AVENIO Edge System

True walk-away NGS sample prep automation

Discover the freedom of pure automation

AVENIO Edge System is a fully automated system for next-generation sequencing (NGS) library preparation, target enrichment, on-deck pooling, normalization, and quantification. Experience high-quality results with absolute automation, thanks to validated protocols, integrated components, and end-to-end control. At last, laboratory staff have the **freedom to walk away and work away, with confidence and trust**.

Overcome the barriers of manual sample preparation

Even the most advanced laboratories are constrained by the number of steps that are still being performed manually, making work labor-intensive, time-consuming, error-prone, and costly. Automation is the future of laboratory operations because it minimizes hands-on time and produce more consistent and reproducible results.

Automating NGS workflows on a liquid handling system often requires advanced automation knowledge and experience. Adopting and maintaining an automated system also require a great amount of time and resources. **AVENIO Edge System** is designed to optimize resources, from staffing and labor to reagents and consumables, breaking down many of these obstacles.

- Only 20 minutes of setup time required
- All-in-one hardware, including on-deck thermocycling and library quantification
- Ready-to-load and barcoded reagents
- Intuitive software with a built-in controller PC and glove-compatible touchscreen
- No advanced automation knowledge or training required

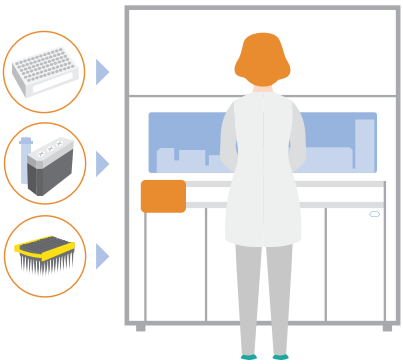
No need to be an automation expert because it's easy as 1-2-3...

1

Create
user-defined workflows with templated design software accessible from anywhere

2

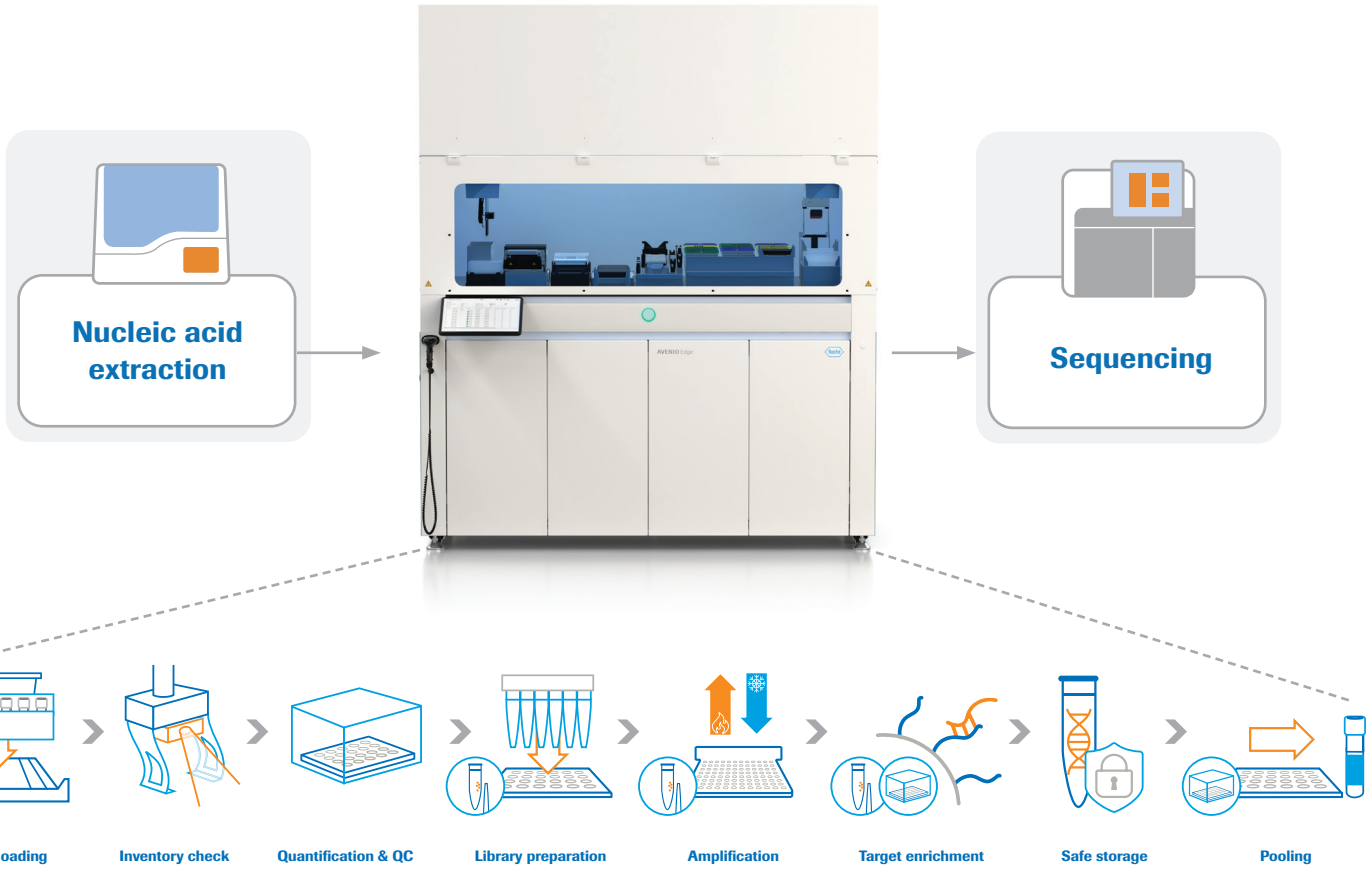
Load
instrument with barcoded samples, reagents, and consumables



