

---

# VALVE SOLUTIONS FOR CHLOR-ALKALI PROCESS



# CHLOR-ALKALI PROCESS VALVE SOLUTIONS



## PRODUCTS PRODUCED BY THE CHLOR-ALKALI INDUSTRY ARE USED IN MANY AREAS OF OUR SOCIETY

<b>Water</b>	<b>Household Disinfectant</b>	<b>Food</b>
<b>Healthcare</b>	<b>Energy &amp; Environment</b>	<b>Advanced Technology</b>
<b>Building &amp; Construction</b>	<b>Defense &amp; Law Enforcement</b>	<b>Transportation</b>



**GLOBAL MARKET**  
500+ Producers and 650+ Facilities

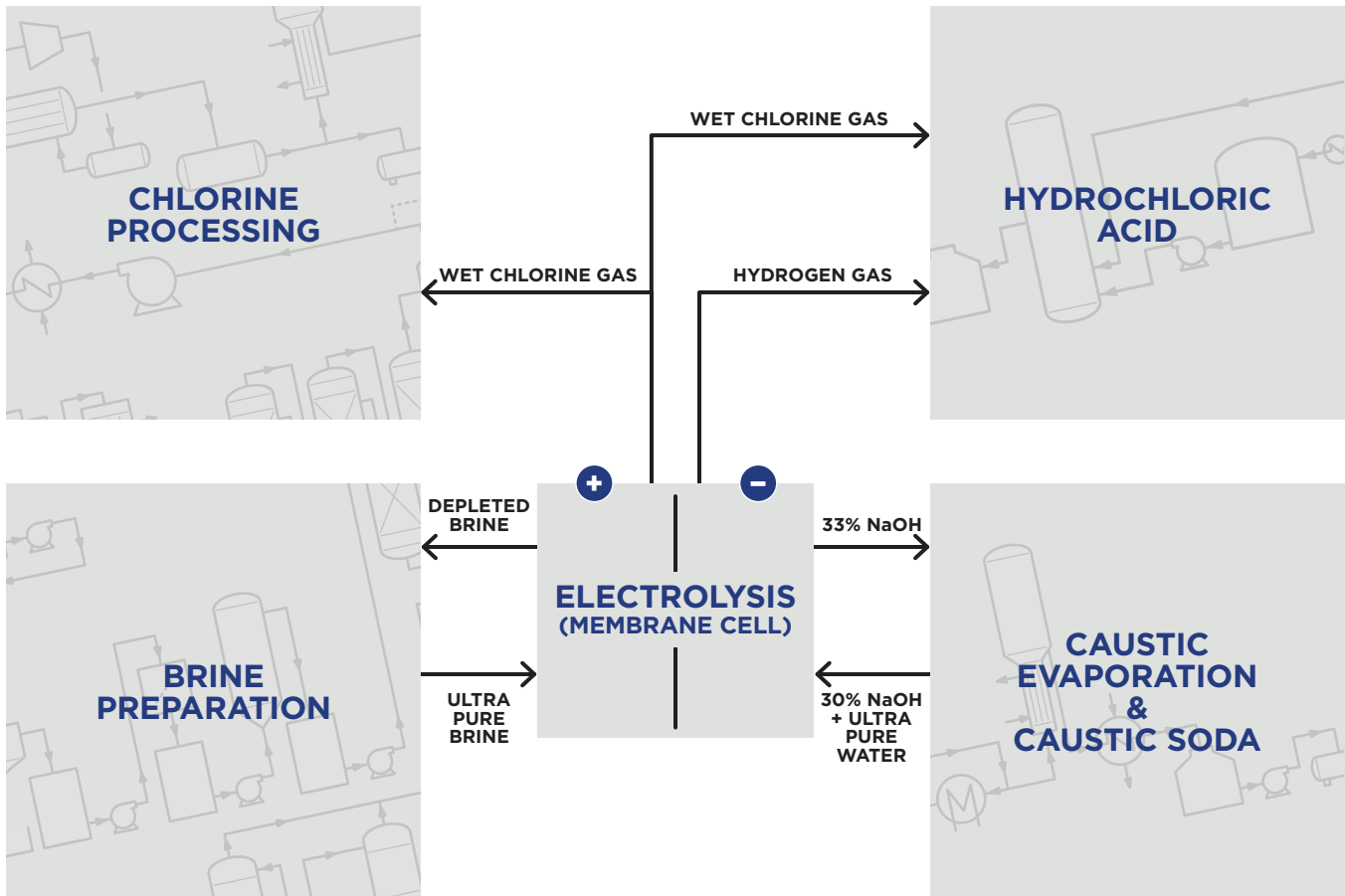
---

**GLOBAL PRODUCTION CAPACITY**  
64 Million Short Tons per Year (58 Million Metric Tons per Year)

---

**PRIMARY PRODUCTION CONCERNS**  
Safety | Environmental Protection | Lower Overall Cost of Ownership

**CHLOR-ALKALI PROCESS OVERVIEW (MEMBRANE)**



**THE PROCESS AND BENEFITS**

The **chlor-alkali process** starts with saturated brine — water with a high concentration (310 grams per liter) of dissolved salt (sodium chloride) at 180°F (82 °C). By comparison, sea water contains (35 grams per liter) of dissolved salt.

An **electrolytic reaction** then splits the saturated brine into **chlorine gas, hydrogen gas & caustic** (sodium hydroxide).

Three kinds of technologies are used to produce these products:

- > **Mercury cell** (almost obsolete)
- > **Diaphragm** (lower efficiency; higher costs to maintain)
- > **Membrane** (most energy efficient; replacing other technologies)

Common uses for the **chlorine molecule**:

- |                          |                               |
|--------------------------|-------------------------------|
| > Water purification     | > Advanced technology         |
| > Household disinfectant | > Building and construction   |
| > Food                   | > Defense and law enforcement |
