GINKGO BIOWORKS

RACs

Reconfigurable Automation Carts

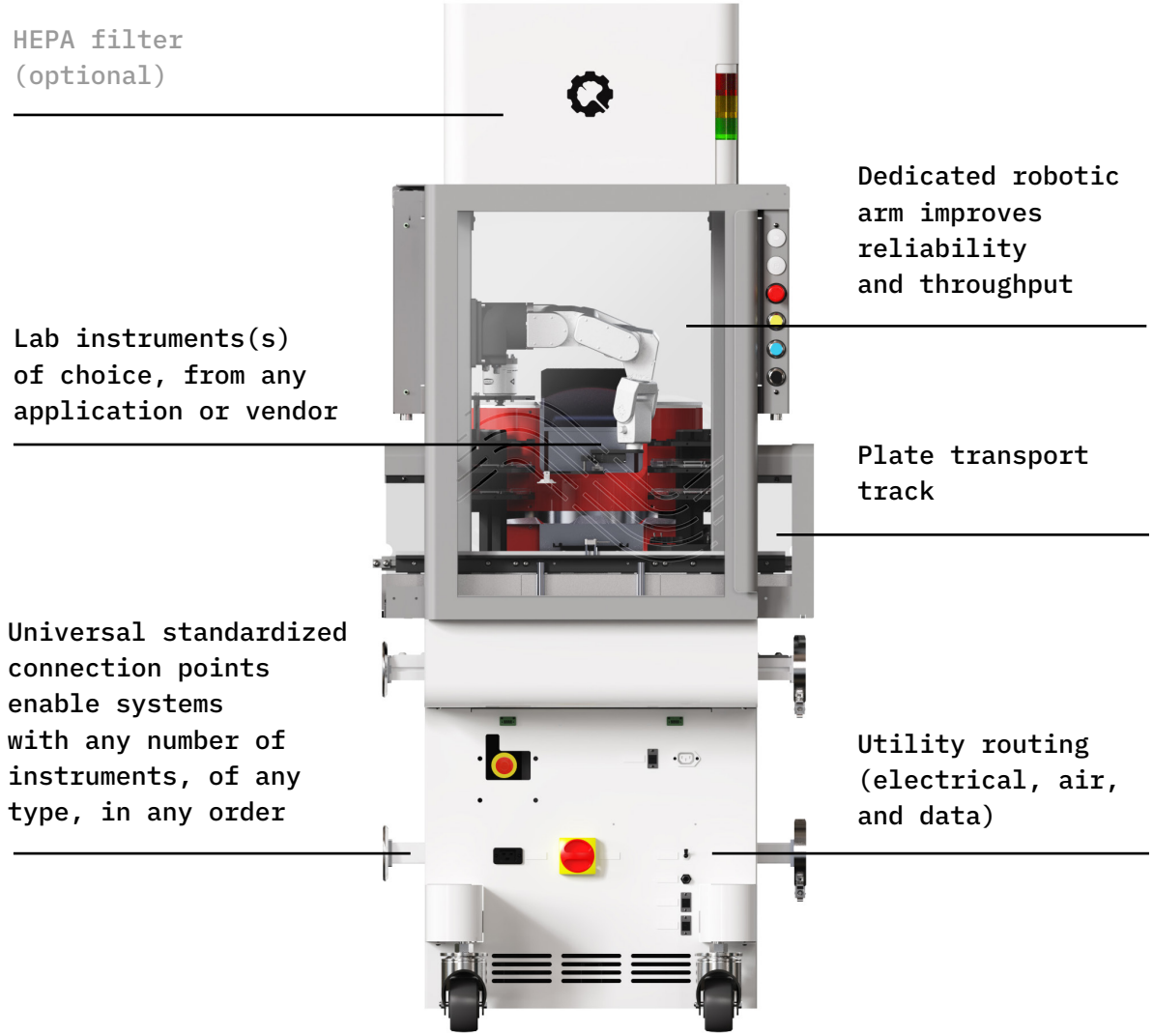
ENABLES:

High walkaway time

High uptime

High instrument utilization

DOWNLOAD



A flexible, extensible automation solution for high-mix and high-throughput workflow environments

Reconfigurable Automation Carts (RACs) are a flexible, extensible automation solution for both high-mix and high-throughput workflow environments. RACs enable high walkaway time, uptime, and instrument utilization.

Significant improvements to existing workflows

>23hrs

Of end-to-end workflow execution

in our qPCR-based genomic titering workflow, thanks to robust, error-free execution on the RAC system and our remote troubleshooting service.