3

Walk away
and return later to collect normalized, pooled, and sequencing-ready libraries

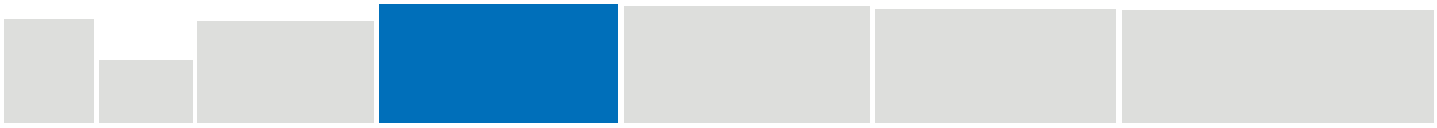
and you can let AVENIO Edge System do the the rest for you



Beautifully designed for a lasting impression

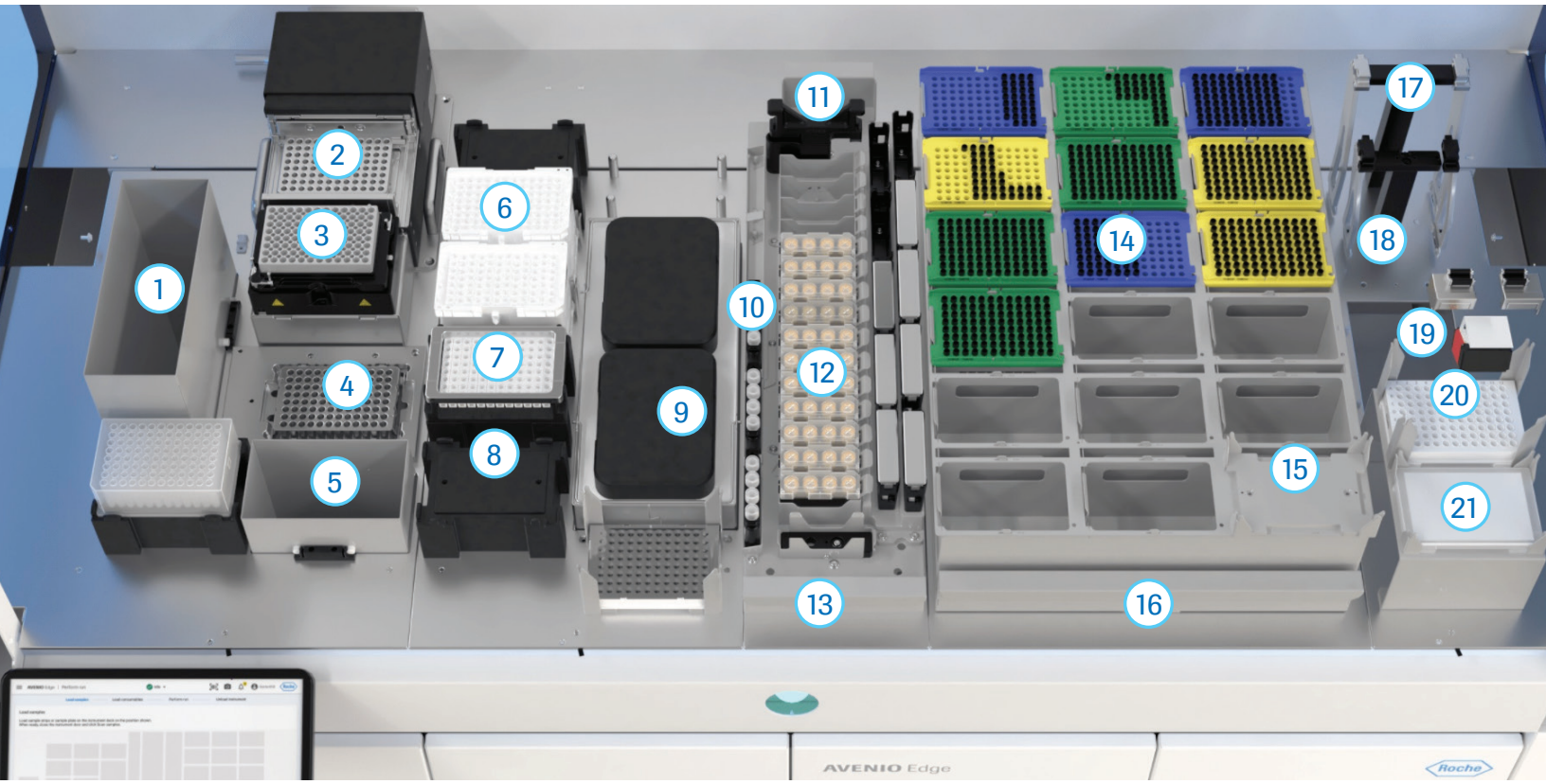
1. Hand-held barcode scanner
2. 8-channel pipetting arm
3. Touchscreen for built-in controller PC
4. Waste compartment and cooling unit
5. Sample processing area
6. Reagent drawer
7. Consumable drawer
8. Status light indicator
9. Gripper arm and 2D barcode reader
10. Storage compartment

