



## Valve Actuators for the Nuclear Market

### Introduction

R.A. Hiller is a well established global supplier of valve actuators for the nuclear power industry. Our range of offerings include products for all pneumatic, hydraulic and electro-hydraulic actuation requirements, including linear and rotary applications.

With an extensive installed base in safety and non-safety related applications in plants utilizing either pressurized water or boiling water type reactors, R.A. Hiller has the expertise to design and support your project.

### Company Timeline

**1950** Hiller established in Pittsburgh, Pennsylvania USA as a distributor for various fluid power products

**1962** Designed the company's first valve actuation products

**1966** Began supplying actuators for use in commercial nuclear power plants

**1972** Main Steam Isolation Valve (MSIV) actuator testing by Institute of Electrical Engineers (IEEE) completed successfully

**1976** 38 inch MSIV actuator testing

**1992** Moved to facility in Export, Pennsylvania

**2000** Advanced Boiling Water Reactor (ABWR) IEEE MSIV actuator qualification

**2005** NGC product range qualified to IEEE/Rules of Design and Construction of Electrical Equipment (RCCE)

**2010** NGP product range qualified to IEEE/AP1000

**2015** NGC MSIV Actuator for Gen 3/3+ reactors

**2018** Hiller became part of Weir Flow Control. Moved to a new facility in McKeesport, Pennsylvania

**2019** Weir Flow Control separated from The Weir Group Plc. and rebranded as Trillium Flow Technologies™

### Applications

- Main steam isolation valves (MSIVs)
- Main feedwater isolation valves (MFIVs)
- Hardened containment vent valves (HCVV)
- Heating, Ventilation and Air Conditioning (HVAC)
- Balance of plant - non-safety related applications

### Quality Assurance Program

Hiller products are certified to the following quality standards:

- ISO 9001
- ANSI N45.2
- 10 CFR50 Appendix B
- ASME NQA-1
- Accept 10CFR21
- Auditing services
- Inspection services
- Regularly audited by Nuclear Procurement Issues Committee (NUPIC) and Nuclear Industry Assessment Committee (NIAC)

### Engineering

- Design engineering
- Installed design base review
- Finite element analysis
- Obsolete actuator support





## Nuclear Valve Actuators

Hiller designs custom solutions to meet customer supplied specifications, typically based on a previously qualified product. This evolutionary design approach facilitates a tried and true cost effective solution.

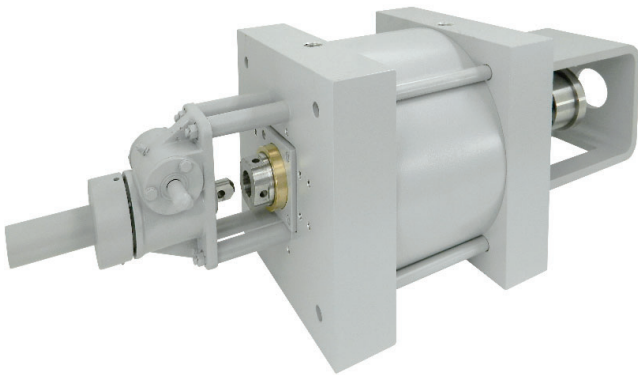
All Hiller valve actuators include the following features. Features that are unique to each range are included under individual product listings.

### All Hiller Actuators

Qualified in accordance with IEEE 323/344/382 as well as recent plant specific requirements for the latest generation of reactors.

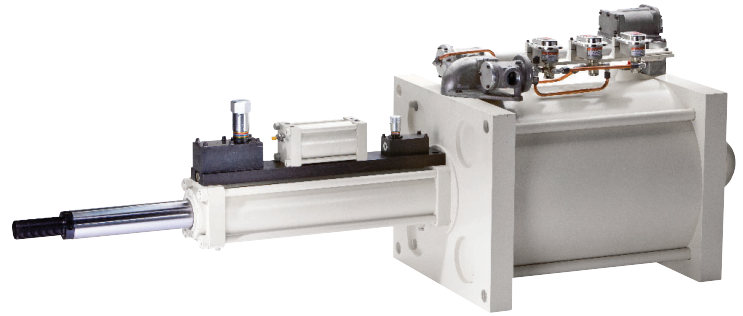
- Suitable for safety related or non-safety related or active or passive duty applications
- Design life of up to 60 years
- Isolating or modulating duty (on-off or positioning)
- Mounting specifically to the valve
- Custom control solutions tailored to suit each application
- CE marking/compliance to European directives (optional)
- Adjustable travel stops
- Manual override options

