High Efficiency

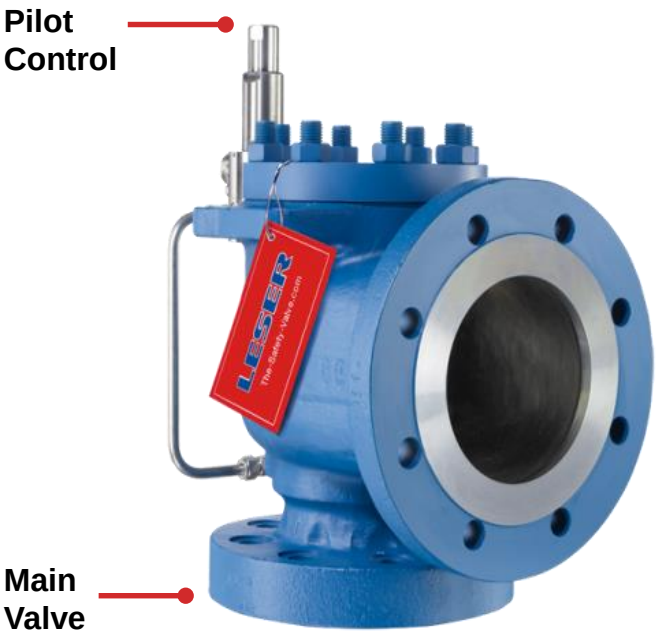
Pilot Operated Safety Valves

Objectives of this Presentation. Knowledge to learn.

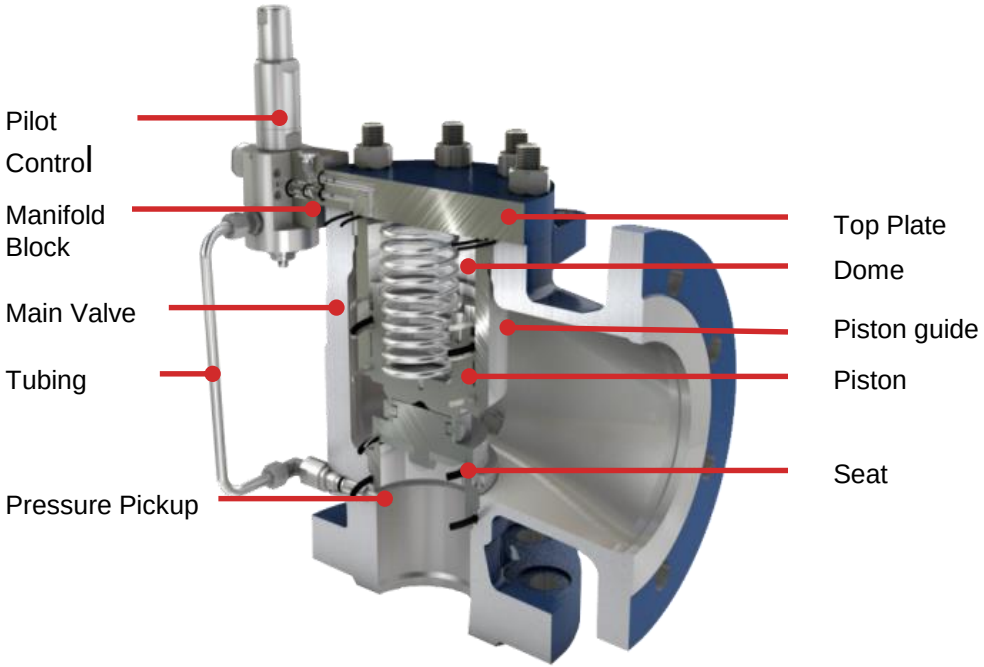
The aim of the presentation is to familiarize yourself with a **pilot operated safety valve**, how it operates and what features and benefits it offers.

Design and Function. What is a Pilot Operated Safety Valve.

A pressure relief valve in which the **main valve** is combined with and controlled by an auxiliary pressure relief valve (**pilot control**).



Design and Function. Main Components of LESER POSVs.