Efficient space utilization with sensitive components fully enclosed



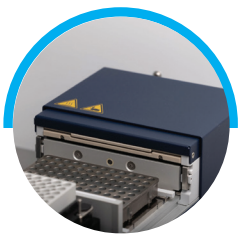
Agilent Magnis | Agilent Bravo A | Perkin Elmer Sciclone NGS | **AVENIO Edge System** | Beckman Biomek i7 | Hamilton NGS Star | Tecan DreamPrep NGS

An illuminated, spacious, and organized deck for easy setup



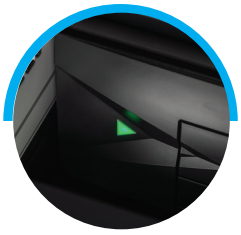
1. Tip waste station
2. Thermal cycler
3. Heater/shaker
4. Magnetic separation station
5. Plate and lid waste station
6. Tip park
7. Sample input station
8. Sample output station
9. Cooling unit
10. Tube racks
11. Piercing tool
12. Reagent mini racks
13. Reagent drawer
14. P1000, P200, P50 filtered tips
15. Quantification plate station
16. Consumable drawer
17. Gripper fingers exchange station
18. Quantification module
19. 2D barcode reader
20. Processing plates
21. Processing plate lids

Innovative features that set AVENIO Edge System apart



Fully integrated **on-deck thermal cycler** streamlines sample amplification

Proprietary advanced bead-processing station provides unparalleled sensitivity and yield

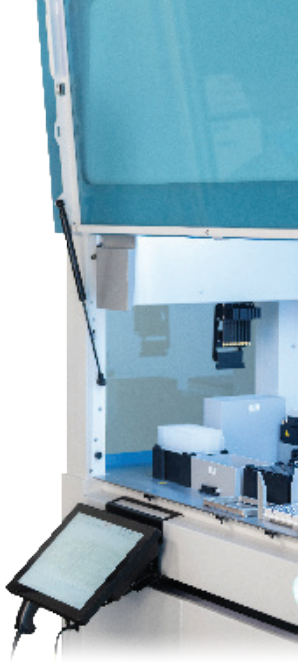


Quantification module underneath the deck saves deck space, minimizes manual tasks, and reduces risk of inconsistencies and human error

Fully barcoded reagents and consumables are automatically loaded and calculated, reducing waste and increasing accuracy

