Differential Piston Control Valves
Pressure, Level and Flow Control
A Century of Experience
VAG GA Industries valves are known for long term reliability in the most demanding water and wastewater applications. Whether a simple check valve or a complex automatic control valve, each VAG GA Industries valve is built on over 100 years of design, manufacturing and application experience to ensure its dependability and superior performance.

Outstanding Technical Support
From the factory to the field, VAG provides responsive and knowledgeable technical assistance and support. VAG application engineers, and our team of trained and experienced sales representatives, work closely with designers to select the right valve from our broad product range to ensure the valve meets the system requirements. VAG is committed to serving our customers in all phases of the project.

Superior Quality
VAG GA Industries valves are designed in accordance with applicable AWWA and other industry standards and precision manufactured from the highest grade materials. Every valve is tested to ensure it meets our high standards and the latest industry requirements so you can be sure it will operate as expected from the minute it is put in service.

Comprehensive Product Range
We are continuously expanding and improving our product line to meet the ever-changing needs of the waterworks industry. From off-the-shelf standard butterfly and plug valves to sophisticated, highly engineered pump control, check and surge control valves, VAG offers one of the broadest ranges of valves specifically suited to the demanding needs of municipal waterworks.
Differential Piston Control Valves
Pressure, Level and Flow Control

The VAG GA Industries Differential Piston Control Valve is a heavy duty automatic water control valve. The rugged and versatile main valve construction is the heart of a countless number of pilot-operated control valve configurations designed to meet virtually any type of water pressure, flow, and level control requirement.

Versatile Body Style
2” – 36” Heavy Duty Cast Iron Globe and Angle body, ANSI B16.1 Class 125 or 250 flanged.

Flow Efficient Full Port
The VAG GA Industries Differential Piston Control Valve’s full port flow area provides low head loss in on/off applications, such as pump control, and the capacity to handle high flow in pressure reducing and other regulating applications.

Exclusive V-Port Design
Only the VAG GA Industries Differential Piston Valve provides the ideal combination of full port capacity and excellent low flow control. The long V-ports provide an ideal “throttling characteristic” by extending the controlling range over a large portion of the valve stroke for stable low flow control.

Cavitation Resistance
All throttling occurs through the long stationary V-ports that are located downstream of the seat, protecting critical seating surfaces from cavitation and wear.

Corrosion Resistant Materials
All critical internal components are made from corrosion resistant bronze for long term service.

Visual Position Indicator
The standard visual position shows at a glance whether the valve is open or closed and can actuate electrical position switches for remote indication.

Long Term Service and Easy Maintenance
All parts are interchangeable between globe and angle body and removable through the top flange so the body stays in the line for all service. Many VAG GA Industries Differential Piston Valves have been in continuous service for 60+ years.
Standard Materials

Body
Cast Iron, ASTM A126 Class B (NSF-61 Epoxy Coated)

Cover
Steel, ASTM A36 (NSF-61 Epoxy Coated)

Cover Fasteners
Steel, ASTM A307

Piston, Liner, Seat Ring
Lead-free Bronze, Alloy C89833 or C95400

Seals
Buna-N or Composition

Renewable Seat
Buna-N

Internal Fasteners
Stainless Steel, Type 304
How it Works

**Valve Fully Open**
When the area above the piston is exhausted to atmosphere, the inlet pressure acting on the underside of the piston exerts an opening force which lifts the piston and opens the valve.

**Valve Fully Closed**
When the inlet pressure simultaneously acts on both the underside and on top of the piston, the larger area on top produces a net closing force which closes the valve. The differential piston valve uses line pressure to close the valve against line pressure, regardless of the line pressure or the pressure drop across the valve.

**Valve Modulating**
Inlet pressure is applied to the underside of the piston while a regulating pilot controls the pressure applied to the top of the piston to “balance” the opening and closing forces and position the main valve in an intermediate position to control pressure, flow or level.

**Globe Body Headloss Chart**

*Angle body headloss is approximately half that of Globe body. Consult factory for more information.*
Pressure Reducing Valves
The VAG GA Industries Pressure Reducing Valve functions to reduce a higher upstream pressure to a lower, downstream pressure regardless of fluctuations in pressure or variations in flow. The pressure reducing pilot senses the downstream pressure and throttles the main valve as necessary to satisfy demand, without allowing the downstream pressure to rise above the pilot’s setting. The main valve will close when the downstream pressure reaches the setting of the pressure reducing pilot.

