FLIGHT WORKS, Inc.

MX-Series (Magnetic Drive Gear Pumps)

MODEL S-2232-M05XS09-HP

Bi-Propellant Space Pump

S-2232-M05XS09-HP

DESCRIPTION

Flight Works M-Series (Magnetic Drive) Gear Pumps offer the highest level of quality, reliability, and versatility in the Flight Works product catalog. The S-2232-M05XS09-HP model is designed for transfer of fluid at high pressure. This fully encapsulated model uses precision-machined parts, magnetic coupling mechanics, and a high-end brushless motor designed for spaceflight applications to produce exceptional performance reliably. The motor allows for simple control, with minimal power draw

STANDARD SPECIFICATIONS

Max Flow Rate	.....	600 ml/min @ 5 psid*
Diff. Pressure (Max)	.....	300 psid* (fluid-dependent; see data chart)
Proof / Burst Pressure	.....	525 psig / 875 psig
$NPSH_r$	.....	8 psi above saturation pressure (fluid dependent)
Mass	.....	250 grams (with standard motor leads)
Envelope & Interfaces	.....	See ICD for full details
Seals	.....	None. Fully welded (Helium leak rate: < 1x10-3 sccs GHe at MDP)
Permissible Fluid	.....	Configuration dependent
Wetted Materials	.....	Configuration dependent. Refer to wetted materials table
Design Temperature	.....	Non-operational: -15°C to +60°C Operational/fluid: +5°C to +40°C
Design Environments	.....	Random vibration (NASA GEVS levels) and vacuum; hall sensors (COTS) *not tested* for radiation tolerance
Nominal Voltage	.....	18 V
Control Options (requires controller)	.....	Ground: hall sensor or back-EMF feedback Space: back-EMF feedback

APPLICATIONS

This micro gear pump has been designed for spaceflight applications. It features a level of versatility and customization that would also allow for use in a wide field of applications with vibration or low atmospheric pressure/vacuum.

⚠ IMPORTANT

This pump is designed to operate with an inlet filter (<10 microns recommended). Operating the pump outside of these design limits in specific applications may be possible, but the customer must check and validate this.

∗Temperature & Fluid Dependent – Consult factory for extended range.

Specifications and data in this document are for informational purposes only, may vary depending on the system in which the pump is integrated, and are subject to change without notice. Flight Works, Inc. makes no warranties concerning the suitability of this pump for a particular application; as such, it is the customer's responsibility to determine the safety and technical suitability of the system. Refer to the Pump User Guide for more details on handling, setup, operation, and more. This pump is a precision unit, built and assembled as a complete product. Opening, adjusting, or dropping the pump can permanently damage assembly integrity. Please contact Flight Works, Inc. by phone or email with any further questions regarding this product or its function.

Made in the USA – Data Sheet EAR99
Product Export Controlled (ECCN 9A106.d)
Subject to Export Administration Regulations (EAR)

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OPTIONS

Space Basic	Product Data Sheet, Interface Control Document, External CAD/STEP file
Space Standard	Space Basic plus ATP data package for each unit, Product specification, integration, and test support

OPTIONAL PROCESSES

- Precision cleaning and certification
- 100% Radiographic Inspection of welds and certification
- Vibe acceptance testing
- Thermal vacuum testing

FLUIDIC INTERFACE	**2X 1/4" Tube stubs with 0.028" wall thickness (6.35 mm OD X 5.00 mm ID)**