Tip park reduces reloading time, risk of contamination, and need for disposables

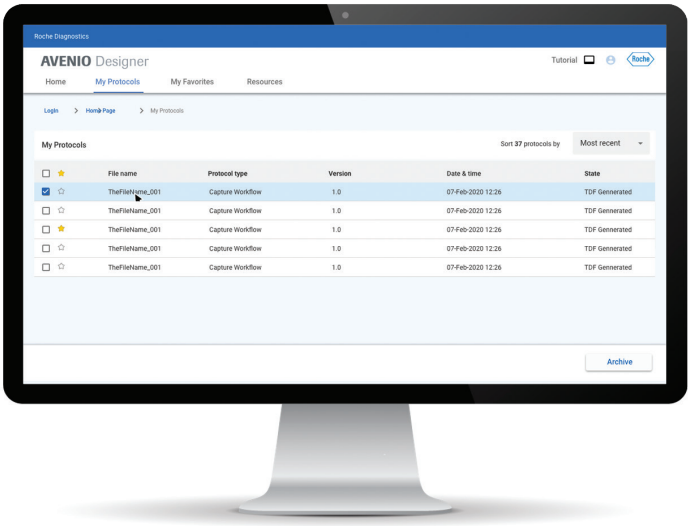
Powered by intuitive software



AVENIO Edge Software

The powerful built-in software that comes with every AVENIO Edge System with pre-loaded protocols for smooth, reliable operation and an enhanced user experience.

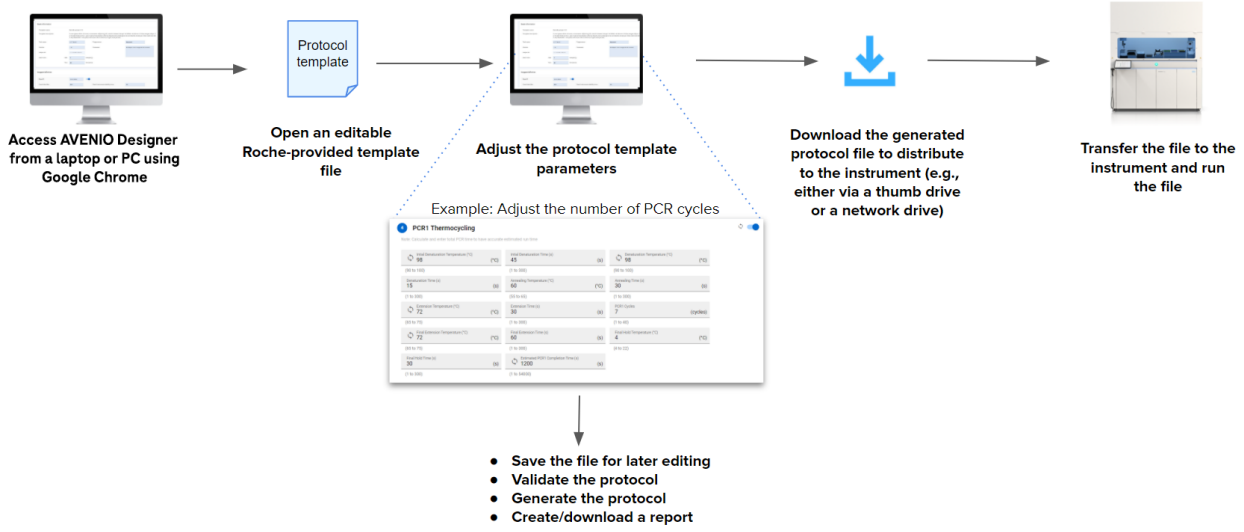
- Easy step-by-step instructions are provided
- Supply list is displayed prior to every run for efficient resource management
- Visual progress indicator is available at any time
- No separate controller PC is needed
- Touchscreen monitor is compatible with gloved hands
- In compliance with 21 CFR Part 11



AVENIO Designer Software

A companion protocol design software for rapid, flexible deployment of user-defined workflows.

- Verified templates simplify the creation of user-defined workflows
- No special training is required for the easy-to-use interface
- Workflows can be configured to start or stop at different steps
- 100% web-based, hosted by the secured Amazon Web Services (AWS)



Modular, ready-to-use reagent kits

AVENIO Edge System reagent kits—based on KAPA reagents* for NGS—generate high-quality libraries and reproducible results, and their modular format allows for workflow flexibility. Each reagent is barcoded and ready-to-load, providing easy tracking and enabling a fast setup process with minimal human errors.