Common Variations:
- Dual Pilot (high/low) Pressure Reducing
- Pressure Reducing and Sustaining
- Pressure Reducing and Solenoid Shutoff
- Pressure Reducing and Check
- Pressure Reducing and Equalizing

Pressure Sustaining Valves
The VAG GA Industries Pressure Sustaining Valve protects the pressure integrity of the upstream system. The valve will remain fully open as long as the inlet pressure exceeds the minimum pressure setting on the pilot. Should the upstream pressure fall to the minimum pressure setting on the pilot, the valve will throttle to hold back (sustain) the pressure and will close if the inlet pressure falls below the pilot setting. The upstream system pressure is protected by reducing or cutting off the flow to the downstream system.

Common Variations:
- Pressure Reducing and Sustaining
- Pressure Sustaining and Solenoid Shutoff
- Pressure Sustaining and Check
**Emergency Cut-In Valves**

The VAG GA Industries Emergency Cut-In Valve automatically opens to introduce a supplemental source of water when the downstream pressure falls below a pre-set minimum, typically due to an emergency. Once open, the cut-in valve does not close until the outlet rises to a pre-set, independent higher pressure. While open, the valve will throttle the outlet pressure between the opening and closing pressures. Once closed, the valve will not re-open unless the outlet pressure falls below the opening pressure.

Common Variations:
- Cut-in with Check
- Cut-in with Solenoid Shutoff
- Cut-in with Sustaining
- Cut-in with Reducing

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**Altitude Valves**

The VAG GA Industries Altitude Valve is used on the inlet of water tanks, standpipes and reservoirs to prevent overflow when the supply head is greater than the maximum water level. A single acting altitude is a “one-way” flow valve, where water must be drawn from the tank through another pipe (tank supplies downstream system) or a check valve in parallel to the altitude valve (tank is filled through the altitude valve and supplies system through the check valve when system head falls below tank head). A double acting altitude valve is “two-way” flow and not only fills the tank, but also re-opens when system head falls below tank head to allow the tank to supply the system through the altitude valve.

Common Variations:
- Altitude with Check
- Altitude with Solenoid Shutoff
- Altitude with Sustaining
- Altitude with Relief
Solenoid Valves
The VAG GA Industries Solenoid valve opens and closes by remotely energizing/de-energizing the solenoid pilot. A normally closed solenoid valve opens fully when the solenoid pilot is energized and closes tight when de-energized. A normally open solenoid valve opens fully when the solenoid pilot is de-energized and closes tight when it is energized. Throttling solenoid valves have two solenoid pilots and can be opened fully, closed tight, or held in a partially open position to “throttle” by energizing/de-energizing one or both of the solenoids.

Common Variations:
- Solenoid with Check
- Open and/or Closed Limit Switch
- Valve Position Feedback Transmitter (throttling solenoid)

Pump Control Valves
Electric Check Pump Control Valves are installed on the discharge of a water pump to control surges associated with the starting and stopping of the pump. Valve operation is sequenced with the pump motor through a system of electro-hydraulic controls to slowly open and close the valve during normal pump operation without excessive surge. In emergency situations, such as loss of power, pump, or motor failure, the valve will automatically close quickly, protecting the system.

Common Variations:
- Electric Check with Pump Discharge Pressure Sustaining
- Electric Check with Pump Suction Pressure Sustaining
- Electric Check with Pump Differential Pressure Sustaining
- Electric Check with Pump Discharge Pressure Reducing
- Electric Check with Integral Mechanical Check
Surge Relief Valves
The VAG GA Industries Surge Relief Valve protects the system from an excessive rise in pressure subsequent to a stoppage of pumping or a sudden valve closure. The valve is normally closed, but opens quickly if the pressure at the inlet rises above the setting of the pilot. Once open, it will discharge water at a rate sufficient to prevent a further rise in pressure. The valve closes at an adjustable speed when the pressure subsides below its setting. This type of valve is typically installed on the side outlet of a tee, in the discharge header after the pump check valves, or just ahead of a fast closing valve.