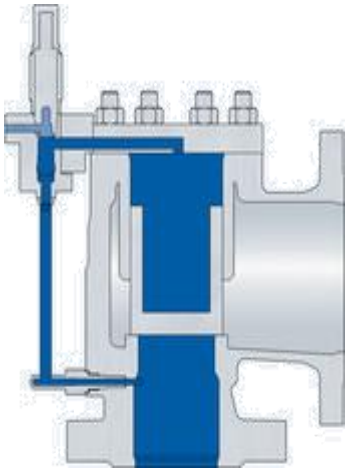


Design and Function. Operating Cycle – Normal Operation.

1. Below set pressure: normal operation

- During normal operation, the system pressure is picked up at the main valve inlet and routed to the dome
- Since the dome area is larger than the area of the main valve seat, the closing force is greater than the opening force
- This keeps the main valve tightly closed

1



Force = Pressure x Area

Area $_{dome}$ > Area $_{seat}$

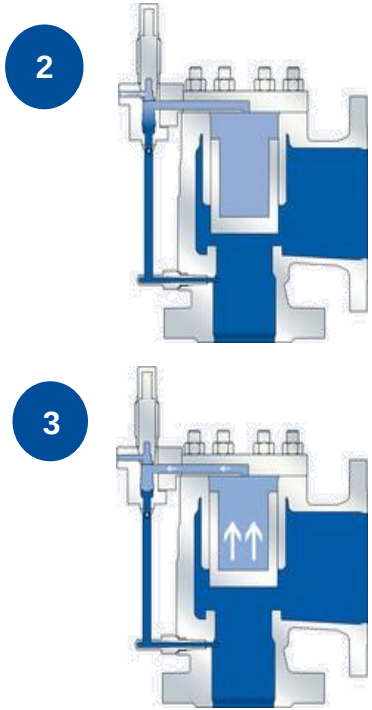
Design and Function. Operating Cycle – Opening.

2. At set pressure: actuating state

- At set pressure, the pilot control actuates
- The medium is no longer routed to the dome and the dome is vented
- As a result, the closing force ceases

3. Main valve opening

- The main valve opens
- Depending on the design of the pilot valve, this opening is either rapid and complete (Pop Action) or gradual and partial following system pressure (Modulate Action).

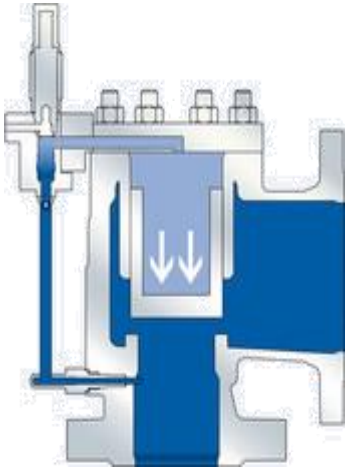


Design and Function. Operating Cycle – Closing/Blowdown.

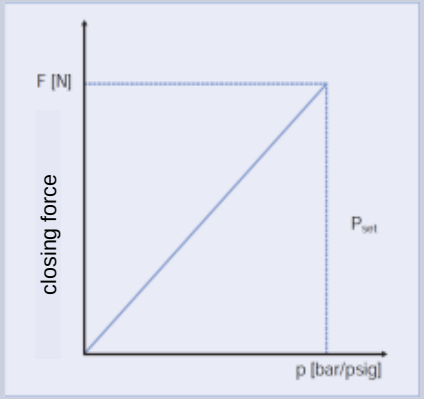
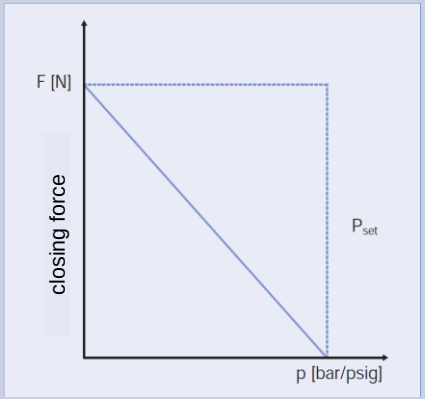
4. At closing pressure: refilling the dome

- If system pressure drops to closing pressure, the pilot valve actuates and again routes the medium to the dome
- The pressure in the dome builds up and the main valve recloses either rapid and complete (Pop Action) or gradual and partial following system pressure (Modulate Action)

4



Design and Function. Closing forces: POSV vs. Spring Loaded.