- Stable for up to 12 months from date of assembly, if unopened and stored in appropriate conditions
- Stable on the instrument deck for up to one week

Kit Options

8 reactions per run

24 reactions per run

Each modular kit provides sufficient reagents for three AVENIO Edge runs

*KAPA reagents are Research Use Only. Not for use in diagnostic procedures

A growing application menu of user-defined workflows

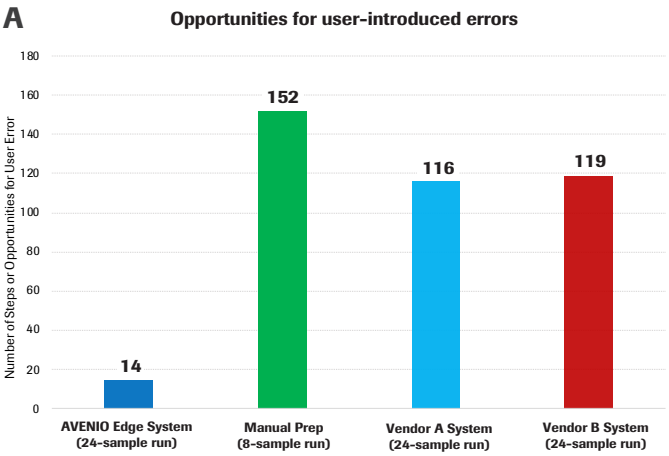
Workflows	Samples per run	Estimated setup time *(minutes)*
AVENIO Edge HyperPrep and AVENIO Edge HyperPlus DNA library preparation*	1-48	**20**
AVENIO Edge target enrichment with KAPA HyperExome or custom panels**	1-48	**20**
AVENIO Edge HyperCap DNA library preparation and target enrichment*	1-24	**20**
Input control: input sample quantification, normalization, and buffer exchange	1-96	**15**
Post-capture pooling and quantification, with the option of entering QC metrics from external assessment	1-48	**15**

*These workflows use universal UMI or non-UMI adapters and UDI primers.
**The input is indexed DNA or cDNA libraries.

...with more validated Roche protocols to come in the future

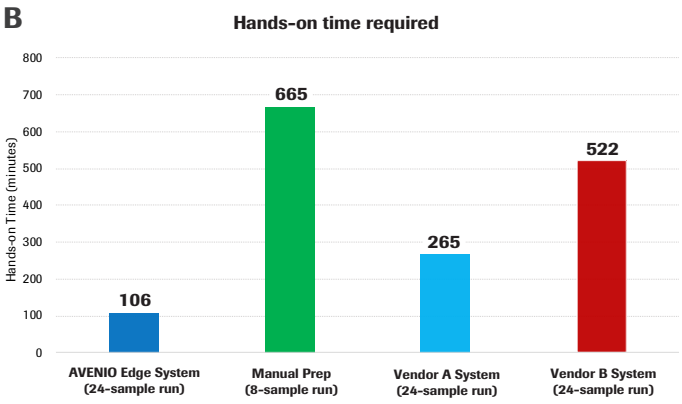
AVENIO Edge System is a Class 1 IVD instrument and is intended for downstream diagnostic applications. AVENIO Edge reagents and workflows are for Research Use Only. Not intended for diagnostic applications.

Minimize human errors for more reliable and reproducible results



AVENIO Edge System	% Reduction in error opportunities	Reduced number of error opportunities
vs. Manual Preparation	91%	138
vs. Vendor A System	88%	102
vs. Vendor B System	88%	105

