VACCO
SPACE PRODUCTS

1 N / 0.25 lb Mono-Propellant Thruster Valve Module
V0D10898-01

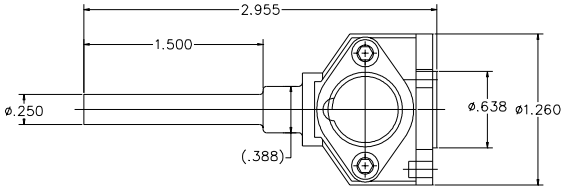
DESCRIPTION

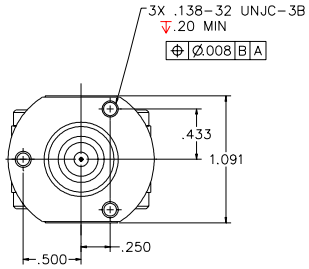
VACCO Industries maintains a product line of solenoid thruster valves designed to meet industry's demand for high reliability, tight leakage, and quick response at an affordable cost.

The Mono-propellant Thruster Valve Module (mTVM) is an innovative patented design that integrates two series redundant solenoid thruster valves into a single assembly ideally suited for the attitude control thruster applications. The mTVM is a small, compact and lightweight valve. Although currently manufactured in a titanium body with titanium interfaces, the unique patented design allows for future modification to Stainless Steel or Aluminum.

FEATURES

- Series-Redundant Valve Assembly
- Valve Seats can be Independently Verified
- Suspended Armatures (No Sliding Fits)
- Titanium Body & Interface
- Viton or EPR Seal
- 25 Micron Etched Disc Inlet Filter
- Lightweight – 85g





OPERATING PARAMETERS

MEOP	400 psig
Proof	1,500 psig
Burst	2,500 psig
Response	< 4.0 msec @ 100 psig
Flow	TBD
Pressure Drop	TBD
Internal Leakage	1 x 10^{-3} sccs @ 400 psid
External Leakage	1 x 10^{-6} sccs @ 400 psig

Weight	85 grams
Operating Temperature	-20 to +60°C
Non-Operating Temperature	-60 to +65°C
Pull-In Voltage	9 VDC Max @ 200 psig
Power	< 4 watts Max @ 20 VDC
Operating Voltage	20 to 40 VDC
Inlet Filter Rating	25 micron (abs)
Demonstrated Cycle Life	180,000 (***no degradation***)

Performance characteristics are based upon customer requirements, as such, are not representative of component capabilities or limitations

