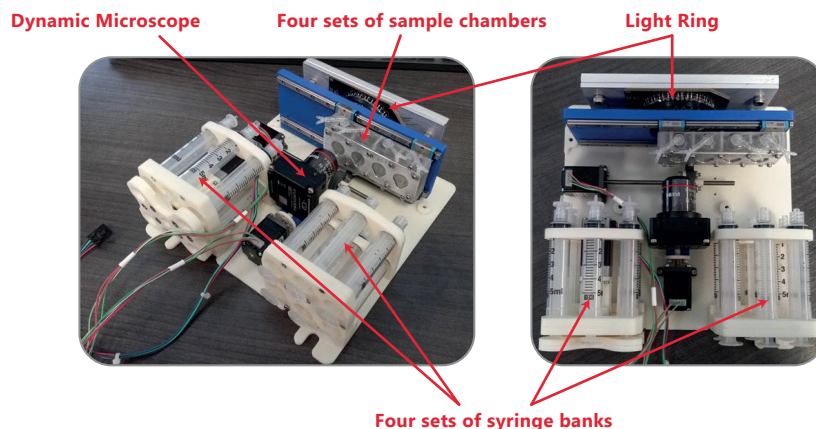


AEROSPACE TECHNOLOGY

PHARMACEUTICAL IN-SPACE LABORATORY – BIO-CRYSTAL OPTIMIZATION EXPERIMENTS DYNAMIC MICROSCOPY CASSETTE (PIL-BOX DMC)

PRODUCT DESCRIPTION

The Redwire Space Pharmaceutical In-space Laboratory (PIL) provides services to pharmaceutical and institutional researchers seeking to use target molecules in their crystalline state to reformulate existing products and/or develop formulations for new products. This PIL-BOX DMC is unique in that it will enable real-time observation of crystal growth in multiple automated mixing experiments. This will allow for real-time hardware performance optimization, the identification of causal relationships, and the immediate evaluation of the success of the growth process. The PIL-BOX DMC contains an automated, high-resolution Dynamic Microscope. The PIL-BOX DMC aims to meet that need and provide real-time observations of crystal growth & final morphology. This will provide researchers with empirical data that they can compare with data derived from ground control experiments.



APPLICATIONS

+ Fluid Processing Microscopy

PIL-BOX DMC - a triple - contained, multi-sample fluid handling cassette.

+ Dynamic

PIL-BOX FC - a dynamic observation module allows for near real time observations.

+ Syringe based

PIL-BOX FC - includes several syringe banks for up to 4 experiments per cassette.

MARKETS SERVED

- + In-space manufacturing
- + Regenerative medicine

- + Bioengineering
- + Crystalline bipharmaceuticals

- + Pharmaceuticals
- + Agriculture

PARAMETERS

- + Five different PIL-BOX platforms in both the ADSEP Facility, the MVP Facility and a handheld option.
- + Three ADSEP options, PIL-BOX SC (Syringe Cassette) PIL-BOX FC (Fluidics Cassette) and PIL-BOX DMC (Dynamic Microscopy Cassette) can be processed three at a time in a processing temperature (4 – 40° C). They are independently monitored and controlled.
- + The MVP option, the PIL-BOX CM (Crystal Module) can be processed up to six experiments at a time with another six control modules that may be processed at 1g. The MVP environment processing temperature is monitored and can be controlled (14 – 40°C).
- + The manual hand held device utilizes 2 syringes that can be processed in the aisle by a crew member.
- + The automated versions in ADSEP and MVP will have autonomous control via timeline or direct command and near Realtime download capabilities of facility data.
- + Cassette and module interfaces with the processing facility through blind-mating power/data connector can be swapped to allow for multiple cassettes/modules to be processed per ISS increment.

OTHERS FEATURES

Pharmaceutical In-space Laboratory – Bio-crystal Optimization Experiment (PIL-BOX) Comparison Table					
Hardware Platform	Handled Device ⁴	PIL-BOX SC	PIL-BOX FC	PIL-BOX DMC	PIL-BOX CM
Incubation Facility	Stand Alone	ADSEP	ADSEP	ADSEP	MVP
Default Injection & Mixing Method	Manual	Autonomous ¹	Autonomous ¹	Autonomous ¹	Semi-autonomous ¹
Optimizable Variables	Solution Concentrations	Solution Concentrations; Temperature Ramps	Solution Concentrations; Temperature Ramps	Solution Concentrations; Temperature Ramps	Solution Concentrations; Temperature Ramps; Variable g-Levels
Default Transport Stowage Temperature	-80°C to Ambient	4°C to Ambient ^{2,3}	4°C to Ambient ^{2,3}	4°C to Ambient ^{2,3}	-80°C to Ambient ^{2,3}
Imaging	Crew Observation	Crew Observation	Crew Observation	Real-time Microscopic Imaging	Real-time Macroscopic Imaging
Number of Optimization Samples	1	10	12	4	12
Optimization Sample Volume	1 - 50 mL	1 - 2 mL	1 - 30 mL	1 - 2 mL	10 - 30 mL
Manufacturing Volume	100 - 250 mL	100 - 250 mL	250 - 750 mL	20 - 50 mL	20 - 50 mL
Gravity Level	µg	µg	µg	µg	µg - 2g
Temperature Control	no	4°C - 40°C	4°C - 40°C	4°C - 40°C	14°C - 40°C
Hardware Provided Levels of Containment	1	3	3	3	3

MISSION HERITAGE

- + Space Shuttle Endeavour STS-77 and Space Shuttle Discovery STS-95.
- + SpaceX Cargo Dragon.
- + Northrop Grumman Cygnus.
- + International Space Station EXPRESS Rack.

This product is controlled for export from the United States. Contact Redwire for details.



HERITAGE

Redwire is a new leader in mission critical space solutions and high reliability components for the next generation space economy. With decades of flight heritage combined with the agile and innovative culture of commercial space platform, Redwire is uniquely positioned to assist its customers in solving the complex challenges of the future space missions. For more information, please visit www.redwirespace.com

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