Save hands-on time for more innovation and collaboration

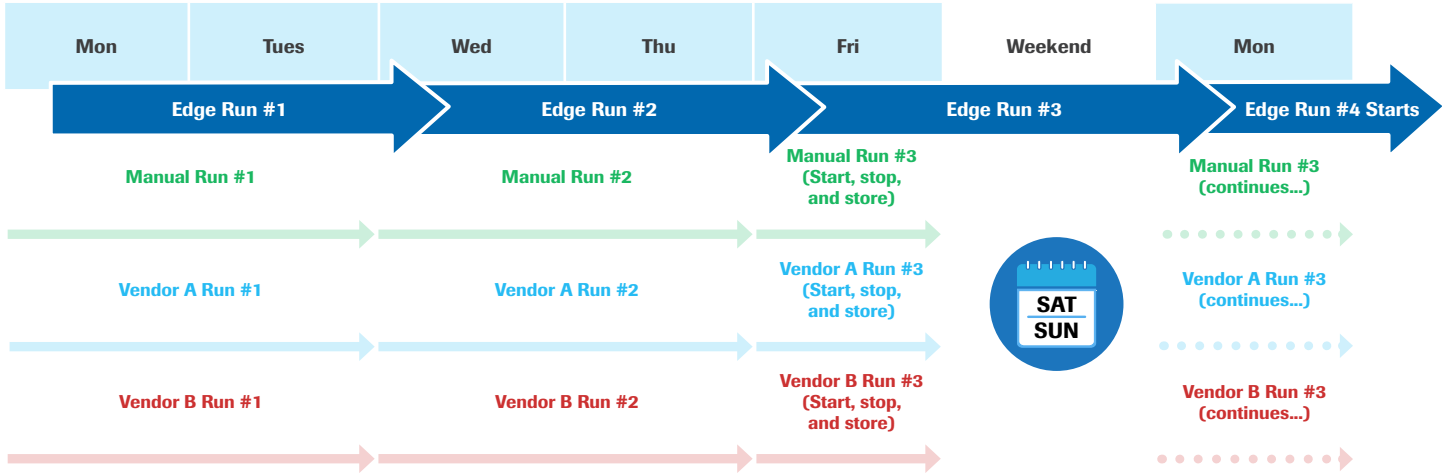


AVENIO Edge System	% Less hands-on time required	Hours gained for other activities
vs. Manual Preparation	84%	9.3
vs. Vendor A System	60%	2.6
vs. Vendor B System	80%	6.9

Figure 1. AVENIO Edge System substantially reduces the likelihood of user-introduced errors and reduces the hands-on time required for a complete 24-sample NGS workflow. The complete workflow includes input sample normalization, DNA library preparation, target enrichment, library quantification, and post-capture pooling. In two internal workflow studies, details of the steps required to execute the HyperCap target enrichment workflow were compared across four methods: The AVENIO Edge HyperCap workflow (24 samples) on the AVENIO Edge System; the KAPA HyperCap Workflow v.3 performed manually (8 samples); and the KAPA HyperCap Workflow v.3 carried out on two different open-platform non-Roche automation systems (each with 24 samples). **(A)** AVENIO Edge System reduces the risk for user errors by 91% compared to manual preparation, and by 88% compared to two other NGS automation systems. **(B)** Preparation of quantified, pooled, target-enriched libraries on the AVENIO Edge System requires only 106 minutes (1.7 hours) of total hands-on time, including three protocol setups and the final clean-up; in contrast, manual preparation requires 665 minutes (11 hours); the Vendor A system requires 265 minutes (4.4 hours); and the Vendor B system requires 522 minutes (8.7 hours) of hands-on time to complete the entire workflow.

The **AVENIO Edge System** substantially reduces the likelihood of user-introduced errors and reduces hands-on time

