



**CCI - Herion
Process
Solenoid
Valves for
Nuclear
Service**



The permanent solution for nuclear process solenoid valve problems.

Table 1: Current Industry Problems and the Solutions

Currently Industry Problems	The Solution CCI - Herion
Limited EQ Life <i>High O & M Costs</i>	40+ Years EQ Life <i>Continuously Energized</i>
Inaccurate Position Indication <i>Reed Switch Subject to Thermal and Vibration Drift</i>	Induction Coil Position Indication <i>Drift Free</i>
Coil Burnout <i>Inadvertent System or Plant Shut Down</i>	Class C Coil Rated for 662°F <i>Tolerates Voltage Fluctuations</i>
Seal Welded Bonnet <i>High Maintenance Costs</i>	Bolted Bonnet <i>Provides Rapid Access to Internals</i>
Air Entrapment in Multi-Pilot Stages <i>Inconsistent Shutoff</i>	Solid Mechanical Connection Between Plunger and Disc <i>Maintains Positive Isolation</i>
Conventional Electrical Connectors <i>Excessive Personnel Radiation Exposure</i>	Electrical Quick Disconnect Option <i>Reduces Personnel Radiation Exposure</i>
Leakage and LLRT Failure <i>Seat Subject to Wear and Steam Cutting</i>	Spherical Contour Seat Design <i>Zero Leakage; High Tolerance to Contaminants</i>
Costly Maintenance	No Scheduled Maintenance

ACCURATE POSITION INDICATION AND RELIABLE, SEAL-TIGHT OPERATION OVER THE LONG TERM

CCI is heavily committed to the nuclear power industry in supplying safety related technology and services. Herion is Europe's foremost solenoid valve manufacturer. Together, we now offer a superior 2-way solenoid actuated valve for safety related and balance of plant services. These valves have proven their long term reliability in over 1500 demanding nuclear plant applications.

The valves provide unique solutions to problems commonly associated with process control valves in critical nuclear power plant services.

