

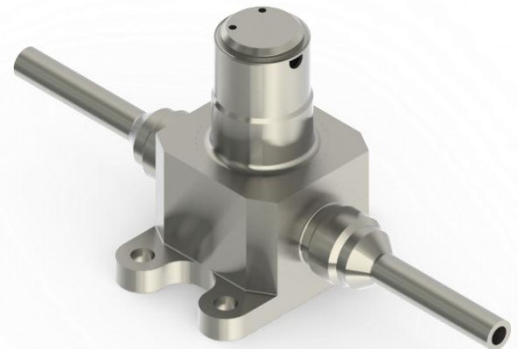
## ISOLATION VALVE (IV)

### Modular Stand-Alone Isolation Valves for Electrical and Chemical Propulsion Systems

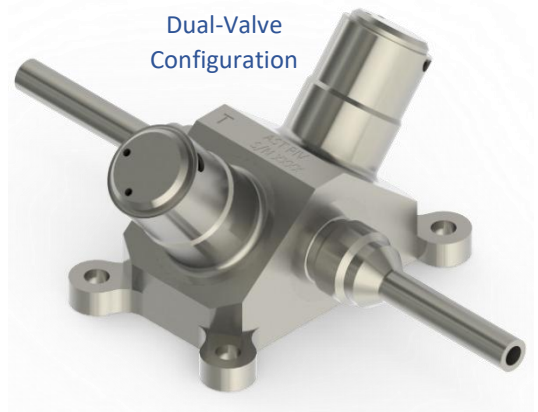
Since 2015, AST has been using **high-pressure isolation valves** in its electric pressure regulators and flow controllers. They are direct and very fast acting solenoid valves having excellent leakage performance over very high number of operational cycles. The valves produced **fully industrialized**, ready for high-cadence space-production. Over **1,300 valves operating in orbit** prove the technology's high reliability for the demanding operations and environments.

In stand-alone configuration, the valves can provide isolation function embedded in larger fluidic assemblies. By using AST's Building-Block-Concept with space-qualified and proven components a large variety of configurations can be offered: different pressure ranges, valve orifices and fluidic interfaces can be selected. Today, solenoid and manual valves are offered as standard valve functions. They can be integrated as **single-valve or dual-valve configuration**. Especially the configuration with two valves - either in **serial or in parallel redundancy** - offers a highly compact product with minimum interfaces for integration on spacecraft level.

Single Valve Config



Dual-Valve Configuration



### Key Features:

- ▶ **High Reliability:** millions of accumulated hours in space prove robustness and dependability.
- ▶ **High Performance:** very fast acting, frictionless and leak-tight even after millions of operational cycles.
- ▶ **Industrialized for Space:** continuous production ensures consistent performance and short lead times.
- ▶ **Designed for Flexibility:** A broad range of configurations and standard interfaces –customizable to mission needs.
- ▶ **Ready for integration:** Delivered without the need for additional bracketry – saving time and reducing complexity.
- ▶ **Fast Availability:** Standard Configurations are available from stock (small quantities); custom Configurations can be delivered in 8–12 weeks; Larger quantities: contact us for tailored solutions