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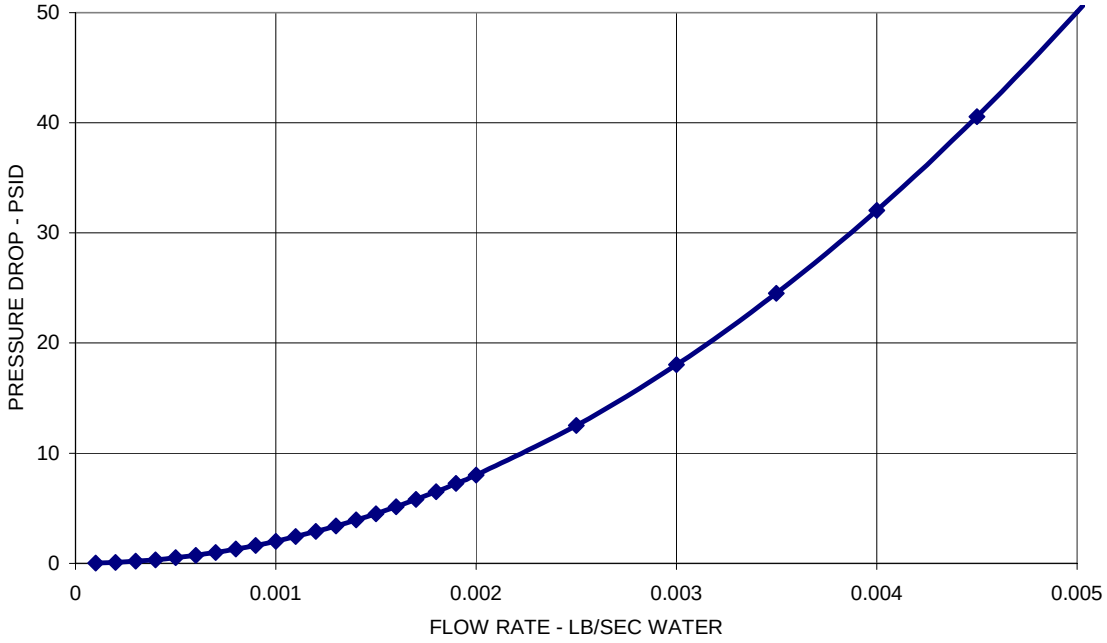
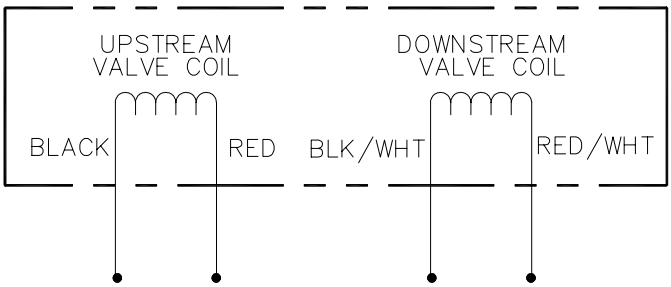
PERFORMANCE CHARACTERISTICS

PRESSURE DROP CHARACTERISTICS
Mono-Propellant Thuster Valve Module



ELECTRICAL SCHEMATIC

ELECTRICAL SCHEMATIC



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MONOPROPELLANT THRUSTER VALVE (120+ LB_F)
XV0E11057-01

DESCRIPTION

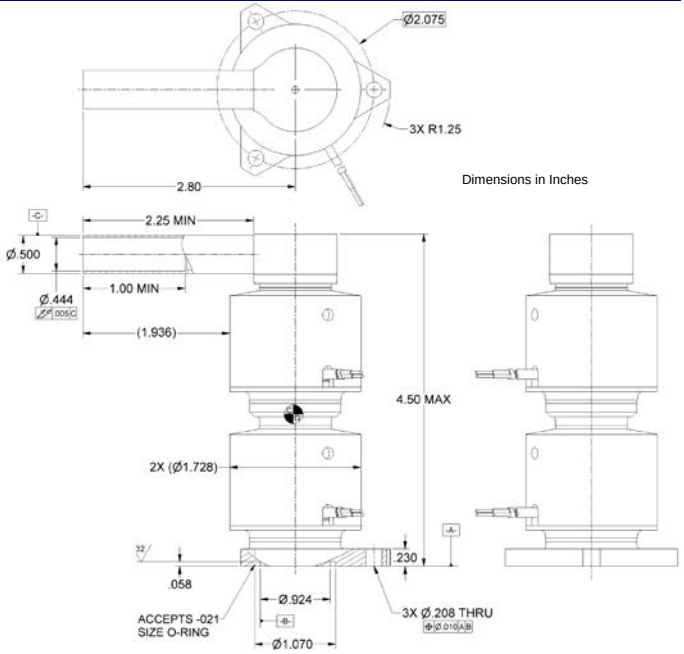
The 120+ Lbf (535+ N) Monopropellant Thruster Valve is a series redundant, direct acting, normally closed, coaxial 2-way solenoid valve with an integral inlet filter. Each series redundant valve contains a single coil for separate upstream and downstream actuation.

The plus (+) is indicated on thrust as low delta-pressure capability may permit higher flow and hence greater thrust engine use.

The design approach is purposely simple and incorporates proven design features that balance critical space flight performance needs against cost. Performance importance applies to the original man-rated application, or to other launch vehicle, spacecraft, or satellite use.