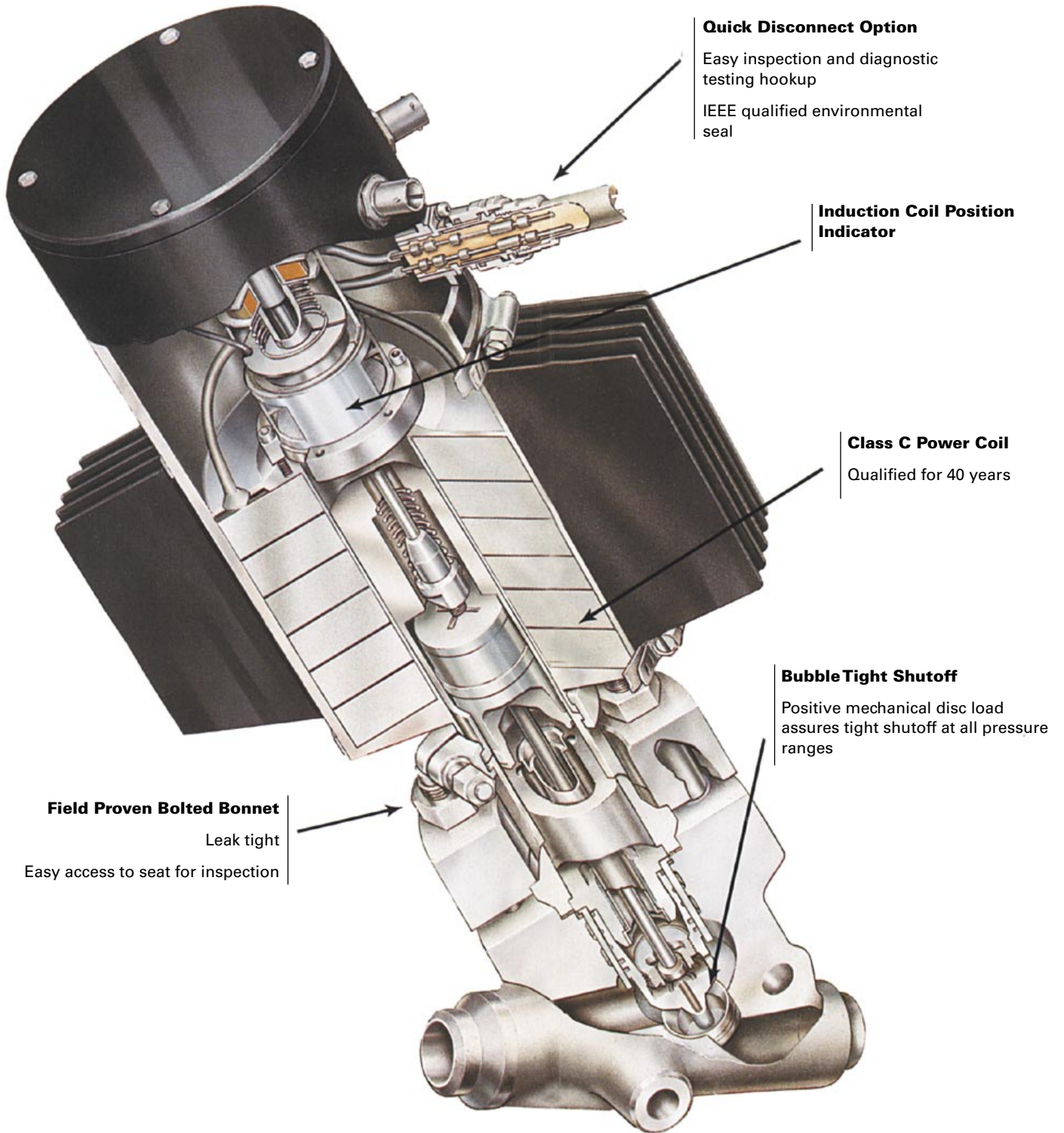
BENEFITS OF CCI - HERION SOLENOIDS

- Tight shutoff (>Class 6) is achieved with cobalt-free spherically ground seats.
- Induction coil position sensing system eliminates inaccurate position indication, erroneous signals to the control room, and frequently required adjustments and maintenance.
- Backpressure resistant single stage pilot design and optional 3-way pilot eliminate spurious valve opening and related concerns.
- Bolted-bonnet design - maintenance, if ever needed, can easily be accomplished while the valve remains welded in line. No bonnet seal weld. Seats are site replaceable.
- 40+ years qualified life
- Predictive maintenance is simplified through a unique diagnostic and trending system
- Can be retrofitted into existing conventional 2-way solenoid valves
- Can be installed in any orientation
- Factory parts and services are readily available.

MEETS STRINGENT PERFORMANCE AND QUALITY CRITERIA

- Available to ASME Section III, Class 1, 2, or 3 including N-stamp
- Qualified to IEEE 323, 344 & 382
- LOCA hardened: operates in ambient temperatures to 392°F and pressures to 225 psi
- Meets ANSI 2500 standard or special class
- Rated pressures to 2500 psi
- Rated medium temperatures to 668°F
- Meets ANSI B16.34 & B16.41
- Housing meet NEMA 4 and 12 requirements
- Outperforms ANSI B 16.104 standards for Class 6 leak rating