88%

Reduction in hands-on time

when applying Ginkgo Automation to a formerly manual drug discovery workflow.

10x

Cost reductions

in reagents, enabled by RACs' error-free handling of sub-microliter enzymatic reaction volumes.

Workcells built with RACs have several advantages over traditional workcells

- Expanded in a matter of days, not months, with minimal downtime
- One arm per RAC largely eliminates deadlocks and allows for easier interleaving of workflows
- Individual devices can be repaired or removed while overall system continues operation
- Fully compatible RACs eliminate the need for decommissioning— systems can be expanded or reconfigured for future uses

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Individual RAC units combine to create RAC systems capable of performing numerous lab operations.

More RACs = more unit operations; redundant RACs can be added to increase throughput and deal with bottlenecks in processes.

Protocols are developed to execute experimental workflows. Different workflows can be run simultaneously, by different operators, with different parameters.

Reconfiguring carts and writing new protocols is straightforward—users need not specify all workflows, only required instrumentation. Large RAC systems can be operational, from storage, in one day. Ginkgo's automation services include hardware (RACs), Catalyst - ACS, our Automation Control Software, and Catalyst - Flow, our ticketless remote support solution.

Off the shelf instrumentation integrations

Storage
HighRes Bio TundraStore D
HighRes Bio AmbiStore D
HighRes Bio SteriStore D
HighRes Bio MicroServe
LiCONiC LPX 110

Incubation
Thermo Fisher Cytomat 2
Inheco Single Plate Incubator

Bulk Dispensing
Agilent BioTek MultifloFX
Agilent 406 FX
Agilent BioTek EL406
Blue Cat Bio BlueWasher

Centrifugation
BioNex Solutions HiG3/4
HighRes Biosolutions Microspin

Colony Picking
Singer Instruments PIXL

Liquid Handling
Formulatrix Flo i8
Agilent Bravo
Beckman Echo 5xx/6xx
Formulatrix Tempest

Thermal Cycling
Thermo Fisher ATC
BioRad Laboratories Opus

Flow Cytometry
Thermo Fisher Attune Cytpix

High-content imaging
Araceli Biosciences Endeavor

HPLC
Waters ACQUITY

Sealing
Azenta a4s
Agilent PlateLoc

Barcoding
Agilent VCode

Peeling
Azenta XPeel

Plate Reading
BMG Labtech PHERAstar
Tecan Spark
Molecular Devices SpectraMax i3x

Shaking
QInstruments BioShake 3000/5000/D30

Transfection
Lonza Nucleofector96

Capping/decapping
Azenta IntellixCap96

New instrumentation is onboarded regularly.
Additional lab instrumentation can be onboarded to customer systems as requested.


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Exemplary Applications

Genetic Engineering/Synthetic Biology

- generic DNA amplification (PCR)
- “DNA parts” amplification
- colony PCR
- in vitro / in vivo DNA assembly
- in vitro transcription
- restriction digestion
- rolling circle amplification
- microbial cell heat-shock transformation
- microbial cell electroporation
- mammalian cell chemical transfection
- mammalian cell nucleofection

Nucleic Acid / Protein Purification

- magnetic bead-based purification
- filter plate-based purification
- microchromatography tip-based purification
- UV-Vis spectrophotometry-based quantification
- fluorometry-based quantification

Analytical Chemistry

- HPLC-based sample analysis

NGS Library Preparation

- enzymatic DNA fragmentation / tagmentation
- DNA ligation of adapters
- RNA to DNA reverse transcription
- target enrichment
- indexing PCR

Cell Culture Handling

- cell culture cryopreservation
- cell culture inoculation
- cell culture passaging
- protein-expression induction
- cell culture plating
- cell culture enzymatic / chemical lysis
- colony picking
- optical density measurements

Generic Labware / Sample Handling

- bulk microplate prep (barcoding, bulk dispensing etc.)
- stamping liquid handling rearray
- cherry picking liquid handling rearray
- sample serial dilution or normalization

High-throughput Assays

- plate reader-based assays:
  - ELISA assays
  - AlphaLISA assays
  - HTRF assays
  - HiBiT assays
  - enzyme kinetics assays
  - ADME pharmacokinetics assays
- qPCR-based assays:
  - gene expression profiling
  - genotyping
  - rAAV titering
  - thermal shift assays
- flow cytometry-based assays:
  - cell proliferation assays
  - cell viability / apoptosis assays
- high-content imaging-based assays:
  - cell proliferation assays
  - cell differentiation assays
  - cell viability / apoptosis assays
  - cytotoxicity assays

* List is not exhaustive