FEATURES

- Series Redundant, Normally Closed Direct Acting Solenoid Valve
- All-Welded Pressure Vessel Construction
- Integral Pleated Mesh Inlet Filter (25 Micron Absolute)
- Flown Monopropellant Wetted Stainless Steel Materials & AF-E-411 Seals (Conventional EPDM Also Available)
- Pressure Unbalanced & Sliding Fit For Low Cost Heritage Technology Construction
- Successfully Tested to Over 3000 Cycles Dry and 100,000 Cycles Wet
- 90° Inlet With Outlet Flange Mount Shown; Can Be In-Line Inlet Or Tube Stub Outlet Instead



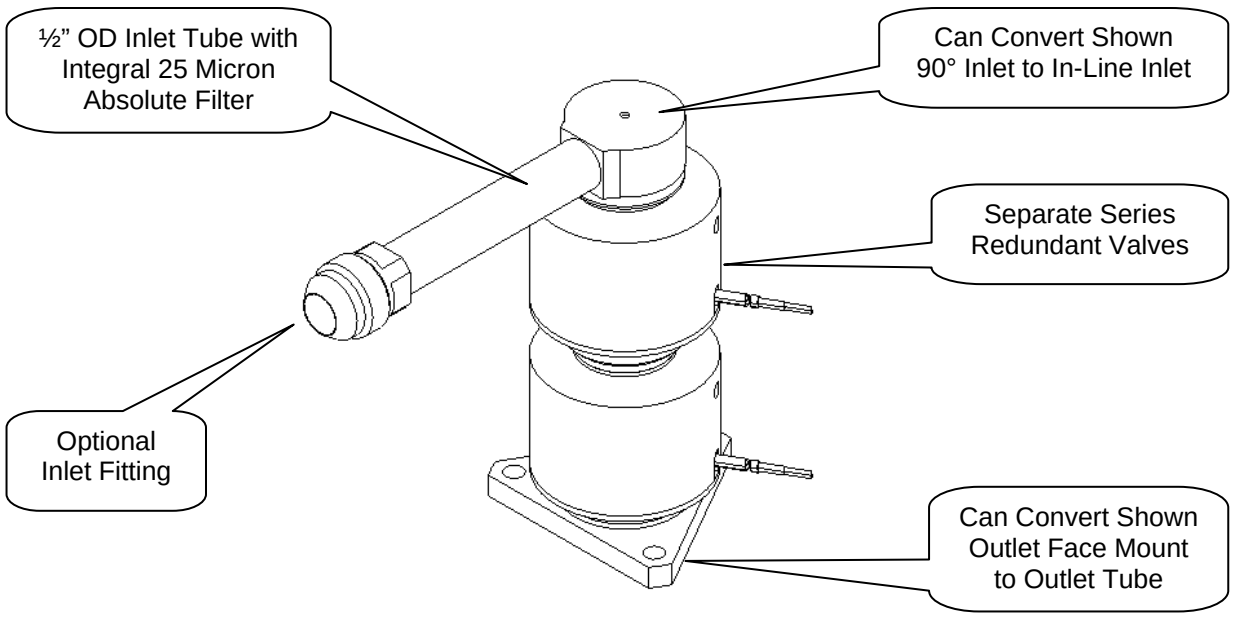
OPERATING PARAMETERS

Op. Pressure	≤ 475 psig (≤ 1000 psig Surge)
Proof Pressure	1500 psig
Burst Pressure	2500 psig
Op. Temperature	40ºF to 160ºF (& ≤ 300°F Soakback)
Flow Rate	≤ 40 psid @ 0.45 Lb/Sec H_2O
Op. Voltage	22 to 36 VDC
Opening Response	≤ 40 mSec
Closing Response	≤ 40 mSec
Internal Leakage	≤ 1 X 10^{-4} sccs GHe
External Leakage	≤ 1 X 10^{-6} sccs GHe
Weight	≤ 1.9 lb (≤ 860 grams)
Current Draw per Coil	≤ 1.5 Amps