CCI - Herion Corrective action solution for NRC NUREG 1275 Volume 6



Quick Disconnect Option

Easy inspection and diagnostic testing hookup
IEEE qualified environmental seal

Induction Coil Position Indicator

Class C Power Coil

Qualified for 40 years

BubbleTight Shutoff

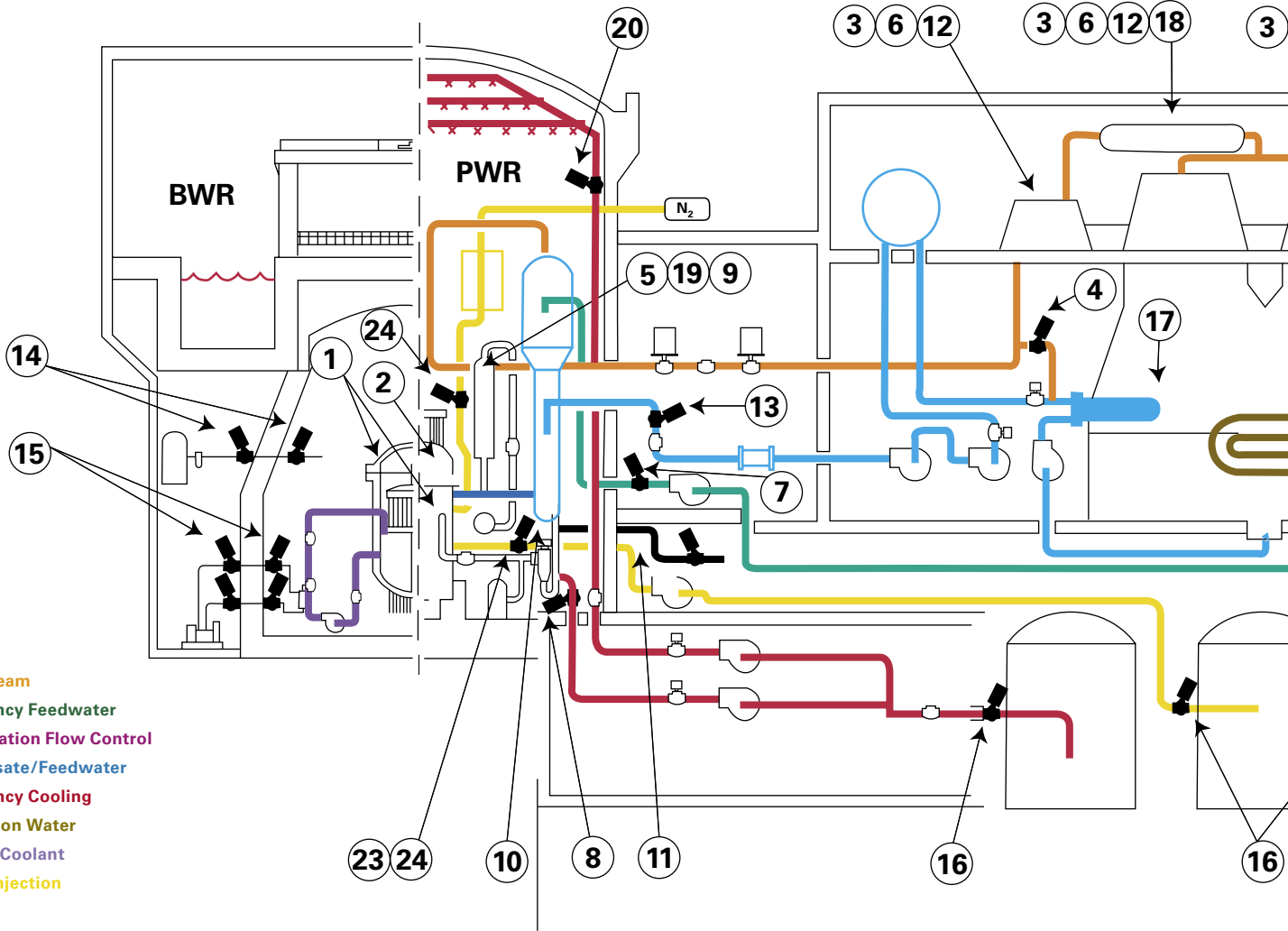
Positive mechanical disc load assures tight shutoff at all pressure ranges

Field Proven Bolted Bonnet

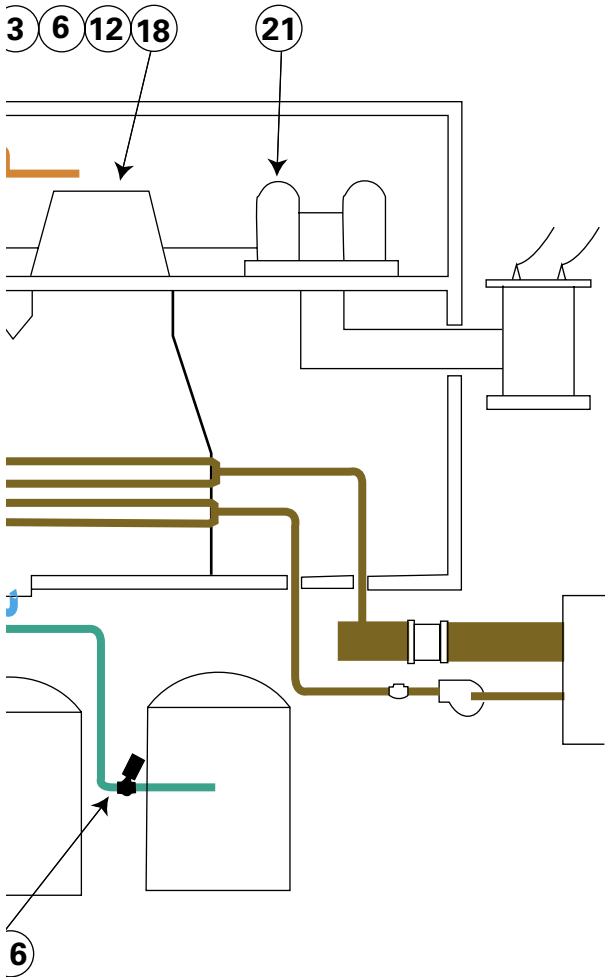
Leak tight
Easy access to seat for inspection

