

WHITE PAPER

Adaptable Automation for Rapidly Changing Labs

Precision Where it Counts,
Flexibility When You Need it



The Flexibility Bottleneck in Lab Automation

Automation should accelerate discovery. But for many labs, it's become a bottleneck. Rigid protocols, complex software, and one-size-fits all workflows force researchers to work around their tools, rather than with them.

Most liquid handlers are built for uniform, multi-channel workflows, not the unpredictable, iterative nature of science. In this whitepaper, we explore how **Hudson Lab Automation's single-channel Scorpion liquid handler automates tasks traditionally done by hand**, simplifying complex workflows, reducing manual bottlenecks, and accelerating R&D.

Why Adaptability Is the New Throughput

Modern labs move fast, but rarely in straight lines. Protocols evolve, samples vary, and experiments shift directions. The workflows that push science forward often fall outside the capabilities of rigid automation systems designed for volume, not variability.

The Scorpion was built for the other 80%, the daily science that demands flexible automation. Its software mirrors the way scientists think, enabling researchers to define their desired outcome, such as a target concentration or pH level, and let the software calculate the path forward. When systems are built by scientists for scientists, with preloaded labware and reagents, adaptable tools, and seamless integrations, they unlock the full potential of both human creativity and machine efficiency.

Making Automation Part of the Daily Routine

The biggest barrier to lab automation has been its steep learning curve. Scientists worry they'll spend more time setting up protocols than running them. And lab managers know that if a system isn't intuitive, it won't get used. The Scorpion solves this. Its interface is visual, flexible, and thinks the way scientists do no coding, no need to hire an engineer. And with one-on-one onboarding support from Hudson Lab Automation, teams quickly build the confidence to make it part of their everyday workflow.

Complex Protocols Often Require Single-Channel Pipetting

Multi-channel systems fall short when each well requires unique reagent combinations, volumes, or timing. Their fixed channel spacing locks them into uniform plate formats, forcing scientists back to manual pipetting for tube-based workflows and mixed labware tasks. Single-channel automation changes this game. It brings the precision of automation to cross-format workflows and enables per-well customization without compromising speed or consistency. Researchers save time, reduce errors, and focus on insights instead of repetitive steps.



Single-Channel Precision

Unlike multi-channel systems, the Scorpion enables:

- Well-by-well customization, dispense different reagents and volumes to each well
- Condition-specific pipetting, perfect for screening and assay development
- Tight control over liquid classes and timing
- Compatibility with a wide range of consumables, including tubes from 1.5 to 50 mL
- Seamless integration with any SBS footprint labware under 121mm in height

Designed by Scientists for Scientists

The Scorpion is a compact automated liquid handling system designed to enhance your productivity in R&D. Among the fastest and most versatile liquid handling instruments available, its single-channel design delivers the flexibility and precision needed for complex workflows. Any manual workflow you can imagine, the Scorpion can automate, including protein crystallography, nucleic acid normalization, and volatile liquid chemistry.



Protocol Flexibility

The Scorpion is compatible with a wide range of workflows:

Life Sciences

- Protein crystallization screen building
- Nucleic acid normalization
- Cherry picking from .CSV input or sample tracking systems
- Compound screening
- Cell viability and cytotoxicity assays with variable reagent handling
- FMO panel setup for flow cytometry with unique dye configurations
- Assay plate normalization by OD, Ct, or protein concentration
- PCR plate setup with per-sample customization
- NGS sample prep
- Kinetic assay sampling
- Library prep automation
- Low-volume assay setup

Analytical Chemistry / Materials Science

- LC/MS sample prep including custom cartridge workflows
- Peptide purification and plate setup for mass spec
- Battery testing and electrolyte handling
- Reaction condition optimization
- NMR tube filling using standard mandrels and needle dispensing
- Addition of heating and stirring for chemical workflows

Automation That Adapts to the Way You Work

The Scorpion makes automation accessible, whether you're running simple routines or building complex workflows. It uses visual protocol blocks and guided workflows that reflect how scientists think: start with the experimental goal, and let the system calculate the steps.

With the Scorpion, it's easy to design and adapt protocols on the fly. And with advanced functions available for more complex tasks, users gain full control without sacrificing usability. By making automation accessible to all skill levels, the Scorpion empowers researchers to innovate faster, adapt to evolving project needs, and spend more time on science, not software.

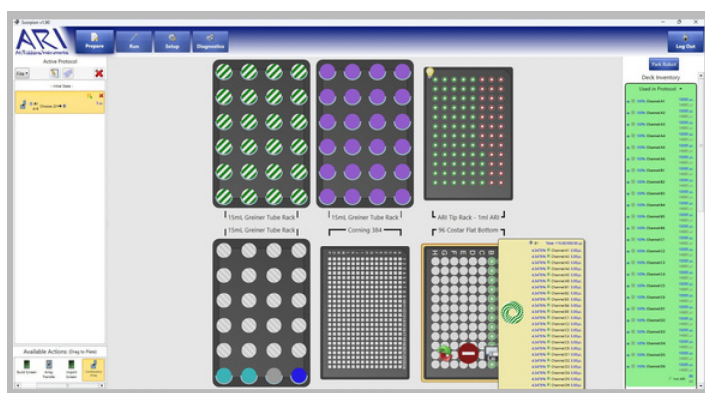


Figure 1. Scorpion User Interface.

