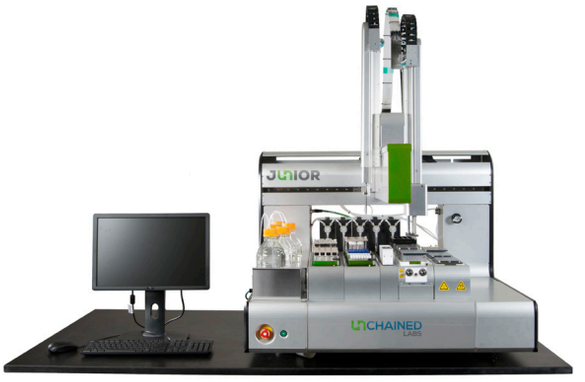
Junior
Process chemistry

Walk up, set up your run and walk away. Junior turns reaction screening and process optimization into totally routine activities. Build a system for reaction screening and plow through hundreds of modifications per week. Deck one out with real-time sampling to fine tune your chemistry pathways. Junior lets you dive deep so you know exactly what tweaks to make next.



Junior configured for reaction optimization

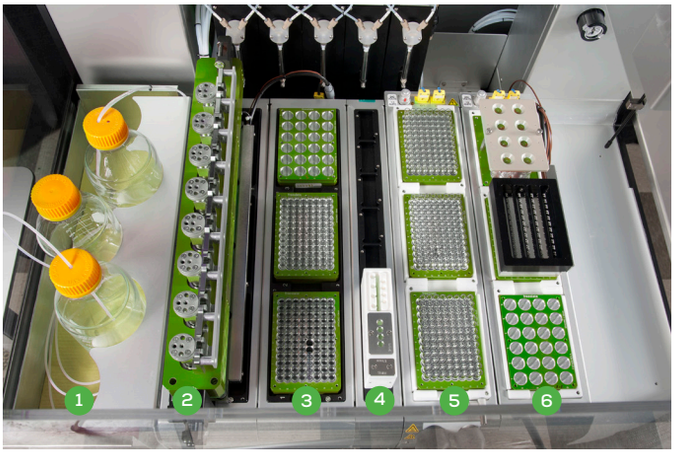
Applications

- Process optimization
  - Identify high yield conditions
  - Reaction screening and optimization
- Screen continuous variables such as equivalents, concentrations, temperatures, pressures and time
- Screen discrete variables such as catalyst precursors, ligands and solvents
- Optimize and screen new synthetic routes
- Improve yields and impurity profiles
- Optimize catalyst loading
- Map process robustness

Optimization sampling reactor (OSR)

Key features

- Rapid, real-time reaction kinetics
- Process control of 8 individual reactions with independent pressure and temp control
- Fully automated *in-situ* reagent addition and slurry sampling under pressure
- Execute up to 96 pressurized reactions such as hydrogenation (with optional SPR or DSPR)
- Overhead stirring for complete reaction mixing
- Accurate and automated dosing of small quantities of solid, liquid or slurry reagents
- Control heating, stirring, and vortexing in vials or microtiter plates
- Provide an inert atmosphere for air-sensitive chemistries



Example Junior deck configured for reaction optimization

1 Solvent tray
2 OSR
3 3-position vortexing station
4 Wash station
5 Heating/cooling/stirring bay
6 3-position plate rack

Available options

Heated 4-tip liquid dispenser – extended tip
Heated reservoir volume per tip: 1 mL
Reservoir temperature: Up to 120 °C
Temperature uniformity: ±2 °C (across tips)
Tip pitch: 9 mm
Extendible tip: 1
Syringe sizes: 50 µL – 2.5 mL (standard supplied)

Heated single-tip liquid dispenser
Heated reservoir volume: 1 mL
Reservoir temperature: Up to 120 °C
Syringe sizes: 1–2.5 mL (standard)
Needle size: 16 gauge, non-piercing

Vortexing station – 3 positions
Orbital: 60–3570 rpm
Maximum vortexing mass: 2268 g (5 lb/plate)

pH measurement
Configuration: Single or 4-channel probe
Measurement time per 96-well plate: <90 minutes
Range: 1–13 pH unit
Resolution: 0.05 pH unit
Repeatability: ±0.1 pH unit

Deck screening pressure reactor (DSPR)
Max pressure rating: 200 psi @ 180 °C
Pressure drop: <5 psi/hr

Optimization sampling reactor and sampling arm
Temperature rating: -20–200 °C
Reactors: 8 independent reactors
Possible delta between adjacent reactors: 50 °C
Heating rate: Up to 5 °C/min
Cooling rate: Up to 2 °C/min
Pressure rating: 30–400 psi
Maximum overhead stirring speed: 750 rpm
Reactor total volume: 40 mL
Reactor working volume: 5–25 mL

Solid dispense
Dispense technology: Dispense algorithm dynamically controls the dispensing head to adjust for powders with different densities, particle sizes, particle shapes and static charges

- **Classic powder dispense:** Traditional stirrer dispense mechanism
  - **Hopper volume range:** 10–100 mL
- **Storage vial (SV) powder dispense:** Unique vibratory dispensing mechanism for highly precise dispensing of small amounts as low as 0.5 mg
  - **Hopper volume:** 4 mL

Balance with integrated camera
Maximum weight:
- **Standard:** 1200 g
- **High-sensitivity option:** 220 g

Sensitivity:
- **Standard:** 0.1 mg
- **High sensitivity option:** 0.01 mg

Resolution:
- **Standard:** 0.1 mg
- **High-sensitivity option:**
  - 0.01 mg (0–110 g)
  - 0.1 mg (110–220 g)

Repeatability:
- **Standard:**
  - **High weight (measured >200 g):** 0.25 mg
  - **Low weight (measured up to 200 g):** 0.15 mg
- **High-sensitivity option:**
  - **High weight (measured at 200 g):** 0.15 mg
  - **Low weight (measured at 10 g):** 0.04 mg

Response time: <22s
Camera resolution: 1032 pixels (max wide) x 779 pixels (tall)

Off-deck third-party instrument integration
- HPLC
- GC

Other systems available for virtual integration.
Please contact Unchained Labs for a full list of systems.

Facilities requirements

Physical:
With integrated enclosure:
105 cm W x 90.4 cm D x 140 cm H, ~150 kg
With integrated table option:
167 cm W x 90,4 cm D x 200 cm H, ~240 kg

Electrical:
Junior:
120–220 V ±10 %, 50–60 Hz, 16 A
Computer:
US: 115 V ±10 %, 60 Hz
EU: 220 V ±10 %, 50 Hz

Compressed dry air: 0.5 MPa to 0.9 MPa (70–130 psi), 4 L/min (8 mm hose)

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Rev D