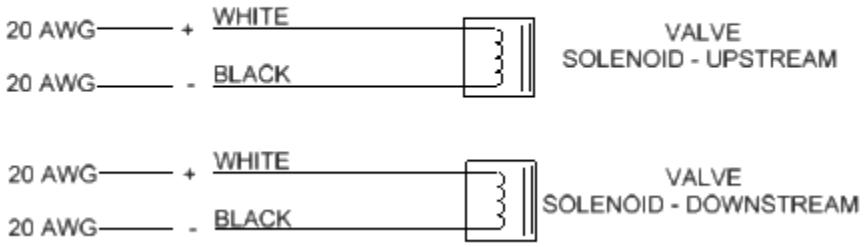
Information shown is based on certain application requirements and as such, may not represent entire component capability. Please contact VACCO to discuss your specific application needs.

MONOPROPELLANT THRUSTER VALVE (120+ LB_F)
XV0E11057-01

MONOPROP THRUSTER VALVE



ELECTRICAL SCHEMATIC



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MONOPROPELLANT THRUSTER VALVE (625 LB$_F$)
X10005000-01

DESCRIPTION

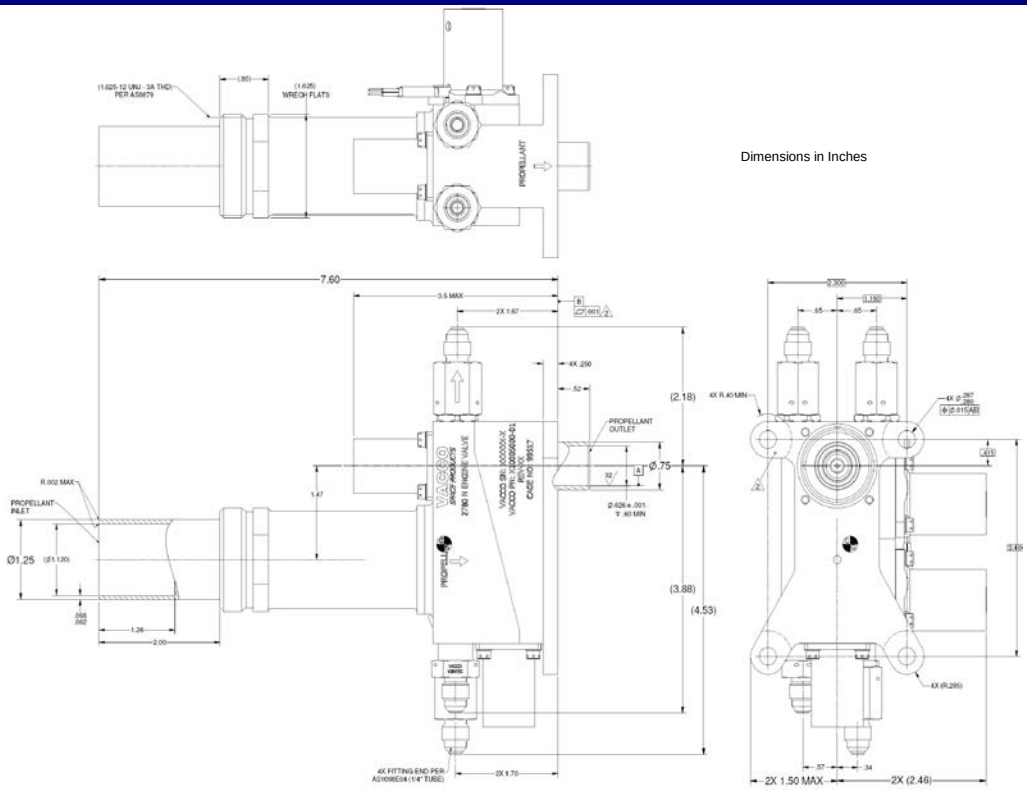
The 625 Lbf (2780 Newton) Monopropellant Thruster Valve is a series redundant, normally closed, pneumatic pilot operated valve with integral inlet filters & external vent check valves. Each series redundant valve is independently operated.