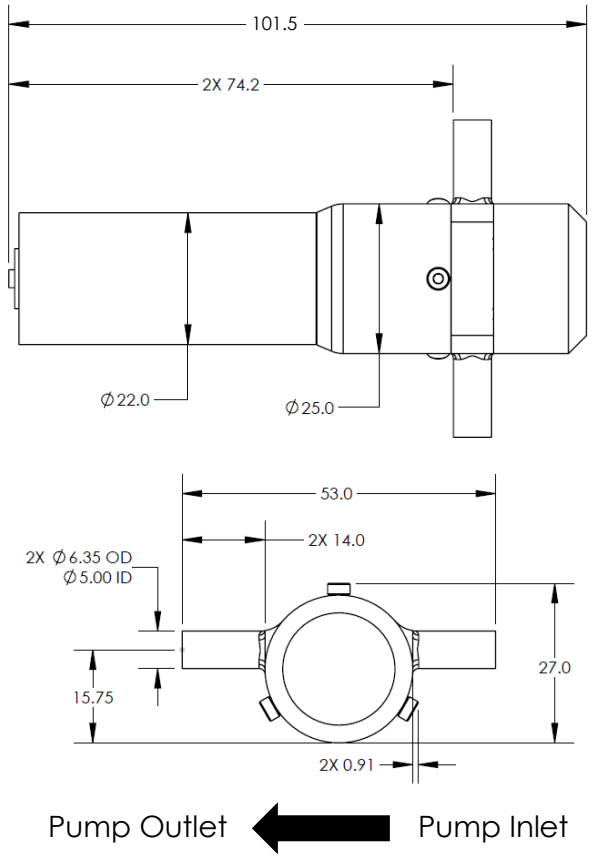
PUMP WETTED MATERIALS

S-2232-M05XS09-HG-HP	S-2212-M05XS09-HZ-HP
• 300 & 400 Series Stainless Steel • Inconel 625 • Silicon Carbide	• 300 & 400 Series Stainless Steel • Titanium 6Al-4V • Silicon Carbide

WIRE HARNESS OPTIONS

Standard (P/N)	Shielded (P/N-1)	Shielded w/ Sensors (P/N-2)
• Motor power and hall effect sensor flying leads • 300±20 mm length • Nema HP-3 Type E AWG20 19x.203 PTFE • UL style 1213 AWG26 7x0.16 PTFE	• Shielded motor power leads • Motor power terminated w/ Glenair 790-045PE-7P3MM • 300±20 mm length • EMI shielding of connector is tested to meet EIA 364-83 and EIA-364-66 • Ref. S-2232-M04XS09 ICD for pinout • Interfaces with Flight Works space motor controller	• Shielded motor power leads • 2x RTD mounted on assembly w/ twisted leads • Motor power and sensors terminated w/ Glenair 790-045PE-7P3MM • 300±20 mm length • Ref. S-2232-M04XS09 ICD for pinout • Interfaces with Flight Works space motor controller

DIMENSIONS (mm)



STANDARD ELECTRICAL INTERFACE	
RED WIRE (20 AWG)	MOTOR WINDING 1
BLACK WIRE (20 AWG)	MOTOR WINDING 2
WHITE WIRE (20 AWG)	MOTOR WINDING 3
RED/GREY WIRE (26 AWG)	HALL SENSOR 1
BLACK/GREY WIRE (26 AWG)	HALL SENSOR 2
WHITE/GREY WIRE (26 AWG)	HALL SENSOR 3
GREEN WIRE (26 AWG)	3-24 VDC HALL SENSOR
BLUE WIRE (26 AWG)	GROUND

SEE PAGE 3 FOR PERFORMANCE DATA

COMMON ACCESSORIES (Contact Flight Works to Purchase)

FLOW SYSTEM ITEMS

- Filters
- Fittings: Tee/Elbow/Y/Adapters
- Valves: Ball/Check/Needle

CONTROL COMPONENTS

- COTS Motor Controllers
- Flight Works Space Motor Controller
- Pressure Gauges/Regulators

TUBING

- Polyurethane Tubing: 4, 6, 8mm
- Tygon Tubing: Small, Medium
- Stainless Steel Tubing: 1/16", 1/8"