| > Healthcare             | > Transportation              |
| > Energy and environment |                               |

Common end use applications for **caustic soda**:

- |                                       |                            |
|---------------------------------------|----------------------------|
| > Cooking wood chips in paper mills   | > Drain cleaners           |
| > Viscosity control of drilling mud   | > Detergents               |
| > Sanitizing equipment in food plants | > Bleaching & disinfection |
|                                       | > Weed killers             |
|                                       | > Water treatment          |

Common use for **hydrogen**:

- |                              |                                |
|------------------------------|--------------------------------|
| > Zero carbon emissions fuel | > Hydrogenation of fats & oils |
| > Nitrogenous fertilizers    | > Production of HCL            |

## ACRIS<sup>®</sup> VALVES SOLVE COMMON PROBLEMS IN CHLOR-ALKALI PROCESSES

- > LOW FLOW RATES
- > SHAFT LEAKAGE
- > SEAT LEAKAGE
- > SCALING
- > INTERNAL CORROSION
- > TORQUE INCREASE
- > ABRASION
- > RIGID LINER COLD FLOW
- > EROSION
- > PERMEATION
- > LINER FAILURE
- > OPERATIONS UNCERTAINTY

Acris<sup>®</sup> PFA/MPFA lined butterfly, PFA lined ball and check valves offer unsurpassed resistance to corrosion, permeation, and microbial contamination — for maximum purity and reliability, with minimal maintenance.

Engineered for bidirectional zero leakage shut/off, Acris<sup>®</sup> fully PFA/MPFA lined butterfly and PFA lined ball valves are the high performance solution for critical applications. PFA lined check valves provide tight shut-off per BS EN 12266-1.

