HAMILTON

Long String STAR V

Demand the Bigger Picture

The Long String STAR V

PIONEERING TOWARDS BETTER RESOLUTION OF STRUCTURAL VARIATION

Over the past few decades, the understanding of biological principles and processes has evolved tremendously. An invaluable contribution towards this gain in knowledge is attributable to advances in genomic research and technologies. Next-Generation Sequencing (NGS) approaches, as well as other techniques, have had a fundamental impact on life sciences and many applied fields within our society. But the journey is far from over.

Although well established, current NGS methods are unable to accurately resolve certain regions of the genome. This makes the detection of structural variants particularly challenging. Different cytogenetic techniques have their own limitations as well. Even in concert, these methods cannot provide a complete and high-resolution picture of the genome. This inability represents one of the last frontiers in genomics.

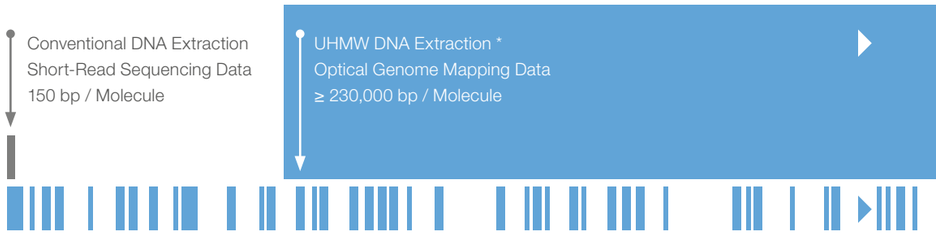
Throughout this brochure, protected product names may be used without being specifically marked as such.

EXPANDING THE FIELD OF VIEW THROUGH INNOVATION

In this ever-evolving field, new innovations continue to shed light on this uncharted territory and drive new discoveries. Bionano Genomics has developed Optical Genome Mapping (OGM), a technique that transforms the view of the genome, by detecting structural variants in an unbiased, genome-wide fashion. In contrast to conventional sequencing techniques, OGM leverages the extraction of Ultra High Molecular Weight (UHMW) DNA.

Thanks to Hamilton's focus and long-standing expertise in automating genomic workflows, we are now stepping into the most advanced application areas. With the Long String STAR V for UHMW DNA extraction, we are now proudly presenting the world's first automation solution for this process. In conjunction with OGM, you will be able to see what has been hidden for so long.

Take the next step towards answering open questions in genomic analysis, while working efficiently and at scale.



**The DNA isolated from the Hamilton Long String STAR V contains Mbp length molecules which overall exceed the OGM quality threshold of 230 kbp post extraction, labeling, linearization, and imaging.*

Together is Better

As experts in precision automated liquid handling, Hamilton has partnered with Bionano Genomics to automate the UHMW DNA extraction process. Together, we empower the scientific community by accelerating its ability to process a high number of samples in a reliable and reproducible manner. Our aim is to always provide the best possible solution, to elevate our customers.

See Sharper

Although structural variants make a significant contribution to human disease, such aberrations are frequently missed by NGS technology. The analysis of UHMW DNA by OGM provides a more comprehensive way of detecting such aberrations in the range of 500 bp up to megabase pairs in length. Structural variation discovery with OGM outperforms what can be achieved by sequencing-based workflows.

- Up to 99% structural variant detection
- 10,000X resolution compared to karyotype
- Routinely detect mosaic variants down to as little as 5% variant allele fraction

To capitalize on these benefits, UHMW DNA (typically between 250 kbp up to > 1 Mpb in length) must be isolated from samples of interest. Instead of magnetic beads or silica spin columns, the procedure uses magnetic disks, which are covered by a nanostructured silica surface. This enables a high DNA binding capacity and helps to protect the bound DNA from shearing forces.

Extract Longer DNA Molecules Easier Than Ever Before

The manual preparation of UHMW DNA samples can be challenging, due to sample viscosity and sensitivity to shearing. Manual protocols require users to be highly trained to achieve optimal results with regard to both quantity and quality. These factors also limit the number of samples that can be reasonably processed at a single time.

Long String STAR V optimizes the laboratory workflow for purification of ultra-long DNA molecules, increasing confidence about your sample quantity and quality. It drives consistency, as extracts are always prepared with identical parameters, ensuring great yields and excellent quality. Adopt a full walk-away workflow for UHMW DNA extraction with increased sample throughput to take your sample preparation process to the next level.

- Replace manual preparations with consistent, automated protocols
- Consistently obtain UHMW DNA molecules
- Standardize and trace your sample workflow
- Reduce hands-on time for improved lab efficiency
- Process up to 12 samples per run and 24 samples in a single workday

The Tool for Novel Discoveries

The Long String STAR V is an Assay Ready Workstation with a standardized hardware configuration for automated magnetic disk handling. The product is suitable for Research Use Only (RUO). It is based on our latest and greatest Microlab STAR V platform and features state-of-the-art CO-RE pipetting technology, as well as the Hamilton Quad CO-RE Gripper for plate transport steps.