# AST IV Characteristics

Valve	ASV-IV-HP1	ASV-IV-HP2	ASV-IV-LP	Remark
<b>Operating Media</b>	Xe, Kr, Ar, N <sub>2</sub> , He	Xe, Kr, Ar, N <sub>2</sub> , He	Xe, Kr, Ar, N <sub>2</sub> , He	Qualified for Xe at 186 bar, Kr 186bar, Kr 310bar
<b>Inlet Pressure MEP</b>	320 bar	320 bar	320 bar	Max sustained pressure
<b>Inlet Pressure MEOP</b>	186 bar 310 bar	150 bar	25 bar	186 bar qualified for Xe, Kr, Gen1 310 bar qualified for Kr, Gen2
<b>Flow Diameter</b>	0.4 mm	0.4 mm 0.6 mm	0.4 mm 0.6 mm 1.0 mm	Selectable by design
<b>Pressure Drop</b>	0.1-10 mbar up to 480 sccm	0.1-10 mbar up to 480 sccm	0.1-10 mbar up to 480 sccm	At 310 bar N <sub>2</sub> of inlet pressure (depends on the medium, density, temperature)
<b>Back Pressure Relief</b>	Depending on the chosen orifice	Depending on the chosen orifice	Depending on the chosen orifice	
<b>Operational Cycles</b>	> 100.000 – up to 310bar qualified	>3.000.000 – up to 150bar qualified	>50.000.000 – up to 10bar qualified	Maintaining internal leakage requirements. Qualification done for 0.4 mm flow diameter. >1.000.000.000 valve cycles demonstrated with mechanical integrity
<b>Response Time</b>	< 10 ms	< 10 ms	< 10 ms	Opening may be faster depending on medium and inlet pressure, closing time depends on quenching circuit design
<b>Proof Pressure</b>	> 1.5 x MEP	> 1.5 x MEP	> 1.5 x MEP	Tested value > 465 bar
<b>Burst Pressure</b>	> 2.5 x MEP	> 2.5 x MEP	> 2.5 x MEP	Qualified value > 775 bar
<b>Internal Leakage</b>	< 1*10 <sup>-5</sup> sccs GHe	< 1*10 <sup>-5</sup> sccs GHe	< 1*10 <sup>-5</sup> sccs GHe	Verified during acceptance tests
<b>External Leakage</b>	< 1*10 <sup>-6</sup> sccs GHe	< 1*10 <sup>-6</sup> sccs GHe	< 1*10 <sup>-6</sup> sccs GHe	Verified during acceptance tests
<b>Filtration Rate</b>	98% at <11 μm	98% at <11 μm	98% at <11 μm	5μm mesh at inlet and outlet
<b>Fluidic Interface</b>	¼" tube, AN Screwed, ¼" VCR	¼" tube, AN Screwed, ¼" VCR	¼" tube, AN Screwed, ¼" VCR	Interface can be selected
<b>Mass</b>	< 230 g (single valve) < 400 g (dual valve)	< 230 g (single valve) < 400 g (dual valve)	< 230 g (single valve) < 400 g (dual valve)	Depending on configuration
<b>Coil Resistance</b>	~50 Ω (± 3 Ω) at 20°C	~50 Ω (± 3 Ω) at 20°C	~50 Ω (± 3 Ω) at 20°C	
<b>Operating Voltage</b>	28 V (± 4 V) (pull-in) 8-12 Vdc (hold)	28 V (± 4 V) (pull-in) 8-12 Vdc (hold)	28 V (± 4 V) (pull-in) 8-12 Vdc (hold)	Pull-in and hold scheme recommended for optimized power consumption
<b>Power Consumption</b>	24.4 W (Peak) 3.4 W (Hold)	24.4 W (Peak) 3.4 W (Hold)	24.4 W (Peak) 3.4 W (Hold)	24-32 V pull in voltage, 8-12V hold voltage

Valve	ASV-IV-HP1	ASV-IV-HP2	ASV-IV-LP	Remark
<b>Thermal Range</b>	-10°C to +75°C -20°C to +85°C	-10°C to +75°C -20°C to +85°C	-10°C to +75°C -20°C to +85°C	Operational Non-operational
<b>Vibration Qualification Levels</b>	29.8 gRMS	29.8 gRMS	29.8 gRMS	All 3 axis
<b>Shock Qualification Loads</b>	>2000 g	>2000 g	>2000 g	At frequencies > 1000Hz
<b>Magnetic Moment</b>	<5 mAm	<5 mAm	<5 mAm	At distances >20 mm
<b>Radiation Tolerance</b>	10 Mrad	10 Mrad	10 Mrad	Total Ionizing Dose (TID)