### AMRESIST ACRIS<sup>®</sup> PFA/MPFA LINED BUTTERFLY VALVES

#### SPECIFICATIONS

##### Size Range

NPS 1 to 24 | DN 25 to 600

##### Temperature Range

-20°F to 320°F (-29°C to 160°C)

##### Pressure Rating

Up to 150 psi | Up to 10 bar

##### Body Style

Two-piece | Wafer, Lug

##### End of Line Service

Enables downstream dismantling at full working pressure, due to:

- > Wide elastomer backup liner secured in machined body groove
- > Oversized 17-4 stainless steel shaft
- > Flexible PFA liner



PFA/MPFA LINED  
17-4 STAINLESS STEEL  
SHAFT AND DISC



OPTIONAL  
TITANIUM GRADES 2 & 7  
SHAFT AND DISC

### AMRESIST ACRIS<sup>®</sup> PFA LINED BALL VALVES

#### SPECIFICATIONS

##### Size Range

NPS ½ to 8 | DN 15 to 200

##### Temperature Range

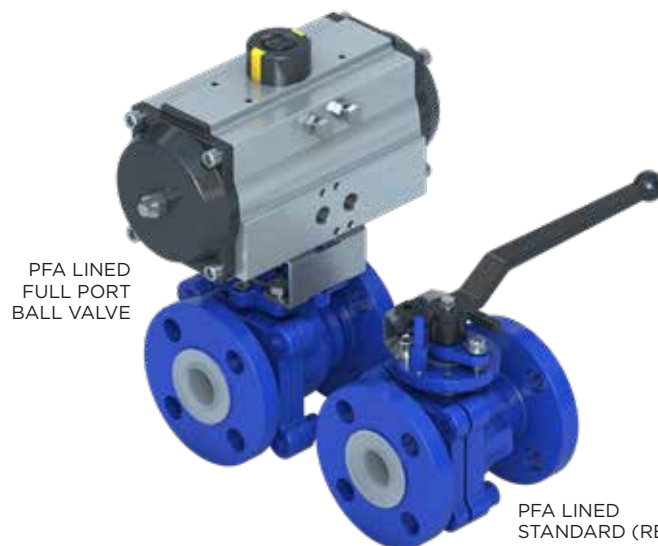
-49°F to 400°F (-45°C to 204°C)

##### Pressure Rating

Up to 250 psi | Up to 17 bar

##### End Connections

Two-piece | Flanged



PFA LINED  
FULL PORT  
BALL VALVE

PFA LINED  
STANDARD (REDUCED) PORT  
BALL VALVE

**AMRESIST**

**PFA Lined Ball Check Valve (BCV)**

**SPECIFICATIONS**

**Size Range**

NPS ½ to 8 | DN 15 to 200

**Temperature Range**

-49°F to 400°F (-45°C to 204°C)

**Pressure Rating**

Up to 225 psi | Up to 15.5 bar

**End Connections**

Two-piece | Flanged



**AMRESIST**

**PFA Lined Piston Check Valve (PCV)**

**SPECIFICATIONS**

**Size Range**

NPS ½ to 8 | DN 15 to 200

**Temperature Range**

-49°F to 400°F (-45°C to 204°C)

**Pressure Rating**

Up to 225 psi | Up to 15.5 bar

**End Connections**

Two-piece | Flanged



**AMRESIST**

**PFA Lined Swing Check Valve (SCV)**

**SPECIFICATIONS**

**Size Range**

NPS 2 to 18 | DN 50 to 450

**Temperature Range**

-49°F to 400°F (-45°C to 204°C)

**Pressure Rating**

Up to 225 psi | Up to 15.5 bar

**End Connections**

Wafer



**PROBLEM | LOW FLOW RATES**

**POSSIBLE EFFECTS**

- > Lower pump efficiency
- > Lower production output
- > Engineering design requires larger lines
- > Increased construction costs
- > Higher line velocity
- > Increased erosion