Small pneumatic 3-way, 2-position solenoid pilot valves provide brute force pneumatic actuation of larger main liquid propellant wetted valves, resulting in a compact, low weight valve assembly.

The valve design is purposely simple and incorporates proven design features that balance critical space flight performance against low cost expendable use desires, including man-rated applications.

FEATURES

- Series Redundant, Normally Closed, Pilot Operated Valve
- Pneumatically Actuated Main Section
- Electrically Operated Pilot Section
- Compact, Light Weight Design
- Integral Propellant & Pneumatic Section 25 Micron Absolute Filters
- Redundant Dynamic EPDM Propellant Seals
- Flown Monopropellant Wetted Stainless Steel Materials & AF-E-411 Main Seals (Conventional EPDM Also Available)



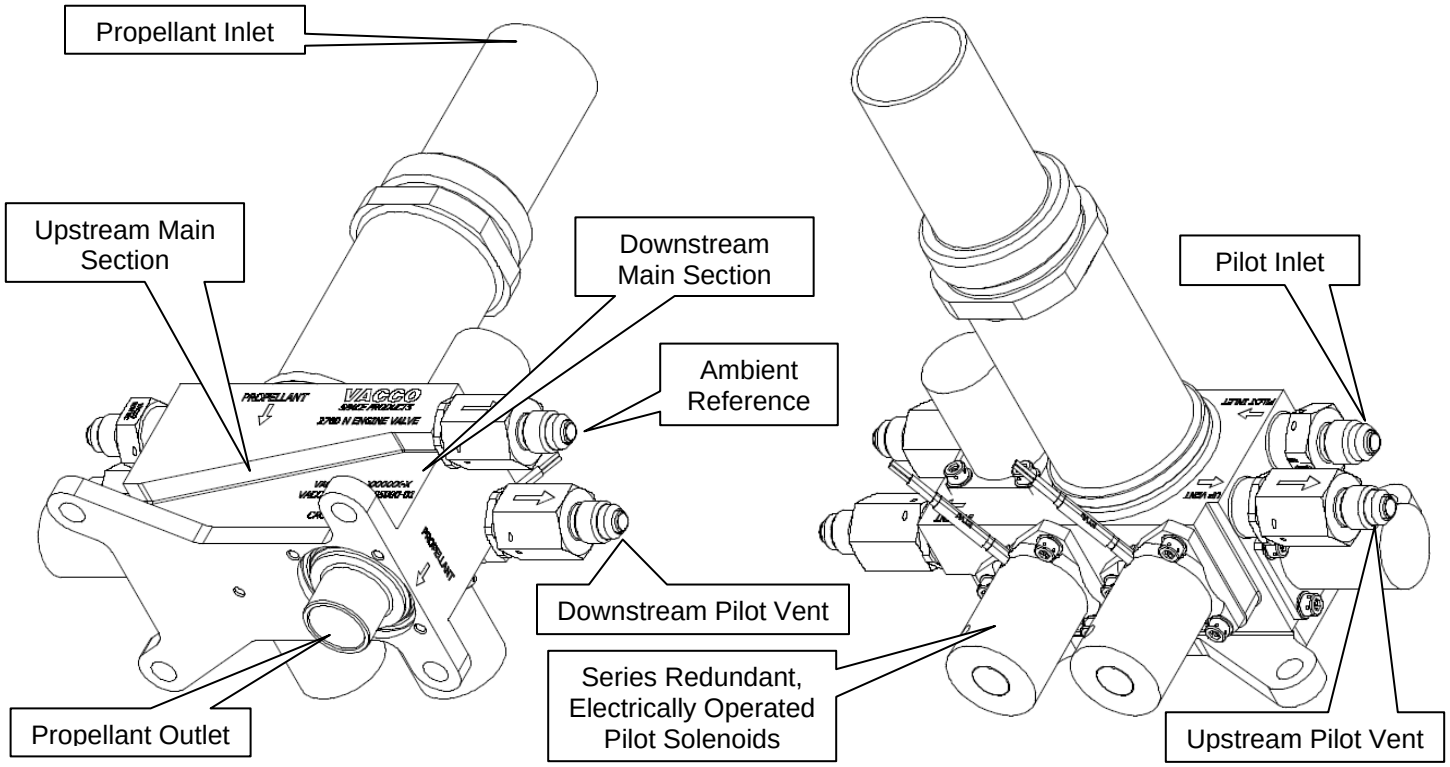
OPERATING PARAMETERS

Prop. Op. Pressure	≤ 570 to 800 psia (1300 psia Surge)
Prop. Proof Pressure	1950 psia
Prop. Burst Pressure	3250 psia
Pilot Op. Pressure	≤ 605 to 850 psia
Pilot Proof Pressure	1275 psia
Pilot Burst Pressure	2125 psia
Op. Temperature	40ºF to 160ºF (& ≤ 250°F Soakback)
Flow Capacity	≤ 100 psid @ 3.0 Lb/Sec H_2O
Operating Voltage	22 to 36 VDC
Opening Valve Response	≤ 40 mSec
Closing Valve Response	≤ 60 mSec