## AST IV – Customization Options

Configuration Discriminators	AST Isolation Valve Customization Options				AST   ADVANCED SPACE TECHNOLOGIES
Valve Type	HP1-Mono-Stable Isolation Valve	HP2-Mono-Stable Isolation Valve	LP1-Mono-Stable Isolation Valve		
Configuration	1-valve: single config	2-valves: parallel redundant	2-valves: serial redundant	2-valves: back-to-back	
Fluidic Interfaces	stainless steel 1/4" tubestubs	AN screwed	VCR-compatible 1/4" screwed	titanium 1/4" tubestubs *	
Tube Wall Thickness	0.71 mm	0.89 mm	1.25 mm		
Chemical Compatibility	Xe, Kr, Ar, N2, He	He, N2, * MMH/NTO vapors	others **		

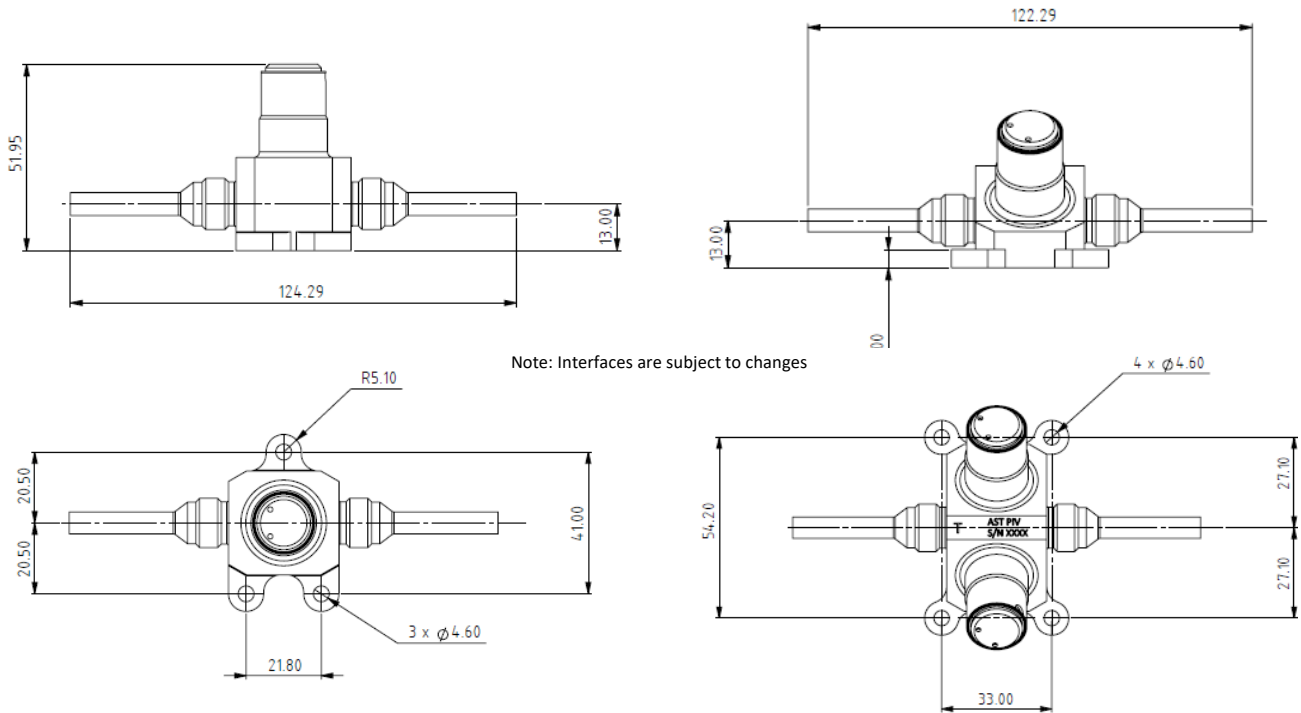
\*Under Development. Activities are in progress to support expanded operating pressure ranges, additional flow diameters, and alternative seal materials.