**LOW FLOW RATES | SOLVED**

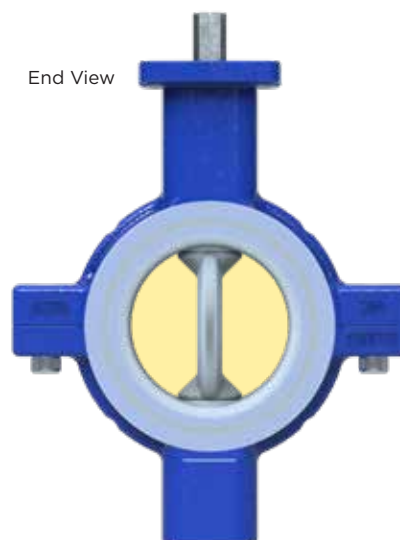
**High Strength Core**

- > A high strength 17-4 stainless steel, one-piece shaft-disc is at the core of the PFA/MPFA disc.
- > The high strength core allows for a low-profile, high-flow disc design.

**High-Flow Design Benefits**

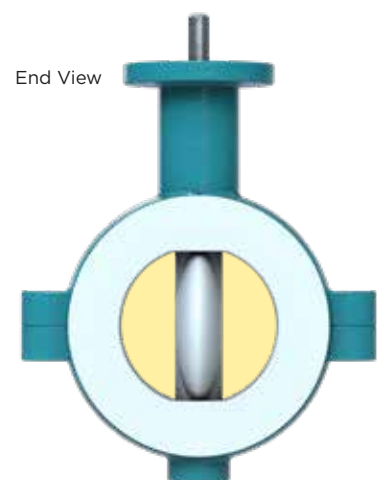
The high-flow design offers many benefits, such as:

- > Increased pump efficiency.
- > Increased production.
- > Lower line velocity.
- > Lowers erosion effects.
- > May allow the use of smaller line sizes.



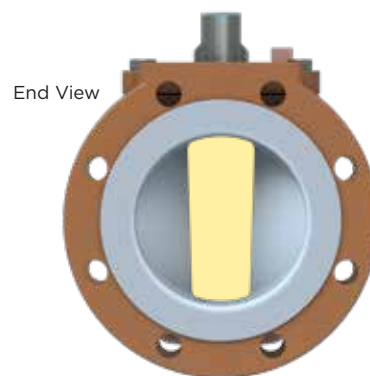
End View

ACRIS® LOW-PROFILE DISC  
ALLOWS HIGHER FLOW RATES.



End View

LARGE DISC PROFILE  
OF COMPETITORS  
LOWERS FLOW RATES.



End View

TYPICAL PLUG VALVES HAVE HIGHER  
FLOW RESTRICTIONS, RESULTING IN  
LARGER VALVES TO ACHIEVE  
REQUIRED FLOW RATES.

## PROBLEM | SHAFT LEAKAGE

### POSSIBLE EFFECTS

- > Shaft & bearing corrosion
- > Higher valve torque required
- > Loss of fine process control
- > Difficulty operating valve
- > Shaft breakage
- > Inability to isolate equipment
- > Inability to perform maintenance
- > Operations uncertainty
- > Unscheduled down time
- > More frequent shutdowns
- > Personnel safety/exposure
- > Recordable releases
- > Regulatory fines
- > Required use of exotic metal shaft/disc

### TYPICAL ACRI BUTTERFLY SPECIFICATION.

#### For valves located on the electrolyzer:

- > Butterfly
- > Ductile Iron Lug body- Epoxy Coated
- > MPFA Liner
- > MPFA over-molded one piece 17-4 SS Shaft/Disc
- > FKM Backup Liner
- > Filled PTFE Safety Seals-Spring Loaded
- > Spherical Disc and Liner Interface
- > PTFE / SS Sleeve Bearings
- > A193 B7-Xylan Coated Body Bolts
- > Cleaned and Packaged for Chlorine Gas Service
- > API-609 Face to Face
- > Acris IL- 31gG/S9C