Common Variations:
- Surge Relief with Solenoid Override

Surge Anticipator Valves
The VAG GA Industries Surge Sentinel Anticipator Valve is a surge relief valve with the added function of immediately and fully opening upon power outage or other surge producing events in “anticipation” of the resulting pressure surge. The valve’s simple yet versatile electronic control panel eliminates the complicated pilot system normally associated with anticipator valves and allows the valve to be “tuned” to meet the needs of a particular pumping system and easily tested to ensure its operation.
Flow Control Valves

The VAG GA Industries Rate of Flow Control Valve limits the flow to the downstream system, regardless of fluctuations in upstream or downstream line pressure. The upstream orifice plate produces a small differential pressure at a given maximum flow rate, which is sensed by a pressure pilot that in turn throttles the main valve as needed to prevent the flow rate from exceeding a pre-set maximum.

Common Variations:
- Flow Control with Downstream Pressure Reducing
- Flow Control with Upstream Pressure Sustaining
- Flow Control with Solenoid Shutoff
- Flow Control with Check

Options and Accessories

- **Stop-Check Piston** - prevents reverse flow independent of the pilot controls.
- **Limit Switch** - electrically indicates if the valve is open or closed. A single switch indicates “closed/not closed” while dual switches indicate “full closed” and “full open.” Various NEMA rating switches are available.
- **Pressure gauge** - indicates the pressure at the valve inlet and/or outlet.
- **Special Flanges** - faced and drilled per EN1092, BS4504 or AS4087 PN10, 16 or 25.
Specification
VAG Industries Differential Piston Control Valve

DESIGN
A. The main valve shall be pilot-controlled, hydraulically operated, differential piston actuated and full ported.
B. The control valve shall be “self-contained” and incorporate a system of pilot controls, factory assembled to and tested with the main valve. The valve shall be operated by line pressure and utilize the pilot system to open, close or throttle the differential piston main valve to perform the specified function(s).

CONSTRUCTION
A. The main valve body shall be [globe][angle] style, constructed of high-strength cast iron conforming to ASTM A126 Class B with integral flanges, faced and drilled per ANSI B16.1 Class [125][250].
B. The valve shall be “full-ported” so that when fully open the flow area through the valve is no less than the area of its nominal pipe size. Globe body valves shall have an integral bottom pad or feet to permit support directly beneath the body.
C. The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area and the area on the upper surface is greater than that of the underside. There shall be no diaphragms or springs in the main valve.
D. The valve piston shall be fully guided on its outside diameter and all guiding and sealing surfaces shall be bronze. To minimize the consequences of throttling, throttling shall be by long, stationary vee-ports located downstream of the seat and not by the seat itself. Sawtooth attachments or other add-on devices are not permitted.
E. The valve shall be fully capable of operating in any position without the need of springs and shall not incorporate stems, stem guides or spokes in the waterway. A visual position indicator shall be provided.
F. The main valve shall be serviceable in the line through a single flanged top cover that provides easy access to all internal components.
G. The valve shall be shop coated with NSF-61 certified epoxy on internal surfaces in accordance with American Water Works Association Standard C550 (latest revision).

PILOT SYSTEM
A. The valve shall be operated by a system of pilot controls necessary to perform the specified function(s).
B. The pilot system shall be factory pre-piped, installed on the main valve and tested as an assembly.
C. In addition to the necessary pressure regulating and/or electrically operated pilots, the system shall incorporate a wye-strainer and opening and/or closing speed control valves.
D. Sufficient isolating valves and pipe unions shall be provided to facilitate removal and maintenance of the pilot system without disturbing the main valve.
E. Pilots, controls, piping and fittings shall be corrosion resistant copper, bronze or brass.

MANUFACTURER
Valve shall be as manufactured by VAG USA, LLC (VAG GA Industries brand), Cranberry Township, PA USA
The VAG USA, LLC is part of a global network with our partner company, VAG-Armaturen GmbH, headquartered in Mannheim, Germany. Together, we have a highly qualified team of service specialists around the world. Our capabilities include:

- Engineering & technical design
- Production
- Fabrication
- Sales & distribution
- Installation & start-up
- Aftermarket service

For international sales, please contact our partner company, VAG-Armaturen GmbH, headquartered in Mannheim, Germany.

www.vag-group.com