

## MX-Series (Magnetic Drive Gear Pumps)

# MODEL S-2232-M04XS09-GP-HP004

## Green Propellant Space Pump

**S-2232-M04XS09-GP-HP004**

### 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-M04XS09-GP-HP004 model is designed for green propellants at high pressure. This 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 @ 0.1 psid, 575 mL/min @ 350 psid*
Diff. Pressure (Max)	.....	350 psid* (fluid-dependent; see data chart)
Proof / Burst Pressure	.....	750 psia / 1250 psia
NPSH <sub>r</sub>	.....	12 psi above saturation pressure (fluid dependent)
Mass	.....	240 grams (with standard motor leads)
Envelope & Interfaces	.....	See ICD for full details
Seals	.....	Double O-ring seals (Helium leak rate: < 1x10 <sup>-3</sup> sccs GHe at MDP)
Permissible Fluid	.....	ASCENT, isopropyl alcohol
Wetted Materials	.....	Titanium 6Al-4V, CRES 420, CRES 302, CRES 304L, CRES 440C, CRES A286, Silicon carbide, Viton™
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) <i>not tested</i> 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)

## OPTIONS

<b>Space Basic</b>	Product Data Sheet, Interface Control Document, External CAD/STEP file
<b>Space Standard</b>	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

### CONFIGURATION OPTIONS

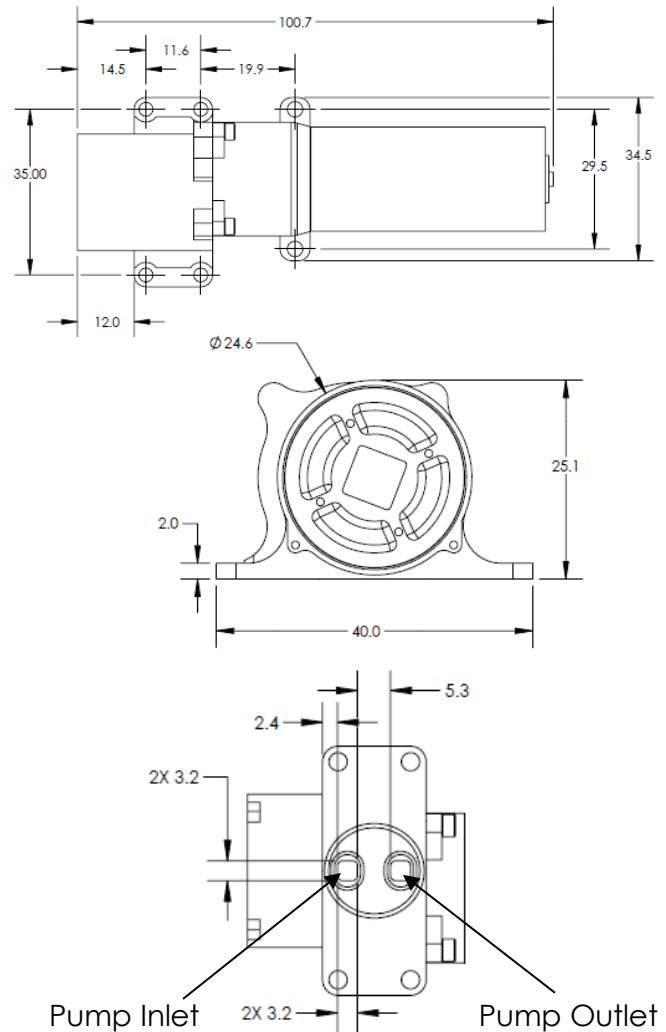
- Mounting features and design support
- Custom configurations options
- Custom wiring harness options

### WIRE HARNESS OPTIONS

Standard (P/N)	Shielded (P/N-1)	Shielded w/ Sensors (P/N-2)
<ul style="list-style-type: none"> <li>Motor power and hall effect sensor flying leads</li> <li>300±20 mm length</li> <li>Nema HP-3 Type E AWG20 19x.203 PTFE</li> <li>UL style 1213 AWG26 7x0.16 PTFE</li> </ul>	<ul style="list-style-type: none"> <li>Shielded motor power leads</li> <li>Motor power terminated w/ Glenair 790-045PE-7P3MM</li> <li>300±20 mm length</li> <li>EMI shielding of connector is tested to meet EIA 364-83 and EIA-364-66</li> <li>Ref. S-2212-M04XS09-HP-HG ICD for pinout</li> <li>Interfaces with Flight Works space motor controller</li> </ul>	<ul style="list-style-type: none"> <li>Shielded motor power leads</li> <li>2x RTD mounted on assembly w/ twisted leads</li> <li>Motor power and sensors terminated w/ Glenair 790-045PE-7P3MM</li> <li>300±20 mm length</li> <li>Ref. S-2212-M04XS09-HP-HG ICD for pinout</li> <li>Interfaces with Flight Works space motor controller</li> </ul>