Our customers benefit from a turnkey solution that minimizes implementation times. Qualified Methods are being developed, together with our partners, and distributed along with the instrument. More than that, we value the strong support for our clients which serves well beyond initial installation.

For additional information about the Long String STAR V, including an explanatory animation video and an Application Note with biological testing results, please access our webpage via the QR Code below.

IN FULL CONTROL OF EVERY STEP FOR MORE CONFIDENCE

Hamilton MagRods

Hamilton MagRods are specifically designed for optimal magnetic disk handling. MagRods can be operated with 5 mL CO-RE pipetting channels and therefore offer a broad range of flexibility.

- Handle magnetic disks anywhere on-deck
- Adjustable settings for both speed and range of movement
- Tunable to cater to sample type or workflow requirements
- Freedom to optimize even single steps

EVERYTHING YOU NEED, WHENEVER YOU NEED IT

Hamilton MagRod Sleeves

Hamilton MagRod Sleeves are manufactured with the highest precision and are shaped for the best possible magnetic disk positioning. The perfect fit protects the MagRods from surrounding liquids and reagents.

Hamilton Elution Strips

Hamilton Elution Strips are used to separate the magnetic disks from the final UHMW DNA sample by centrifugation. The disk remains in the strip, while the eluate is drawn into a microtiter plate.

All necessary consumables are available directly from Hamilton and can be purchased separately.

- Free of human DNA, DNase, and RNase
- Sterile, in compliance with ISO 11135
- Packaging size matches throughput needs

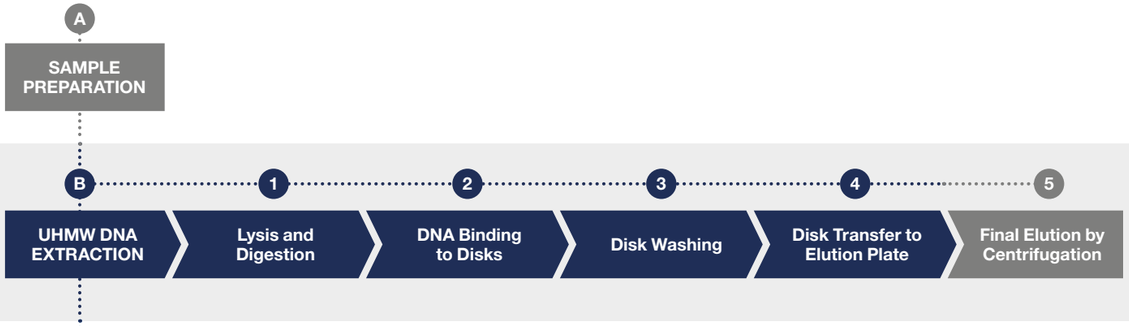
Click, Click, Go

We have designed the operator interface and programming styles with user friendliness in mind for faster familiarization. Intuitive editors offer simple ways to set up and run your method, with predefined parameters optimized by a team of Scientists from both Bionano Genomics and Hamilton. At the same time, you have full control over all method aspects.

Selected highlights include:

- Easily viewable color-coded lights indicate progress
- Customizable worklist templates for quick editing
- Run simulations for method optimization
- Loading dialogs specify required consumables and reagents
- Helper tools for new workflows and separate test methods

SETTING A SOLID FOUNDATION FOR OPTICAL GENOME MAPPING



More time to focus on steps ahead

The established protocol is divided into simple lyse, bind, wash, and elution procedures that can be performed using kits from Bionano Genomics. Herein, genomic DNA is bound to, purified on, and released from a paramagnetic disk.

Frozen cell pellets are manually resuspended and provided to the system (automated resuspension of cell pellets supported by the method). Subsequent steps are performed entirely on the Long String STAR V instrument.

For final elution, the disks are transferred to strips pre-filled by the instrument with elution buffer, standing on top of a microtiter plate. Via a short off-deck centrifugation step, the final UHMW DNA samples are collected in the plate wells.

The extracts obtained are suitable for the Bionano Direct Label and Stain (DLS) process, that enzymatically applies sequence-specific label patterns, meant for data collection on the Saphyr® System.

Processes downstream of UHMW DNA extraction are not covered on the Long String STAR V. For products and services specific to DLS processing, data collection and analysis, please contact Bionano Genomics directly.