### Linear Pneumatic Actuators



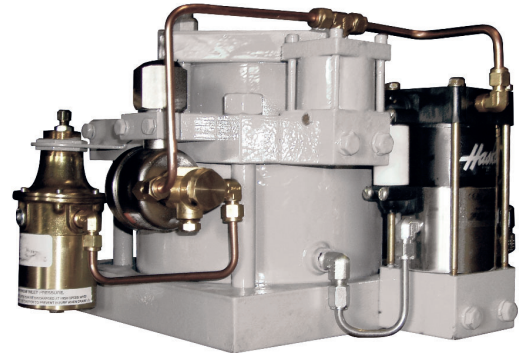
- Single or double acting options available
- Dual piston design available to reduce cylinder bore diameter for installation where space is limited
- Failsafe via internal spring or accumulator available
- Low, medium and high pressure designs
- Maintenance life up to 12 years
- Suitable for gate and globe valves and dampers

### Tandem Linear Pneumatic Actuators



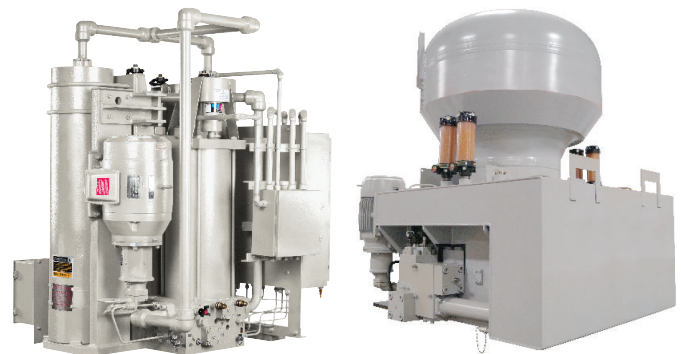
Tandem linear pneumatic actuators include all the features of our linear pneumatic actuators with the addition of a hydraulic cylinder to facilitate precise and repeatable speed control.

### Linear Hydraulic Actuators



Linear hydraulic actuators include all the features of our linear pneumatic actuators, but can provide greater thrust output. They can be designed to accept power supply pressures up to 35 bar (5,000 psig). Hydraulics also have the benefit of providing precise speed control.

### Gas Charged Linear Hydraulic Actuators

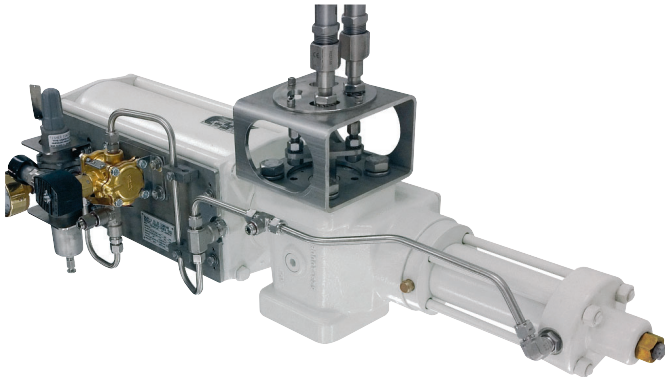


Gas charged linear hydraulic actuators are self-contained hydraulic actuators with integral nitrogen storage to provide a fast failsafe stroke. They are typically used for MSIV and MFIV applications.



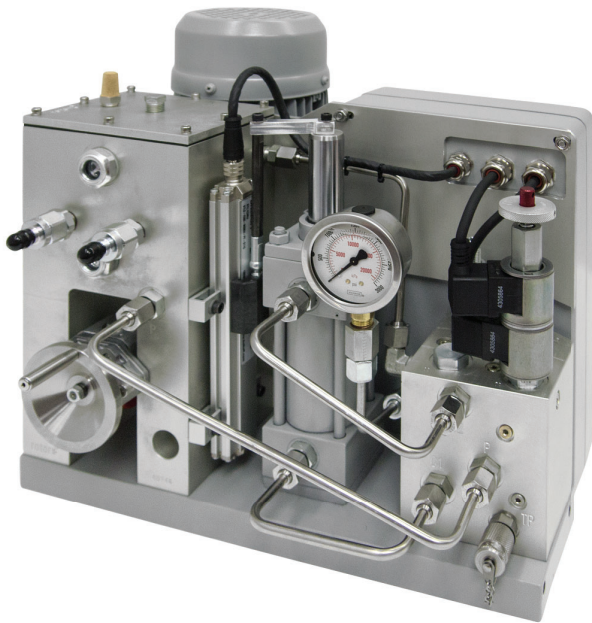
## Nuclear Valve Actuators

### Rotary Pneumatic Actuators



- Rugged yet compact quarter-turn ( $90^{\circ} \pm$ ) scotch yoke designs in single and double acting configurations
- Maintenance life of up to 12 years
- Failsafe via internal spring or accumulator available
- Suitable for ball, plug, butterfly valves and dampers

### Electro-Hydraulic Actuators



- Linear or rotary output motion designs
- Hydraulic power packs (pump, motor, reservoir, etc)
- Can be adapted to suit any electrical power supply (DC, single phase AC or three phase AC)
- Can be mounted in any orientation (per customer specification)
- Compact and light, yet rugged design
- Balance of plant - non-safety related applications

### Qualified Actuation Accessories

These accessories can be locally mounted to the actuator, remotely mounted or supplied separately for use with previously installed actuators