CCI - Herion Solenoid Valve

Process solenoid valve applications in nuclear plants



- | | | |
|--|---|--|
| 1. Reactor Head Vent | 12. Turbine Stop | 22. High Pressure Safety Injection (HPSI) |
| 2. Reactor Spray | 13. Feedwater Control | 23. Low Pressure Safety Injection (LPSI) |
| 3. Turbine Preheat | 14. Instrument Air Containment | 24. Chemical & Volume Control
- Diesel Generator Water Jacket |
| 4. Turbine Bypass | 15. Recirculation Flow Control | 25. Pilot Control (not shown) |
| 5. Pressurized Relief | 16. Emergency Cooling Water - Surge Tank | |
| 6. Turbine Auxiliary Feedwater Control | 17. Component Cooling Systems | |
| 7. Emergency Feedwater Inlet | 18. Turbine Auxiliary Feedwater Control | |
| 8. Emergency Cooling Water Inlet | 19. Pressurizer Spray | |
| 9. Reactor Pressurizer | 20. Containment Spray | |
| 10. Blowdown | 21. Generator Stator Water Cooling
- Demineralizer
- Hydrogen, Detraining | |
| 11. Post Accident Sampling System | | |



MEDIA

- Borated Water
- Boric Acid/Hydrazine
- Chromated Water
- Compressed Air
- Compressed Nitrogen
- Demineralized Water
- Hydrogen
- Saturated Steam
- Steam
- Super Heated Steam
- Waste Water
- Water

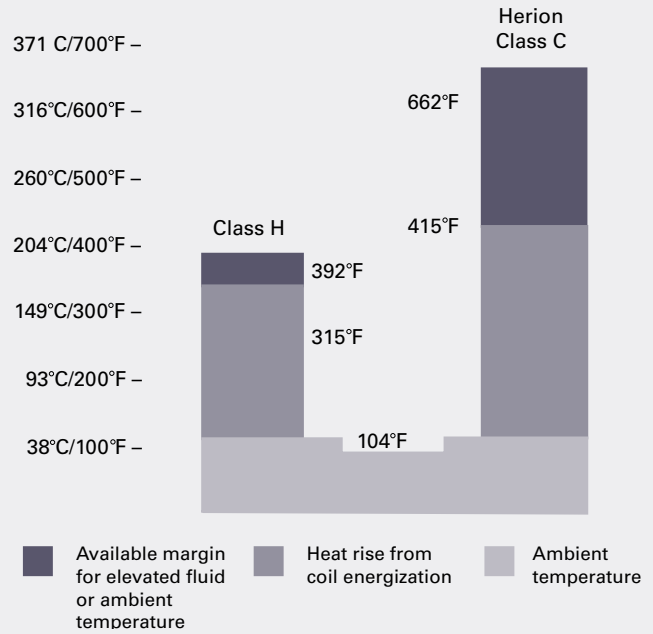


Figure 1: Heat Rise Margin Comparison
Class C vs Class H at 125 VDC, normally energized