#### For valves located outside the electrolyzer:

- > Butterfly
- > Ductile Iron Lug body- Epoxy Coated
- > PFA Liner
- > PFA over-molded one piece 17-4 SS Shaft/Disc
- > FKM Backup Liner
- > Filled PTFE Safety Seals -Spring Loaded
- > Spherical Disc and Liner Interface
- > PTFE / SS Sleeve Bearings
- > A193 B7-Xylan Coated Body Bolts
- > API-609 Face to Face
- > Acris IL- 31kF/S9-B7

## SHAFT LEAKAGE | SOLVED

### Acriseal™ Stem Sealing System

Precision engineered for reliable, maintenance-free service, the Acriseal three-step stem sealing system provides unmatched sealing for long term zero leakage performance.

#### Primary Seal (1)

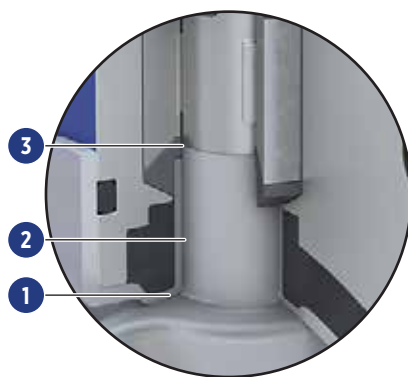
The primary seal is created by the spherically molded PFA/MPFA body liner and matching disc hub interface. The energized backup liner maintains tight contact pressure for consistent shutoff in high cycle applications.

#### Secondary Seal (2)

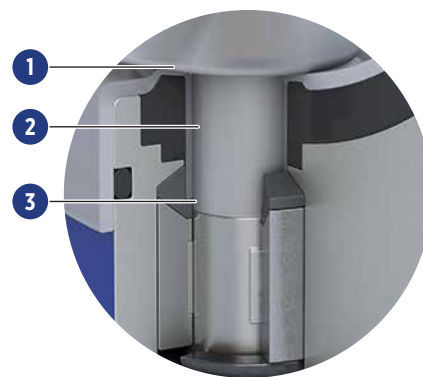
An independent secondary seal is formed by the extended body and disc liners. The flexible PFA/MPFA body liner extends into the stem cavity and the disc liner envelops the stem. The resulting protective sleeve eliminates potential leak paths for fugitive emissions and shields internal components from contact with the media. This feature works in conjunction with the tertiary safety seal to ensure compliance with ISO 15848-1 standards for fugitive emissions.

#### Safety Seal (3)

The third sealing mechanism is a graphite filled PTFE safety seal. Completely isolated from the process media by the extended disc liner, and energized by a coil spring, the safety seal self-adjusts for changes in temperature and wear to ensure absolute zero leakage shutoff of corrosive and ultra pure process media.



UPPER SHAFT SEALING



LOWER SHAFT SEALING

## PROBLEM | SEAT LEAKAGE

### POSSIBLE EFFECTS

- > Chemical cross contamination
- > Brine cross contamination
- > Untreated brine feed into electrolyzer
- > Reduced membrane efficiency
- > Lower electrolyzer output
- > Lower NaOH, H<sub>2</sub>, and Cl<sub>2</sub> production
- > Inability to isolate equipment
- > Inability to perform maintenance
- > Operations uncertainty
- > Unscheduled down time
- > More frequent shutdowns

