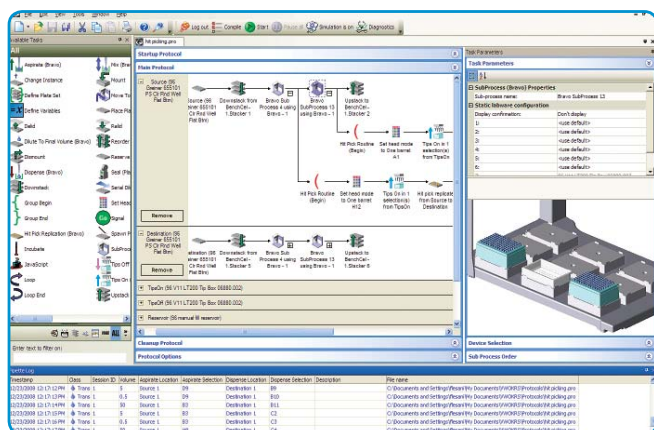


Figure 2. Easily setup your experiments and combine multiple instruments, to move more rapidly from question to answer.

A unified software platform

Each Agilent Automation Solutions instrument is managed by the same software system, dramatically simplifying the user experience (Figure 2). The intuitive design of the software follows your workflow, simplifying conversion of manual experiments to automated experiments, allowing you to perform the experiments you need. The VWorks Automation Control Software is flexible and expandable, readily accommodating additional modules and third-party devices, and even includes a built-in database for managing labware.

References

1. Lennon, N.J. et al. A scalable, fully automated process for construction of sequence-ready barcoded libraries for 454. *Genome Biol* 11, R15 (2010).
2. Morozova, O., Hirst, M. & Marra, M.A. Applications of new sequencing technologies for transcriptome analysis. *Annu Rev Genomics Hum Genet* 10, 135-151 (2009).
3. Thaker, N.G. et al. Designing, optimizing, and implementing high-throughput siRNA genomic screening with glioma cells for the discovery of survival genes and novel drug targets. *J. Neurosci. Methods* 185, 204-212 (2010).

Application Notes

Automation of Agencourt AMPure Purification Kit for the Purification of Next-Generation Sequencing Sample Preparation Reactions on the Agilent Bravo Automated Liquid Handling Platform (5990-4942EN).

Automation of Stratagene Absolutely RNA 96 Microprep Kit with the Bravo Automated Liquid Handling Platform (5990-3558EN).

Complete Automation of Quantitative Polymerase Chain Reaction Assays on the Agilent Bravo Automated Liquid Handling Platform (5990-4522EN).

Automating the CGH/CNV Workflow with the Bravo Automated Liquid Handling Platform (5990-4660EN).

For more information

Learn more:

www.agilent.com/lifesciences/automation

Buy online:

www.agilent.com/chem/store

Find an Agilent customer center in your country:

www.agilent.com/chem/contactus

U.S. and Canada

1-800-227-9770

agilent_inquiries@agilent.com

Europe

info_agilent@agilent.com

Asia Pacific

inquiry_lsca@agilent.com

Research use only. Information, descriptions and specifications in this publication are subject to change without notice. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material.

© Agilent Technologies, Inc. 2010
Published in USA, May 19, 2010
5990-5712EN



Agilent Technologies