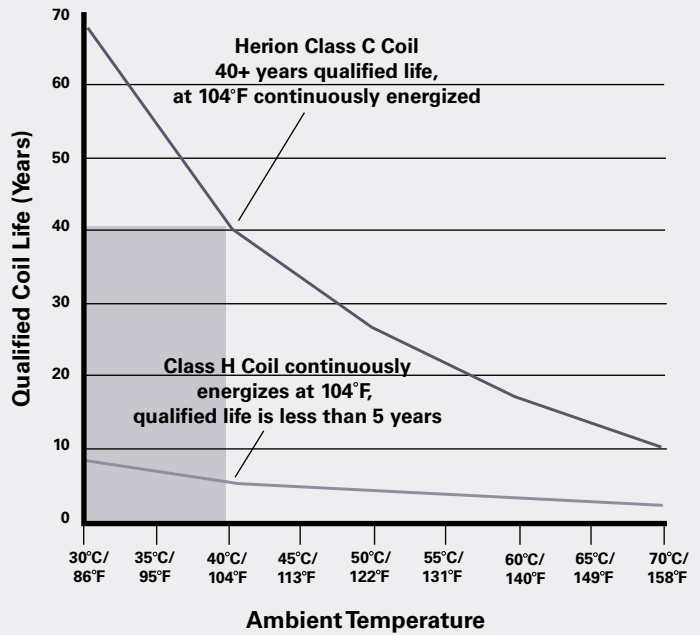
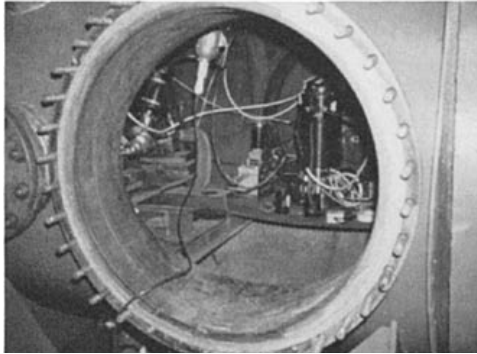


Figure 2: Coil Life Comparison
Class C vs Class H at 125 VDC, continuously energized

CCI - Herion solenoid valves... designed for reliability.



Herion valve installed in D.B.E. autoclave prior to start of first accident transient; 492°F at 65 psig external pressure.

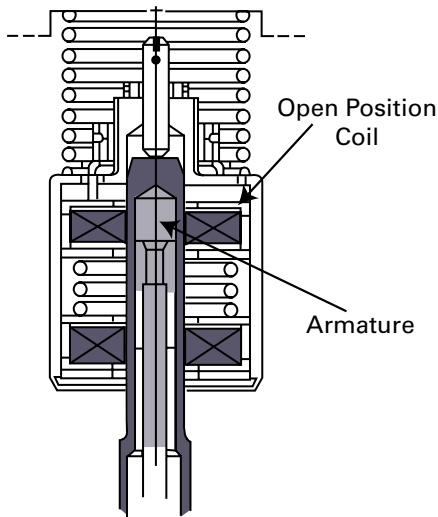


Figure 3: Induction Coil Position Indicator

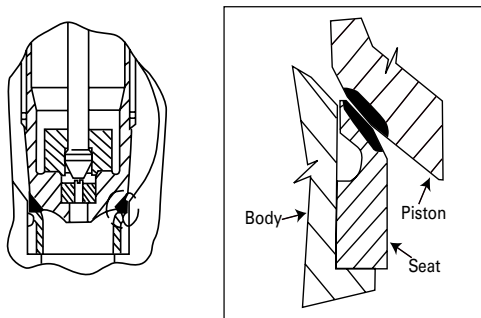


Figure 4: Bubble Tight Shutoff

LONG TERM DEPENDABILITY

Install CCI - Herion process valves for long term peace of mind. Our 40 year design life is based on:

- Conservative engineering, designed for constant energization.
- Accurate position indication unaffected by hostile ambient environments.
- Tight, reliable metal seal which outperforms Class 6 requirements even when some contaminants are present.
- Nuclear power plant installation track record of proven performance.
- Maintenance friendly design. All maintenance procedures are fast and easy resulting in minimal personnel exposure and improved ALARA conformance.
- 24 hour a day, seven days a week service support.

INDUCTION COIL POSITION INDICATOR

- Accurate, repeatable
- Free from thermal and vibration induced drift
- No electrical contacts
- No wear surface
- Nonmagnetic armature
- Remote fine adjustment

BUBBLE TIGHT SHUTOFF

- Energized seat
- Self-aligning (orbiting) disc
- Wear compensating
- Spherical contoured seat



This custom engineered process solenoid valve is machined from a solid 316 SS forging and features special flange bolting to accommodate rapid thermal and pressure changes, and to facilitate maintenance. It is installed in high pressure, safety related steam and condensate service.



A Herion 2-way process solenoid valve in spray valve application in a PWR plant.