<b>FLUIDIC INTERFACE</b>	Manifold mount with double O-rings. Use O-rings 2X 0.205" x 0.016" and 1X 0.583" x 0.020"
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## 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)

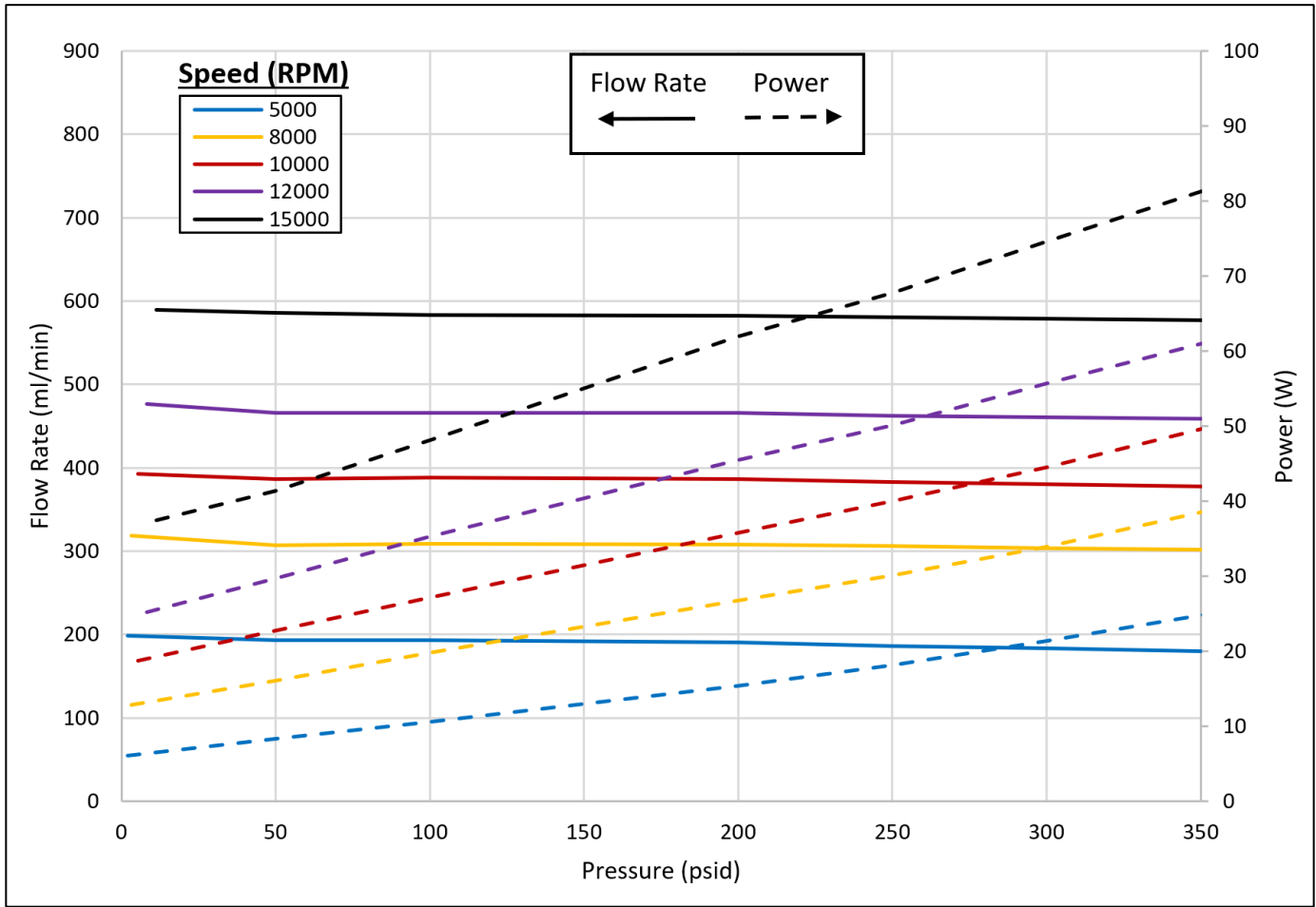
### CONTROL COMPONENTS

- COTS Motor Controllers
- Flight Works Space Motor Controller

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## Predicted Pump Performance w/ ASCENT 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