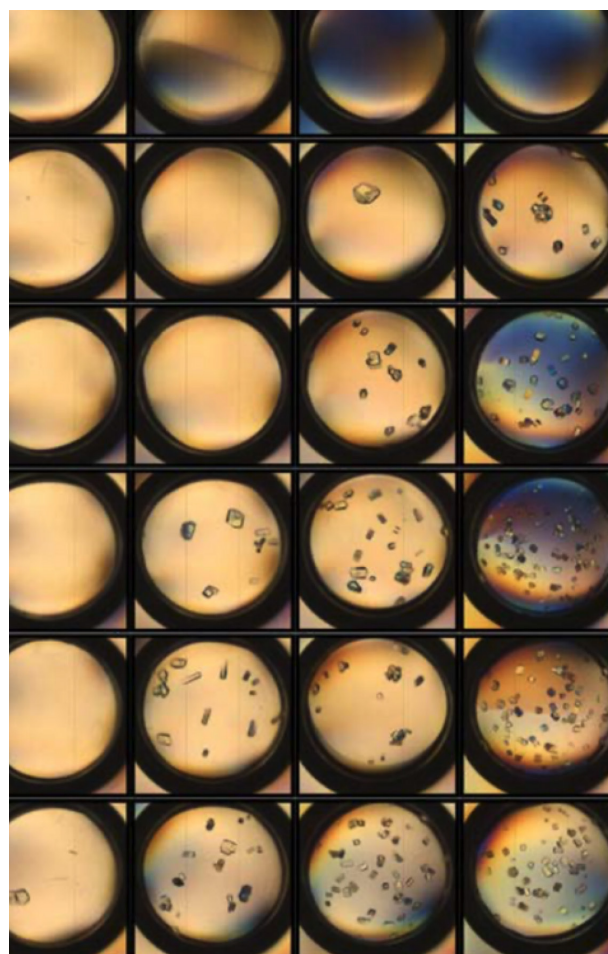
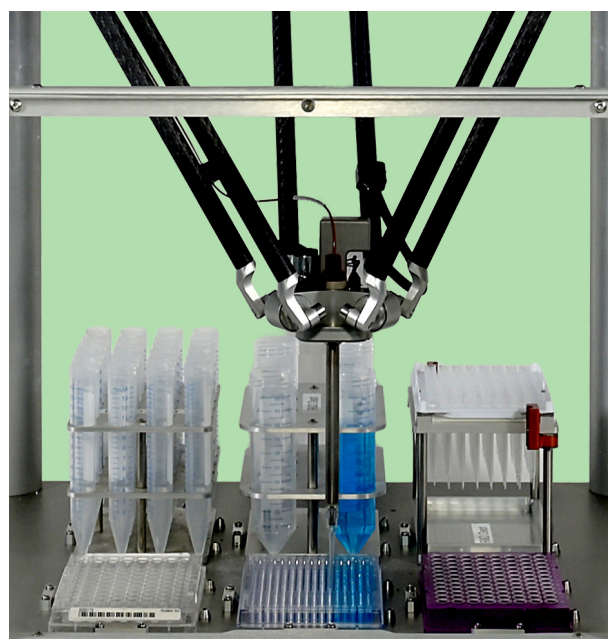


Figure 2. Scorpion Delta Design.

Precision Motion in a Compact Footprint

Inspired by protein crystallization screening, the Scorpion features a delta arm design that enables precise, agile movements. Its three arm structure delivers both speed and accuracy, without the mechanical constraints of traditional robotics.

Its fluid motion enables precision dispensing across complex plate layouts, such as four-corner grid methods in crystallography screens. The system adapts to a wide range of reagent viscosities and labware formats. This makes the Scorpion a reliable solution for automating full experimental tray setups efficiently and reproducibly.



The Scorpion in Action

Avrok BioSciences Cuts Normalization Time in Half with Scorpion

THE CHALLENGE

Avrok BioSciences needed a solution to streamline nucleic acid normalization, traditionally a manual process requiring two technicians and 45 minutes per plate. After evaluating competing systems, they chose the Scorpion for its intuitive software and high dispensing precision.

WHY THE SCORPION?

The Scorpion's ability to interpret the standard .CSVs and automating the normalization workflow reduced their process time to just 20–25 minutes, without technician oversight. The team reported consistent volume accuracy (CV < 4%) and reduced human error after optimizing the instrument settings.



-45 Minutes
Manual Normalization,
Two Technicians



20-25 Minutes
No Human Oversight
Needed



THE RESULTS

"The Scorpion easily adapted to our workflow. It didn't take long before it became a dependable part of the team."

Avrok BioSciences

The Scorpion in Action

Oxford Chemists Optimize Air-Sensitive Reactions with Scorpion

THE CHALLENGE

A chemistry lab at Oxford University needed a compact, glovebox, compatible liquid handler for screening air- and moisture sensitive reactions. After evaluating multiple systems, they selected the Scorpion for its enclosed design, nitrogen pressure control, and solvent compatibility.

WHY THE SCORPION?

The team highlighted the Scorpion's intuitive software, compact footprint, and superior drip-free dispensing, even with volatile organic solvents, as key differentiators.

THE RESULTS

"We mastered the software in a day and saw no dripping issues even with sensitive solvents, something we couldn't say for other systems."

Oxford University Researcher

Agile Innovation for Evolving Labs

Future-proofing your lab starts with automation that works today and adapts as your science evolves. The Scorpion is compact enough for small labs, precise enough for advanced applications, and flexible enough to support shifting research goals. Whether you're an academic lab running daily discovery tasks, a pharmaceutical R&D team refining protocols, or a biotech startup preparing for CRO handoff, the Scorpion delivers reliable performance, no automation engineer required.

Its adaptability goes beyond daily workflows, supporting consistent protocols across teams, disciplines, and development stages. The Scorpion handles diverse labware, variable volumes, and customized liquid classes, enabling seamless tech transfer and shared methods. The Scorpion is more than a piece of equipment; it's a long-term asset that grows with your science.

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