Complete up to 3 runs per week—AVENIO Edge works while you're away



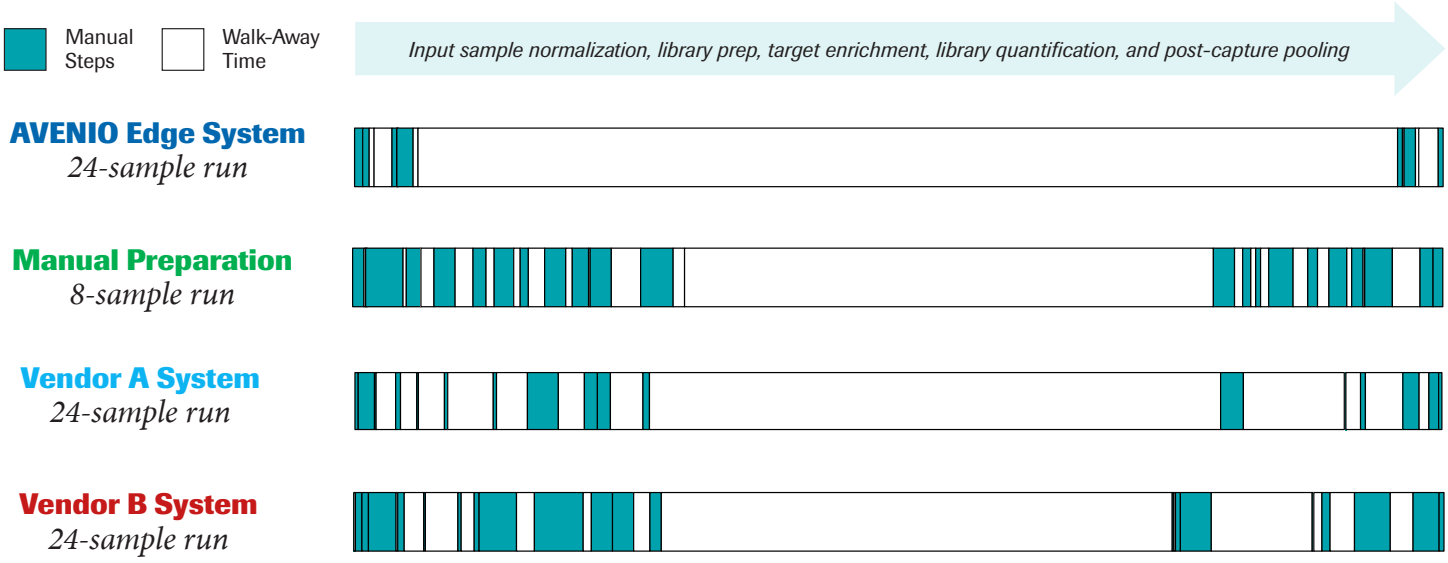
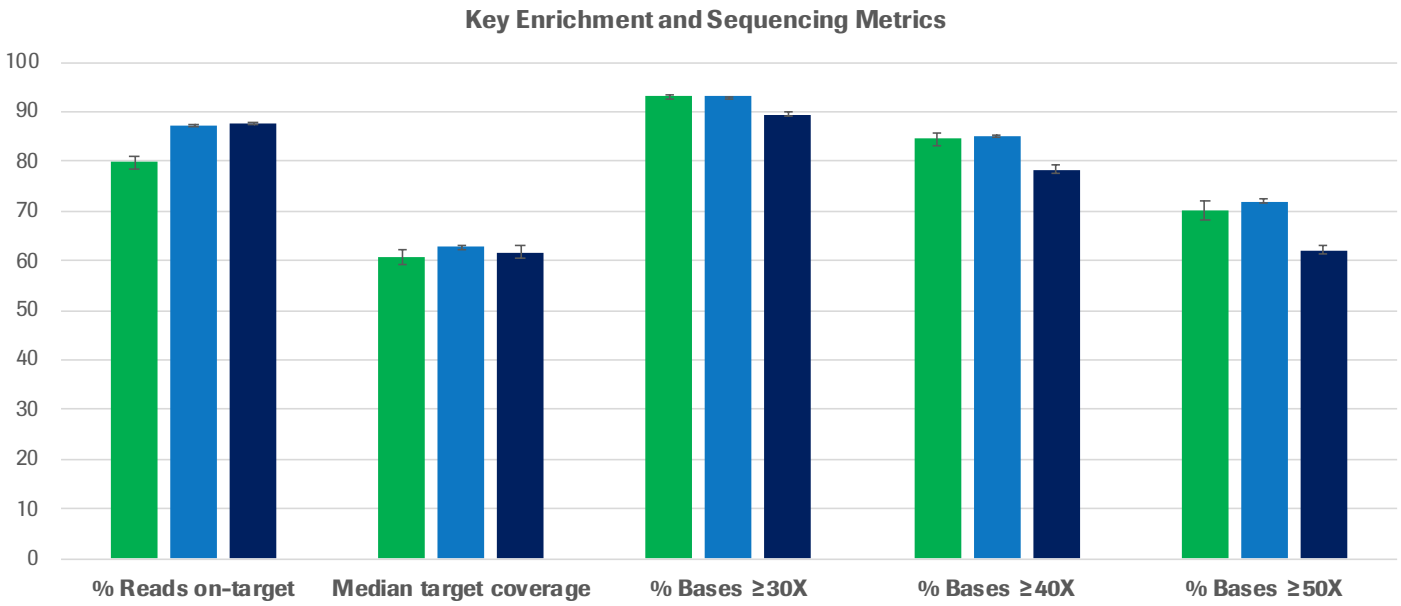
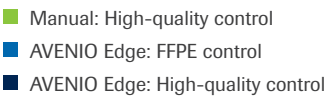


Figure 2. AVENIO Edge System enables its operator to walk away and work on other important tasks without the need to return to the lab bench. In our workflow comparison studies, we record all the manual steps required to process 24 DNA samples in a complete KAPA HyperCap library preparation and target enrichment workflow, including input sample normalization, library quantification, and post-capture pooling. AVENIO Edge System requires only 15-20 minutes of setup time in the beginning of each protocol, allowing the operator to walk away for hours of of uninterrupted hands-on time.