Specifications

Physical Dimensions	
Width	149 cm
Depth	95.9 cm
Height with closed door	96.3 cm
Height with open door	100.5 cm
Weight	approx. 250 kg

Operating Conditions	
Temperature Range	15 – 35°C
Relative Humidity	15% – 85% with no condensation
Altitude	up to 2000 m above sea level
Electrical Power Requirements	110 – 230V AC 50/60Hz +-5%

1000 µL Pipetting Channels Technologies
CO-RE® Technology
Independent Channels
capacitive Liquid Level Detection (cLLD)
Tip Type Detection

1000 µL Pipetting Channel Specifications

Tip Size	Volume	Accuracy (%)	Precision CV (%)
50 µL	1 µL	5%	4%
300 µL	50 µL	2%	0.75%
1000 µL	100 µL	2%	0.75%

Order Configurations*

Description
Long String STAR V

Add-On Option*

Description
Long String STAR V Bench
Swing Arm for Monitor (only available in combination with Bench)

*For ordering details, please get in touch with your local Hamilton sales representative.

Consumables*

Description	Manufacturer
50 µL Filtered Tips	Hamilton
300 µL Filtered Tips	Hamilton
1000 µL Filtered Tips	Hamilton
MagRod Sleeves	Hamilton
Elution Strips	Hamilton
Deep Well Plates (2.2 mL) PP	Hamilton
20 mL Reagent Reservoirs	Hamilton
Microplate 96/U, Wells Clear, RecoverMax	Eppendorf
2.0 mL Screw Cap Microtubes	Sarstedt

Consumables

THE BASIS OF EVERY WORKFLOW

We're proud of the fact that we produce our own tips at various locations throughout Switzerland and the US. This is the only way we can meet our own high-quality standards; and not only ours, but also the most important ISO standards*.

Our goal is to provide the best possible components for our systems with our tips, because they're the essence of every workflow. Nothing works without the appropriate consumables. That's why we offer an entire range of high-quality consumables that provide more security, higher efficiency, and thus more convenience. We also develop and produce smart consumables, which enable innovative solutions in new applications and research fields.

Hamilton consumables are produced in an ISO Class 8 Clean Room, based on ISO 14644 standards, as well as ISO 9001 and ISO 13485. Hamilton goes beyond relying on just statistical analyses of quality to assure the highest product quality (e.g. each CO-RE tip is checked for concentricity of its orifice and the absence of flash from the molding process).

Long String Genomics

OPTICAL GENOME MAPPING - THE FUTURE IS NOW

Use UHMW DNA to perform OGM for unbiased, genome-wide detection of structural variants across a broad range of research applications:

- Constitutional genetic disorders
- Hematologic malignancies
- Solid tumors
- Cell bioprocessing quality control
- Gene discovery and therapy
- Reference genome assembly

An alternative to traditional cytogenetic workflows to detect more chromosomal aberrations in a single assay

OGM detects the structural variants that are missed by sequencing with higher resolution than traditional cytogenetic methods. Reset the benchmark for detecting chromosomal aberrations.

Complement data across the variant continuum by combining OGM with NGS-based methods

By combining OGM and NGS, you can characterize both structural and single nucleotide variants, providing a comprehensive analysis of genomic variation that can impact human health. Reveal more that matters for powerful genetic discovery.

You have just turned from page 3 to page 12 and the OGM Data / molecule has covered all pages, while conventional NGS Data has taken only a very small space on page 3.

For more information about potential applications for Optical Genome Mapping with UHMW DNA, visit bionanogenomics.com.

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Yes, that long!

UHMW DNA Extraction *
Optical Genome Mapping Data
≥ 230,000 bp / Molecule

New Frontiers

MOVING FORWARD BY CLOSING GAPS

Using the Long String STAR V in your laboratory will provide you with the opportunity to extract UHMW DNA easier than ever before with sample throughput surpassing manual capabilities. Get the power to bring your workflow performance to the next level. Human handling errors are a thing of the past, and the user-to-user variation seen with manual protocols is replaced by automated consistency and reproducibility.

The Long String STAR V from Hamilton and OGM solutions from Bionano Genomics add another layer of discovery to your genetic experiments. With the ability to reliably extract ultra-long DNA molecules paired with the Bionano Saphyr system, all classes of structural variants are revealed and short-read sequencing blindspots can be unveiled.

Together, Long String STAR V and OGM deliver a view that empowers you to overcome challenges and discover more.

We drive innovation to improve people's lives

Automating your Imagination

HAMILTON ROBOTICS

We develop and produce state-of-the-art Liquid Handling Systems and laboratory automation technologies. Devote yourself to new ideas, transforming your ideas into reality.

The entire product portfolio is characterized by maximum reliability, maximum efficiency, flexibility and user-friendliness. From production to service and support, the focus is always on your individual needs.

HAMILTON

Hamilton has stood for Life Sciences and Medical Technology since 1966. A visionary idea developed into a strong global presence. Our spirit has always remained the same: To research, develop and produce with passion, courage and curiosity. The desire to discover new technological solutions, innovations, and benefit humanity is our mission. We strive to set our goals high and continue to meet the measure of excellence.

To find a subsidiary or distributor in your area, please visit, www.hamiltoncompany.com/support.

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