



Fluids Integrated Rack (FIR)

Glenn Research Center



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Engineering Team: ZIN Technologies, Inc.

Objective:

- ◆ Develop a flexible, easily configurable, multi-use facility that provides core diagnostics and data acquisition & control capabilities that will support a broad range of research in support of Space Exploration and other endeavors.

Relevance/Impact:

- ◆ The Fluids Integrated Rack (FIR) will support strategic research to enable storage/transfer of two-phase fluids, characterize two-phase heat transfer, support development of multi-phase environmental controls for life support systems, and support human health in physiological/medical systems research to enable long term missions to the Moon and Mars.

Development/Operations Approach:

- ◆ The FIR is part of the Fluids & Combustion Facility (FCF).
- ◆ The FCF system consists of a Flight Segment (flight rack & payload hw/sw) and a Ground Segment (integration/spares).
- ◆ All avionics and diagnostics are contained in orbital replacement units with simple interfaces that allow for easy change-out/reconfiguration.
- ◆ FCF operates together with payload experiment equipment, ground-based operations facilities and the FCF ground segment.
- ◆ The FIR is designed for remote/autonomous operations performed from GRC's Telescience Support Center.



FIR with the Light Microscopy Module



FIR Flight Unit

ISS Resource Requirements

| | |
|--|--|
| Accommodation (carrier) | ISS US Laboratory |
| Upmass (kg) (w/o packing factor) | 745 (includes upmass for stowed ARIS hardware) |
| Volume (m³) (w/o packing factor) | 0.12 (off-rack ascent volume) |
| Power (kw) (peak) | 1.1 (planned) 2.6 Peak (tested) |
| Crew Time (hrs) (initial installation & setup) | 6 |
| Launch/Increment | 17A/Increment 10 -> |

Project Life Cycle Schedule

| Milestones | SCR | HCR | PDR | CDR | VRR | Safety | FHA | Launch | Ops | Return | Final Report |
|-------------------------|--------------------|--------|--------|--------|---------------|--------|--------|------------------------|---------------|--------|--------------|
| Actual/ Baseline | N/A | 6/1998 | 2/2001 | 5/2002 | 2/2003 | 7/2005 | 5/2007 | 8/2009 | Inc. 20,21 -> | N/A | N/A |
| Documentation | Website: eRoom: | | | | SRD: EDMP: | | | Project Plan: SEMP: | | | |