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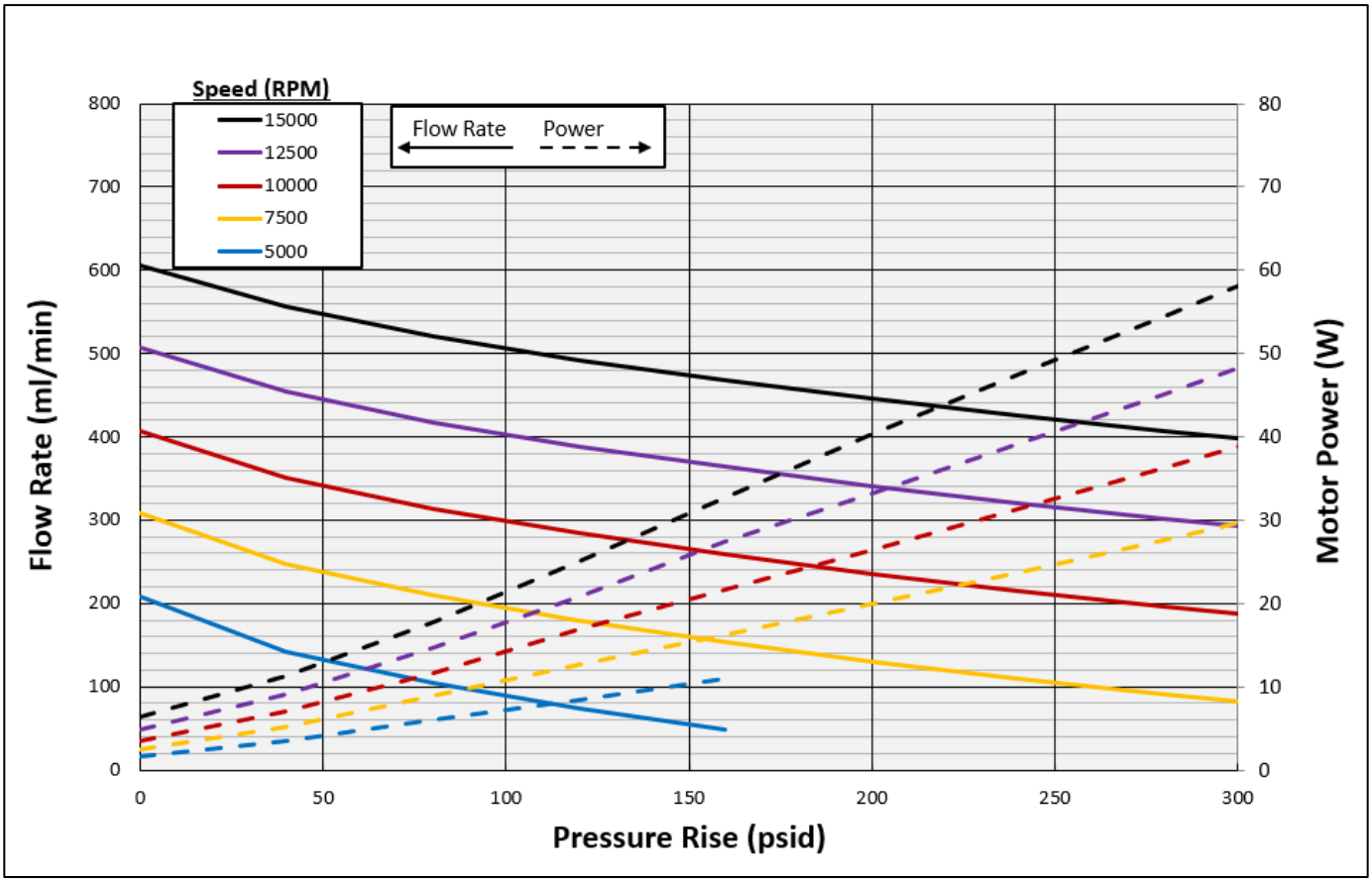
Pump Performance w/ H2O (≈ 1cP) at 25°C



Nominal performance shown; actual performance will vary depending on unit and operating conditions

MOTOR DATA				
Motor	**Nominal Voltage**	**Max Nominal Current**	**No Load Speed Constant**	**No Load Speed at Nominal Voltage**
XS09	18 V	4.24 A	970 RPM/V	17,300 RPM