\*\* Ask for options. For more information, please contact us at: [sales@ast-space.com](mailto:sales@ast-space.com)

# Interfaces

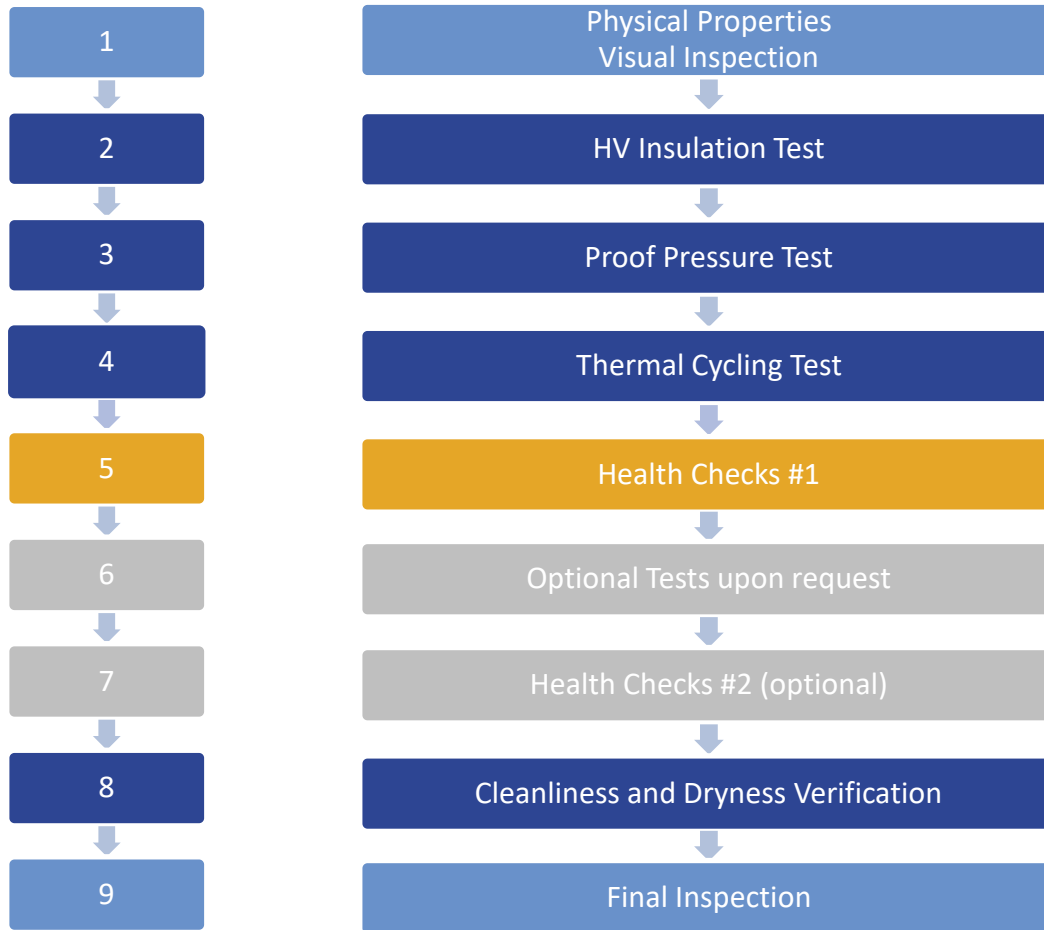
<b>Mechanical</b>	3x or 4x M4 through-holes: depending on single/dual valve configuration
<b>Electrical</b>	As standard, valves are provided with Polyimide isolated, flying leads (AWG26)
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Open</p> <p>24-32 V, 50 Ω (pull-in) 8-12 V, 50 Ω Vdc (hold)</p> </div> <div style="text-align: center;"> <p>Closed</p> </div> </div>
<b>Thermal</b>	Commonly used with conductive or insulating washer/spacer, application-dependent.

## Installation Dimensions



# Acceptance Test Procedure

The standard test sequence is illustrated in the figure below. Please contact us for optional or additional testing requirements.



- Health Checks** (Yellow box): The Health Checks include a visual inspection, electrical tests, internal and external leakage tests. Refer the table below
- Inspection** (Light Blue box): Light Blue boxes indicate an inspection
- Optional Tests** (Grey box): The optional test can include performance test for flow parameters (Min/Max Flow rate, Transfer function) at controlled temperature, Vibration tests, etc.

Health Checks	Visual Inspection	Electrical Test	Internal Leakage Test	External Leakage Test
#1	X	X	X	X
#2	X	X	X	X