Circle Seal Controls manufactures valves, regulators, and controls for aerospace applications. Products include check, relief, solenoid, sampling, bleed, and electromechanical valves; float, vacuum, and pilot-operated valves; pressure regulators; tire fill valve gauges; gauge savers; temperature compensating pressure regulator systems; and positive hydraulic control systems, with design capability to meet your instrumentation and fluid regulation specification requirements. Circle Seal Controls also features an on-site Class 10000 clean room that is tailored to all space requirements.

**CHECK VALVES**

**APPLICATIONS**
Spacecraft, ground support, launch vehicles, launch support equipment, simulators

**FEATURES**
- Small size
- Lightweight
- High inlet pressure
- High reliability

**SPECIFICATIONS**

**Operating fluid**
Hydrogen, oxygen, helium, nitrogen

**Material**
Stainless steel

**Operating pressure**
0 to 5500 psi (0 to 380 bar)

**Flow**
1.5 lb/sec (0.68 kg/sec)

**Temperature range**
-320° F to +530° F (−196° C to +277° C)

**PRECISION SOLENOID VALVES**

**APPLICATIONS**
Spacecraft, ground support, launch vehicles, launch support equipment, simulators, missile launch vehicles

**FEATURES**
Many types of solenoid valves, including general purpose, coaxial, gate, four-way and manifold, cartridge, pilot-assisted, latching, cryogenic, and ultra high pressure. Circle Seal solenoid valves can be designed in a wide variety of voltages, line sizes, duty cycles, pressures, performance characteristics, and connections

**SPECIFICATIONS**

**Material**
Body: Aluminum, brass, stainless steel
Seat: Buna N, EPR, neoprene, silicone, Viton®, Teflon®

**Pressure range**
Operating: 0 to 10,500 psi (0 to 725 bar)
Cracking: $2\,^\circ\,H_2O$ to 10,500 psi (4.98 mbar to 725 bar)

**RELIEF VALVES**

**APPLICATIONS**
Spacecraft, ground support, launch vehicles, launch support equipment, simulators

**FEATURES**
- Small size
- Lightweight
- High inlet pressure
- High reliability

**SPECIFICATIONS**

**Material**
Body: Aluminum, brass, stainless steel
Seat: Buna N, EPR, neoprene, silicone, Viton®, Teflon®

**Pressure range**
Operating: 0 to 10,500 psi (0 to 725 bar)
Cracking: $2\,^\circ\,H_2O$ to 10,500 psi (4.98 mbar to 725 bar)
U.S. Para Plate manufactures valves and pressure regulators for aerospace ground support, aircraft and launch vehicles. Valve types include ball, globe, angle, check, and solenoid valves. Regulators include manual adjustment, servo-dome, miniature and back pressure regulators. U.S. Para Plate has standard products and also provides custom engineering to meet every customer need. U.S. Para Plate also features an on-site Class 10000 clean room that is tailored to all space requirements.

**PRESSURE REGULATORS**

**APPLICATIONS**
Miniaturized pressure systems, research & development labs

**FEATURES**
- Exceptionally compact design envelope
- Unique design minimizes friction and wear
- Repeatable set pressure
- Filtered inlet prevents contaminants from affecting set pressure and lockup
- Threaded seat provides blow-out safety
- Corrosion resistant

**SPECIFICATIONS**
**Weight**
3.5 oz to 16 lbs (99.2 g to 7.26 kg)

**Material**
316 stainless steel

**Pressure ranges**
- Inlet: 0 to 10,000 psig (0 to 690 bar)
- Outlet: 0 to 6000 psig (0 to 414 bar)

**Cv**
0.0005 to 12

**Temperature range**
−65° F to +400 F (−54° C to +204° C)

**CHECK VALVES**

**APPLICATIONS**
Aerospace ground support, wide range of gases and liquids, service and test equipment

**FEATURES**
- Positive shut-off in the check direction
- Corrosion resistant 316 stainless steel
- Pressures up to 6000 psi (414 bar)
- Cv’s ranging from 2.5 to 55.0
- Line sizes from ¼” to 2” standard
- Cryogenic models available
- MS tube or NPT end connections
- NASA tested and approved models

**SPECIFICATIONS**
**Material/Trim**
316 stainless steel, Monel®

**Cracking Pressure**
1.0 to 8.0 psi (69 to 552 mbar)

**Operating Pressure**
- 0 to 3000 or 6000 psi (0 to 207 or 414 bar)

**Cv**
2.5 to 55

**Temperature**
−420° F to +165° F (−251° C to +74° C)

**CRYOGENIC BALL VALVES**

**APPLICATIONS**
Rocket engine test stands, aerospace ground support, fuel valves, drain valves

**FEATURES**
- Bubble-tight performance
- Floating ball design
- Standard operating pressures up to 6000 psi (414 bar)
- Optional pressures up to 15,000 psi (1035 bar)

**SPECIFICATIONS**

**Operating Pressure**
Up to 6000 psi (414 bar), standard

**Proof Pressure**
1½x design

**Burst Pressure**
4x design

**Cv**
9 to 31, higher available

**Temperature**
−420° F to +150° F (−251° C to +66° C)

**Leakage**
Bubble-tight
Aerodyne Controls has provided custom engineered pneumatic components on every manned NASA program from Project Mercury through to the Space Shuttle. Our robust custom engineered pneumatic systems and components provide tighter specification tolerance than found on most off-the-shelf hardware. Aerodyne’s product range includes regulators, check and relief valves, solenoid valves, stored energy systems, and mercury-free motion switches. Aerodyne Controls also has Class 10, Class 100, Class 1000 to 10000 assembly areas within the facility.