#### Control

- Solenoid operated valves
- Pilot operated valves
- Speed control
- Positioners
- Accumulators

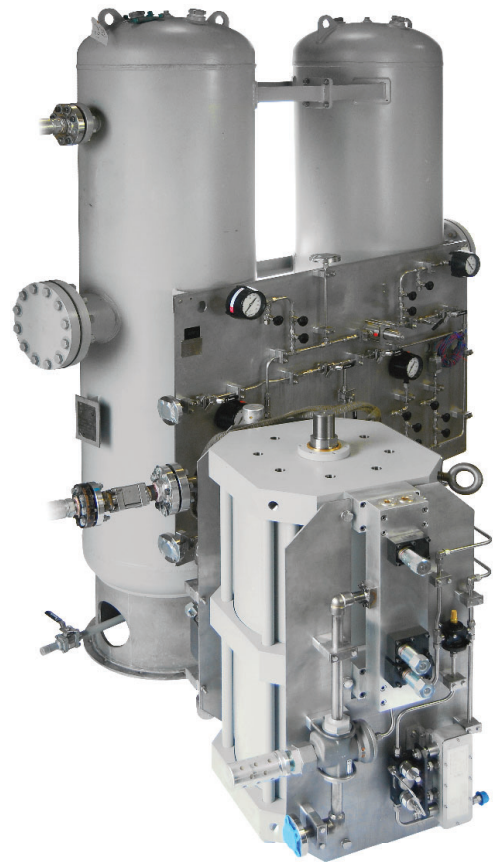
#### Indication

- Limit switches
- Proximity switches
- Pressure switches
- Local position

#### Protection

- Filtration
- Pressure regulation
- Pressure relief

*This is a partial listing. Additional accessories available.*





## Nuclear Valve Actuators

### AFTER SALES AND TECHNICAL SUPPORT

#### Rebuild Program

- Fully equipped workshop which allows us to rebuild all Hiller actuator models in-house
- System upgrade and modification
- Failure analysis and repair
- Calibration, testing and certification
- Long term storage with periodic functional testing
- Customized actuator shipping/storage containers
- Decontamination of “hot” actuator
- Paintings/coatings up to Level 1 requirements

#### Spares

- \$1.5 million USD in spare parts inventory
- All suppliers are regularly audited and approved
- OEM actuator repair kits and actuator components
- Certified genuine OEM spares
- Fast track delivery options

#### Technical Support

Our specialist team of engineers and qualified technicians are available to provide assistance and support through all phases of your project, either on-site or at our facility.

#### In-house

- Basic training on all Hiller products
- Preventative maintenance training
- Spare parts inventory management
- Actuator drawing and manual updates
- Actuator design and modification
- Engineering evaluation of obsolete parts for replacement

#### On-site

- Facility walk-down
- Pre-outage inspection

- Start-up commissioning support
- Plant upgrade feasibility studies
- Failure analysis support
- Installation and maintenance support
- Product training

#### Storage and Maintenance Program

- Store and maintain actuator(s) in a segregated facility area
- Register and document each unit from receipt to return
- Maintain storage condition requirements in accordance with the actuator maintenance manual
- Periodic cycling per customer specification and Hiller engineering procedure
- Provide actuator certification and test data
- Release actuators back to plant on short notice
- Ensure actuator maintenance life is not diminished
- Ensure operational readiness

It is our recommendation that all actuators are stored in IP-1 rated containers, which we can supply, custom built to your specific actuator model. These actuator containers are made to safely store and protect the unit from dirt, fumes, moisture and particle contamination. Containers are available for storage in either horizontal (safe ship) position or vertical (upright to minimize seal set) position. These containers can also be used to ship contaminated (“hot”) units to a decontamination facility.

#### Our storage plan includes the following components:

- All equipment required to complete maintenance testing
- Bolted and sealed blanking plates for all actuator openings
- Dessicant breather system to remove moisture contaminants from the air system
- Replacement dessicant for the duration of storage

- Exposed surface protection for the piston rod and other critical surfaces
- Air control circuit port plugs

### QUOTE REQUEST AND ORDERING INFORMATION

The following must be provided for us to bid or process an order for a nuclear reactor.

#### General

- Project details: plant, utility, Nuclear Steam Supply System (NSSS) supplier, contractor
- General specification
- Reactor type
- Supply pressure
- Environmental conditions
- Required delivery date
- Documentation requirements
- Required safety factor for sizing calculations

#### For Each Actuator

- Valve type
- Valve stroke
- Valve stem details
- Valve yoke details
- Valve torque/thrust requirement
- Valve data sheet
- Valve location in plant
- Is the actuator safety related?
- Is the actuator active or passive?
- Seismic requirements
- Control requirements

#### For Spares

- Part number
- Part description
- Quantity
- Are items for a commercial or a safety application?
- Certification requirement
- Actuator model number
- End user



## Hiller Nuclear Valve Actuators

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