CCI - HERION TECHNICAL DATA

- Qualified in accordance with IEEE 382, 344, 323
- Normal radiation: 70 MEGARADS
- Thermal aging: 40 years @ 104°F, continuously energized
- Environmental aging
 - Pressure aging 15 external cycles to 65 psig.
 - Wear aging (total) 5000 cycles
 - Vibration aging 90 minutes, in each of 3 axes
- Seismic testing:
 - O.B.E. sweeps open/closed @ 3.0 gs
 - S.S.E. sine beat @4.5 gs
- Accident radiation: 130 MEGARADS
- Loss of coolant (D.B.E.), IEEE Case IV

DESIGN SUMMARY

- Built to ASME Section III, Class 1, 2, 3
- "N" stamped as required
- ANSI pressure classes, 150-2500#
- Available for normally open or normally closed
- Cobalt-free seat and other wear parts
- 125 VDC
- Standard sizes, 3/8" - 4"
- ANSI B16.104 Class VI tight shutoff
- Field replacement seat
- Class C high temperature rated power coil (662°F)
- Remote mounted (mild environment) electrical control box with position signal amplifier

OPTIONS

- Spurious opening prevention, internal check valve
- IEEE qualified quarter turn connectors
- SOLVE diagnostic connection
- Reactor head vent "cluster" manifold
- Direct acting configuration
- Socket weld, butt weld, and flanged pipe connect
- Retrofit of conventional 2-way solenoid valves

Table 2: Technical Information

Sizes and Dimensions: Butt weld and socket weld valves

Valve Size		Dimensions (inch/mm)			Weight (Approx.) Class 600 - 2500		
Inches	mm	A	B	C	Lbs	Kg	Cv
1/2"	15	7.87" 200	14.5" 368	5.9" 150	40	18	3.0
3/4"	20	7.87" 200	14.5" 368	5.9" 150	40	18	3.5
1"	25	7.87" 200	15.77" 400	6.97" 177	44	20	14
1 1/4"	32	13.5" 349	19.83" 504	4.26" 108	84	38	22
1 1/2"	40	13.75" 349	19.83" 504	4.26" 108	84	38	38
2"	50	17.75" 451	27.8" 706	6.13" 156	203	92	50
3"	75	18.0" 457	30.1" 764	14.2" 360	420	191	95
4"	100	18.0" 457	35.5" 902	18.0" 457	550	250	140
6"	150	27.27" 692	38" 965	15.5" 393	950	432	210

A = Face to face dimension

B = Height from center of port

C = Distance from inlet port to vertical line of housing

A + C = Total horizontal space

Table 3: Characteristics

Electrical		Mechanical	
Wattage	≈ 410 Watts*	Media	Radioactive steam, water, and gasses
Voltage	125 VDC +10 %/-15 % AC available	Pipe Connections	Socket, butt weld or flanged
Amplifier	24 VDC or Optical 125 VDC	Max. Fluid Temp.	362°C/683°F
Coil Insulation	Class C 350°C/668°F	Operation	Direct acting 0 psid required
Position Indication Cables	Shielded copper/stranded 260°C/500°F	Continuous Ambient Temp.	150°F
Operation	Continuous Duty	Maximum Seat Leakage	5.9 cm ³ /minute bubble leak test
Qualification	IEEE 323, 344, 382	Maximum External Leakage	5.9 x 10 ⁻⁵ cm ³ /min. helium leak test
		Safety Class	ASME Section III, Class 1, 2, 3
Drop Out Voltage	10% at 0ΔP	System Pressure	To 2500 psi
Design Life	40 Years	Design Life	40 Years

* Consult for each application

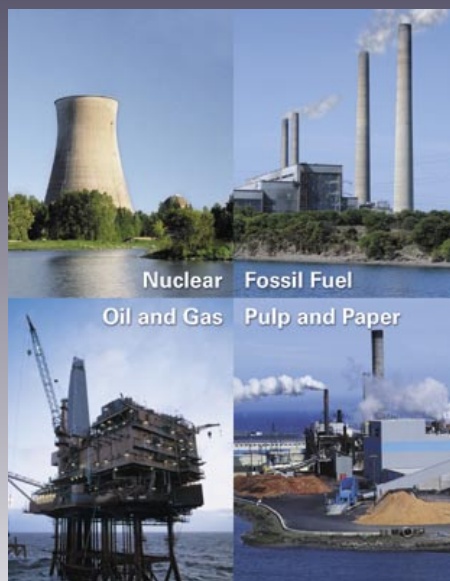


We Solve Control Valve Problems



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