### SEAT LEAKAGE | SOLVED

#### Reliable Upstream/Downstream Sealing

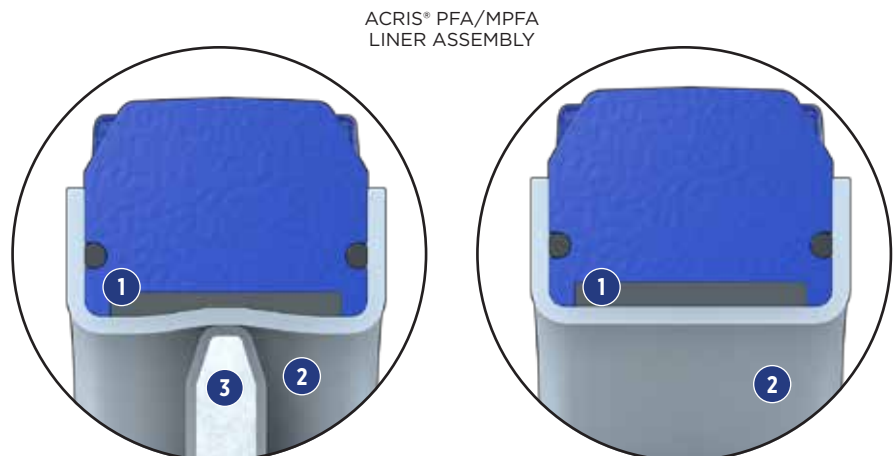
The elastomer backing (1) compresses the flexible PFA/MPFA lining (2) around the leading edge of the disc (3) to provide zero leakage for many years of service.

#### Flexible PFA/MPFA Liner

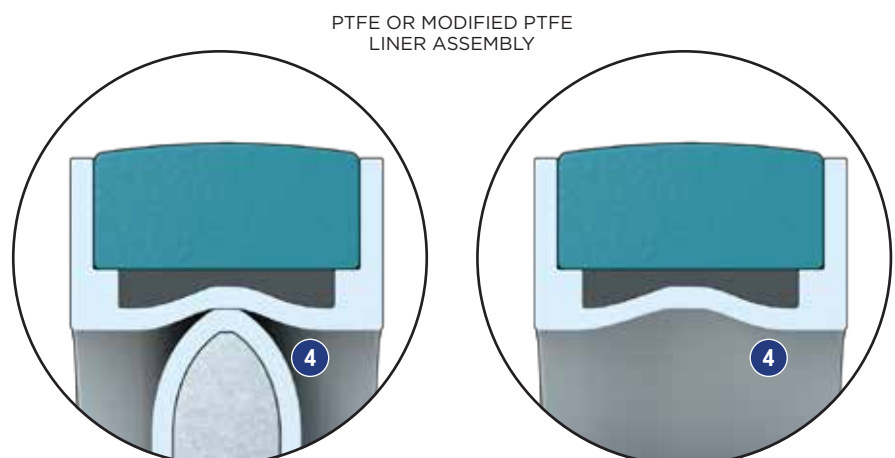
The PFA/MPFA liner (2) remains flexible, never becoming stiff & rigid. This is in contrast to PTFE & Modified PTFE liners (4), which are usually thick sinterings — resulting in a stiff liner, unable to give tight shutoff over a long period of time.

#### Elastomer Backup Liner

The wide FKM elastomer backup liner (1) in the ACRIS<sup>®</sup> valve rests in a machined body groove, which is essential in providing tight shutoff for end of line service at full pressure. This has enabled the ACRIS<sup>®</sup> to be used for pump & vessel isolation, as well as many other difficult services.



Flexible liner returns to original shape, resulting in long-term reliable sealing.



Rigid liner retains shape of disc, resulting in unreliable sealing.

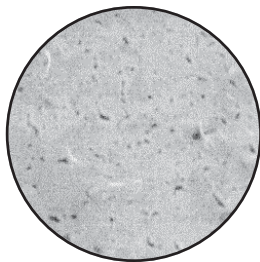
**ADVANTAGES OF AMRESIST ACRIS® PFA/MPFA LINER MATERIAL**

**PFA/MPFA MATERIAL**

- > Starts as pellets.



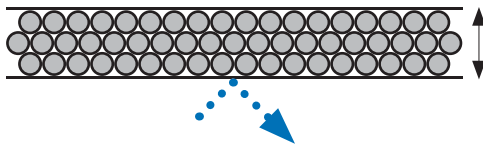
- > Melted and molded, forming mechanical + chemical bond.
  - > Dense material is spared of voids and air pockets.