Internal Leakage	≤ 1 X 10^{-3} sccs GHe
External Leakage	≤ 1 X 10^{-3} sccs GHe
Weight	≤ 5.1 lb (≤ 2.3 kg)

Information shown is based on certain application requirements and as such, may not represent entire component capability. Please contact VACCO to discuss your specific application needs.

MONOPROPELLANT THRUSTER VALVE (625 LB_F)
X10005000-01

VALVE CHARACTERISTICS



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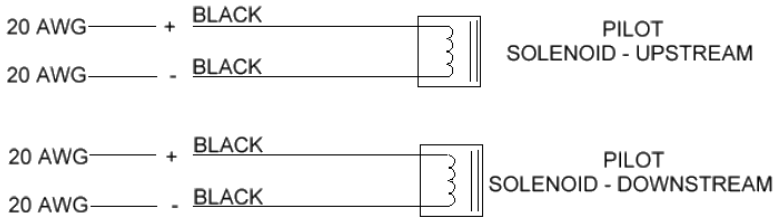

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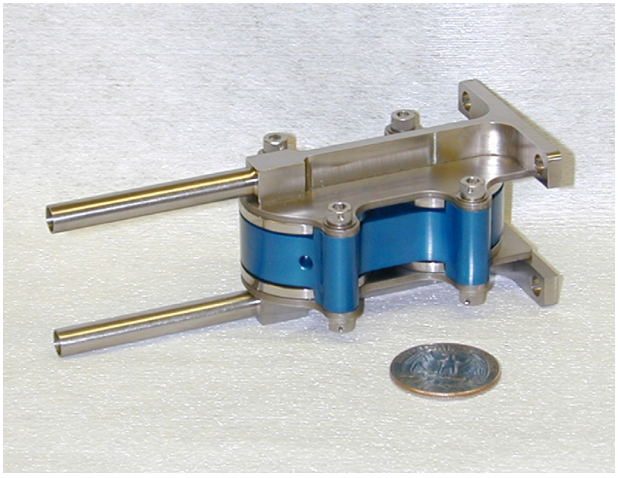
Thruster Valve Module

V0E10772-01

SPACE

VACCO Industries maintains a product line of solenoid thruster valves designed to meet industry's demand for high reliability, tight leakage, and quick response at an affordable cost.

The Thruster Valve Module (TVM) is an innovative design (patent pending) that integrates two bi-propellant solenoid thruster valves into a single assembly ideally suited for the attitude control thruster applications. The TVM is a small, compact arrangement of highly integrated components packaged in a robust titanium structure. The use of inlet titanium tubing simplifies integration of the thruster into the titanium propellant feed system by eliminating CRES/Ti transition tubes.