Reduce hands-on time without sacrificing data quality





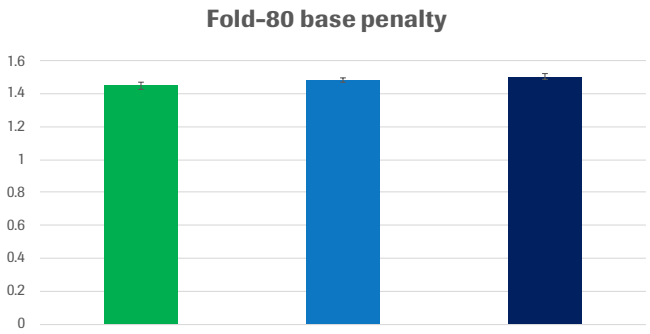


Figure 3. Key enrichment and sequencing metrics showing that high- and low-quality samples run on the AVENIO Edge System yield similar results compared to high-quality samples prepared manually. All libraries were prepared from 100 ng of input DNA with the KAPA HyperPlus Kit; pre-capture multiplexed with 8 samples per capture; hybridized for 16 hours to KAPA HyperExome Probes (43 Mb); sequenced on NovaSeq 6000; and subsampled to 30M paired reads (60M total reads). **Specific procedural details for each dataset are as follows: Manual samples** were prepared with high-quality input DNA (n=48; 16 Coriell DNA samples in triplicate) using the KAPA HyperCap Workflow v3.2, with KAPA Universal Adapters and KAPA UDI primer mix. **AVENIO Edge System FFPE samples** were prepared with FFPE control DNA (HD789, Horizon; n=24); **AVENIO Edge System high-quality samples** were prepared with NA12878 DNA (n= 16 Coriell DNA samples). All AVENIO Edge System samples were prepared with AVENIO Edge HyperPlex Adapters using the AVENIO Edge HyperCap DNA library preparation and target enrichment workflow with post-capture pooling and quantification.

Enjoy peace-of-mind with the Roche Support Network

AVENIO Edge System comes with industry-leading service support from Roche, helping you to maximize your uptime and stay compliant with regulations. Our experienced service engineers are trained to keep your AVENIO Edge System calibrated and optimized.

Pipetting verification is included in every installation, as well as preventive maintenance.

With a service plan, all emergency repairs are prioritized and have a **48-hour response time guarantee**.*

Remote access connectivity allows our engineers to diagnose and resolve issues quickly and in real-time.

You choose from two simple and comprehensive service plan options (see chart on the right).

Service Features	Classic Plan	Premium Plan
Annual preventive maintenance including pipetting verification and quantification module calibration	✓	✓
Remote email and phone technical support	✓	✓
48-hour field service response time	✓	✓
Unlimited emergency field service M-F 8-5 ET local	✓	✓
Unlimited emergency field service weekend & holidays*		✓
Certified service parts	✓	✓
Remote access connectivity for troubleshooting	✓	✓
On-site application support and troubleshooting	✓	✓
On-site operator training (1 per year, 2 trainees)	✓	✓

*48-hour response time guarantee including weekends and Roche holidays require a Premium Service Plan.

NGS application support and training

Our expert field and in-house support application scientists will collaborate with you to optimize your user-defined AVENIO Edge System workflows to meet your specific needs.

On-site user training by our field application scientists makes user experience even more effortless.

ATCGGCA
TTTGGCC
CGCATCG
GACTACG

We will help you **adopt new applications** that become available on the AVENIO Edge System and **fine-tune the parameters** for your individual workflows.

Our customer support scientists are **backed by Roche in-house NGS application development and automation experts**

Discover the freedom of pure automation

For more information about **AVENIO Edge System**, please contact your Roche representative or visit:
sequencing.roche.com/AVENIOEdge

AVENIO Edge System and Application Support

Email: support.seqls@roche.com

Phone: 1 (800) 262-4911 (M-F 8:30am-5pm EST)

Submit an Online Request: https://sequencing.roche.com/en-us/support-resources/support.html#technical-support

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AVENIO Edge reagents and workflows are for Research Use Only, Not intended for diagnostic applications.
User-defined protocols are created using AVENIO Designer Software for Research Use Only. Not for use in diagnostic procedures.
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