10,000X magnification shows minimal voids or air pockets.



- > Dense material creates effective barrier to chemical migration and cold flowing.



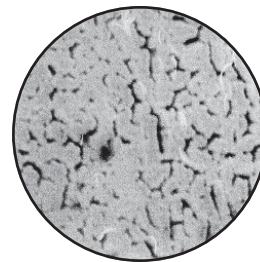
Cross-section of PFA/MPFA material.

**PTFE MATERIAL**

- > Starts as powder.



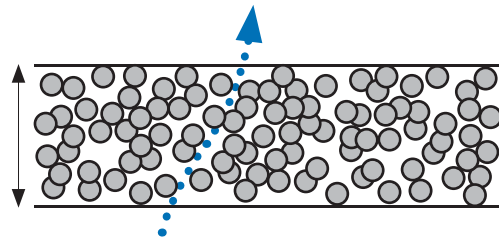
- > Mechanically formed (sintered), not melted.
  - > Porous material is filled with air channels and pockets.



10,000X magnification shows significant voids and air pockets.



- > Porous material creates less effective barrier to chemical migration and cold flowing.



Cross-section of PTFE material.

**AMRESIST ACRIS® RESULTS**

- > PFA/MPFA liner is inherently more flexible than PTFE & Modified PTFE.
- > Flexible PFA/MPFA liner will never take a permanent set.
- > Maintains tight shutoff.

**COMPETITOR RESULTS**

- > PTFE & Modified PTFE liners are thick and rigid.
- > Rigid liners will take a permanent set impression from the disc edge.
- > Less effective shutoff.

**ACTUATORS BY AMRESIST**



**C SERIES**  
Aluminum Body (Standard Sizes)

**SPECIFICATIONS**

**Torque Output Range (Double Acting)**  
55 to 115,250 lbf-in  
6 to 13,022 N m



**SERIES 98**  
Scotch Yoke (Large Sizes)

**SPECIFICATIONS**

**Torque Output Range (Double Acting)**  
10,621 to 885,100 lbf-in  
1,200 to 100,000 N m



**AA SERIES**  
Stainless Steel Body

**SPECIFICATIONS**

**Torque Output Range (Double Acting)**  
55 to 55,883 lbf-in  
6 to 6,314 N m

**CONTROL ACCESSORIES BY AMRESIST**



**POSITIONERS**  
VAC V200



**GEAR OPERATORS**  
Series XHW

**CONTROL ACCESSORIES BY BRAY**



**POSITIONERS**  
Series 6A



**PROXIMITY SENSORS**  
Series 54



**VALVE STATUS MONITORS**  
Series 5A, 5B, 5C

---

DISCOVER HOW ACRIS® VALVES INCREASE RELIABILITY AND REDUCE TOTAL COST OF OWNERSHIP FOR YOUR CRITICAL APPLICATIONS.

VISIT [AMRESIST.COM](https://www.amresist.com) TO LEARN MORE ABOUT PRODUCTS AND LOCATIONS NEAR YOU.

## HEADQUARTERS

2045 Silber Road  
Houston, Texas 77055  
Tel: +1.713.682.0000

All statements, technical information, and recommendations in this bulletin are for general use only. Consult your Amresist representative or factory for the specific requirements and material selection for your intended application. The right to change or modify product design or product without prior notice is reserved. Patents issued and applied for worldwide. Amresist® and Acris® are registered trademarks of Bray International, Inc.

© 2026 BRAY INTERNATIONAL. ALL RIGHTS RESERVED. BRAY.COM

EN\_OVW\_Amresist\_ChlorAlkali\_20260318

---



As members of the Chlorine Institute, Amresist is committed to promoting best practices for safe production, handling, and distribution of chlorine and related products.

**Amrēsist**®  
A Bray Company

[WWW.AMRESIST.COM](https://www.amresist.com)