Features

- Single TVM replaces two series-redundant valve assemblies
- Valve seats can be independently verified
- Suspended armatures (no sliding fits)
- Lightweight titanium construction
- Teflon seal, CRES armature & spring
- 25 Micron titanium etched disc filters
- Aluminum actuator housing (not wetted)

Operating Parameters

MEOP	400 psig
Proof	1,200 psig
Burst	1,650 psig
Back Pressure Relief	200 to 400 psid
Flow	0.035 gpm
Pressure Drop	10 psid
Internal Leakage	3.0 scch @ 260 psid
External Leakage	1.0 x 10^{-6} @ 260 psig

Weight	0.53 lbm (241 grams)
Operating Temperature	20°F to 200°F
Response	7.2 mSec @ 350 psig
Pull-in Voltage	10 VDC max @ 350 psig
Power	17 watts max @ 20 vdc
Operating Voltage	20 to 40 vdc
Dielectric Strength	500 vac rms
Inlet Filter Rating	25 micron (abs)

Performance characteristics are based on customer requirements. As such, they are not representative of component capabilities or limitations.

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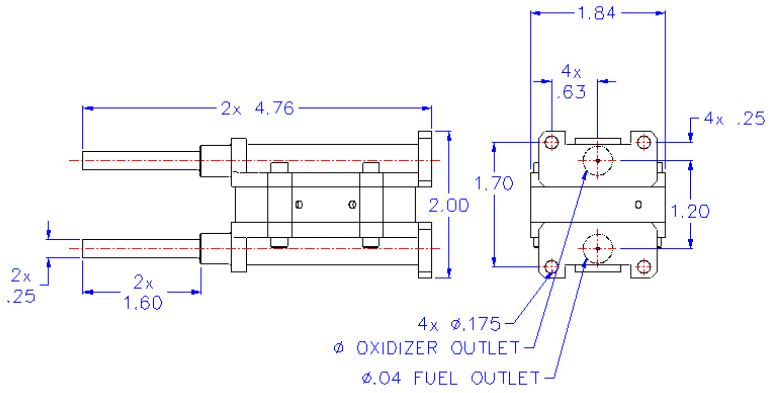
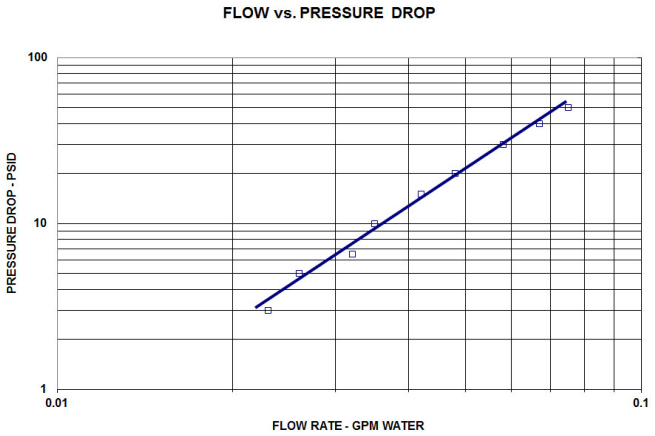
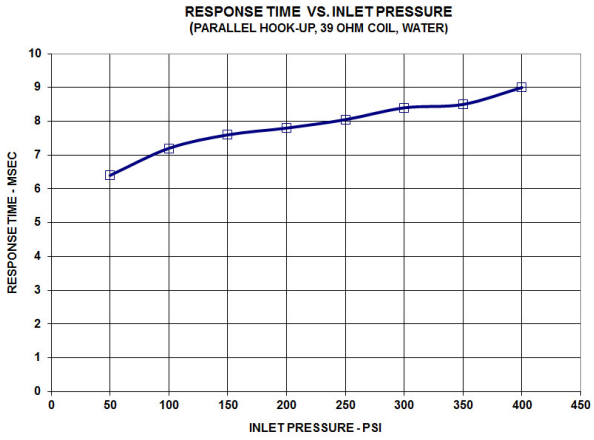
Envelope Drawing

V0E10772-01



Performance Characteristics





Electrical Schematic

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