**CRYOGENIC SOLENOID VALVES**

**APPLICATIONS**
- On-orbit, fuel isolation valves for Space Shuttle

**FEATURES**
- Small envelope
- Lightweight high pressure design, with tight tolerance on outlet pressure

**SPECIFICATIONS**

**Operation**
- 2-way, 2-position latching or non-latching, normally closed

**Operating fluids**
- Liquid nitrogen (LN₂), liquid oxygen (LO₂), liquid hydorgen (LH₂), gaseous helium (GHe)

**Weight**
- 7.40 lbs (3.36 kg)

**Material**
- Welded stainless steel

**Pressures**
- Inlet to 1100 psig (76 bar)

**Rated flow**
- 215 lb/hr (49.5 scfm) (98 kg/hr) GN₂ @ 10 psid (690 mbar) @ 100 psia (5.9 bar) inlet and 70° F (21° C)

**Temperature**
- Operating & fluid: −432° F to +120° F (−258° C to +49° C)

**MINIATURE PRESSURE REGULATOR**

**APPLICATIONS**
- Water system back pressure regulator for Space Shuttle

**FEATURES**
- Small envelope
- Lightweight design
- Tight tolerance on regulated and reseat pressures

**SPECIFICATIONS**

**Service fluids**
- Water, isopropyl alcohol, gaseous helium (GHe), gaseous nitrogen (GN₂)

**Pressures**
- Regulates @ 46 ± 1 psi (3 bar ± 69 mbar)

**Rated Flow**
- 12 lb/hr water @ 51 psia (5 kg/hr @ 2.5 bar) maximum

**Temperature**
- +40° F to +220° F (+4 ° C to +104° C) with water

**Materials**
- CRES stainless steel

**Weight**
- 0.60 lb (0.27 kg)

**ACCELERATION SENSING G SWITCH**

**APPLICATIONS**
- Space dust collection and re-entry parachute deployment switch for Stardust Spacecraft, various missile impact applications, fuse initiation sensing switch

**FEATURES**
- Mercury-free
- Miniature size
- Extremely reliable
- Custom settings and sensitivities available

**SPECIFICATIONS**

**Part G accelerations to 20,000 G**
- Hermetically sealed
- Individually tested
- Tilt, impact, linear, and multi-axis switch types available
Industria has a comprehensive range of electromechanical, hydraulic and oleo-pneumatic components such as solenoids, solenoids valves, pressure switches, self-sealing couplings and connections to assembly, actuators, and manifold blocks. Our French facility contains a 56 sq ft (75 m²) Class 10000 clean room FED STD209E equipped with two Class 100 workstations.

**BLOCK MANIFOLDS**

**APPLICATIONS**
Rockets, launch vehicles

**FEATURES**
- Small size
- Lightweight
- High inlet pressure
- High reliability

**LATCHING SOLENOID VALVES**

**APPLICATIONS**
Rockets, launch vehicles

**SPECIFICATIONS**
- **Fluid**
  - EPS Series: Helium gas
  - SCA Series: Hydrazine
- **Temperature**
  - $-148^\circ$ F to $+104^\circ$ F ($-100^\circ$ C to $+40^\circ$ C)
- **Weight**
  - EPS Series: 3.28 to 3.37 lb (1.49 to 1.53 kg)
  - SCA Series: < 3.75 lb (1.7 kg)
- **Voltage**
  - 46 to 59 VDC
- **Flow**
  - EPS Series: 0.4 oz/sec (12 g/sec) He for 5.8 psi (400 mbar) pressure drop
  - SCA Series: 0.88 lb/sec (400 g/sec) for 14.5 psi (1 bar) pressure drop

**FEATURES**
- Small size
- Lightweight
- High inlet pressure
- High reliability

**PILOT SOLENOID VALVES**

**APPLICATIONS**
Rockets, launch vehicles, satellites

**SPECIFICATIONS**
- **Nominal pressure**
  - up to 7600 psi (525 bar)
- **Passage**
  - up to 0.63” (16 mm)
- **Temperature**
  - $-120^\circ$ F to $+840^\circ$ F ($-85^\circ$ C to $+450^\circ$ C)
- **Tightness**
  - better than $10^{-9}$ Ncc/s He
For more than 50 years, the companies of CIRCOR Aerospace has been an integral player in many of the major space programs throughout the planet. And as we continue to explore new frontiers and push the bounds of human exploration, CIRCOR Aerospace will continue to develop the custom fluid control solutions that the rigors of space exploration continues to demand for now… and into the future.

**SPACE PROGRAMS**

CIRCOR Aerospace has been involved with the following programs:

**SPACE VEHICLES**
- Mercury
- Gemini
- Apollo
- Space Shuttle
- International Space Station
- Hyper-X
- X-33
- X-38
- Spacelab

**SATELLITES & EXPLORATION**
- Navstar satellite
- Spot satellite
- Viking
- Cassini Huyghens satellite
- Lunar Landing Vehicle
- Skylab
- Nimbus satellite
- Stardust spacecraft

**ROCKETS / LAUNCH VEHICLES**
- Saturn
- Delta II and IV (Boeing)
- Ariane IV and V
- JAXA H-I
- Atlas (Lockheed-Martin)
- Athena
- Titan II

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The space photography featured in this brochure should not be construed as an endorsement from a particular organization.