1. Pilot operated safety valve	2. Spring-loaded safety valve
	
With a POSV, increasing system pressure leads to increasing closing force, which acts on the piston of the main valve in the dome area.	When the operating pressure approaches the set pressure, the net closing force of the spring acting on the disk drops.

Design and Function. Serie 810 – Pop Action Pilot Control.

- Used for applications where the certified discharge capacity needs to be reached quickly
- used for gas applications only
- Dome discharges to atmosphere have an adjustable blowdown of 2 – 7% of set pressure (and can be adjusted beyond API standards up to 15%)

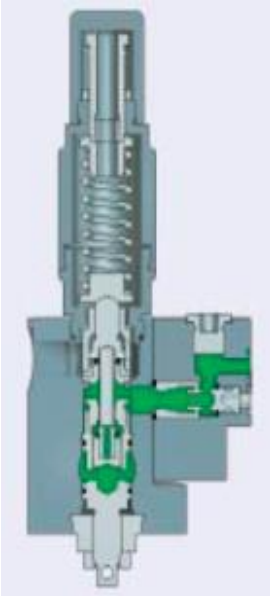
Pop Action

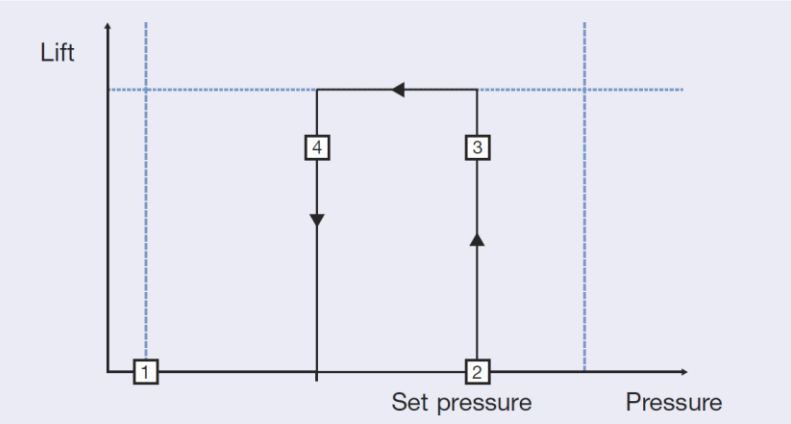
Pilot with full lift
characteristic, opens within 1%

Design and Function. Lift and Closing Curve – Series 810.

1

4

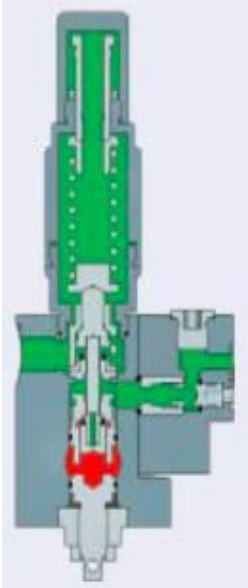




1 – Below set pressure: normal operation
2 – At set pressure
3 – Pop opening
4 – At closing pressure – blowdown

2

3



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Design and Function. Serie 810 – Pop Action Pilot Control.

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Design and Function. Serie 820 – Modulate Action Pilot Control.

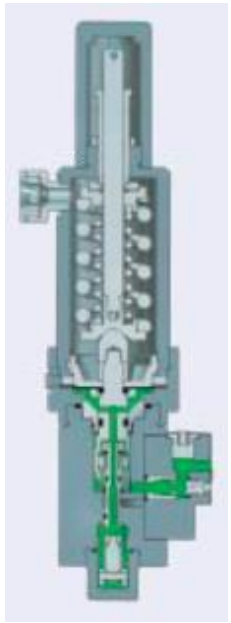
- Used to minimize product loss
- used if product must not discharge to atmosphere
- open in proportion to the overpressure to ensure that only as much mass flow is discharged from the safety valve as is necessary to prevent further pressure increase
- Certified for gas, liquid and steam applications
- have a fixed blowdown of 3 – 7% of set pressure

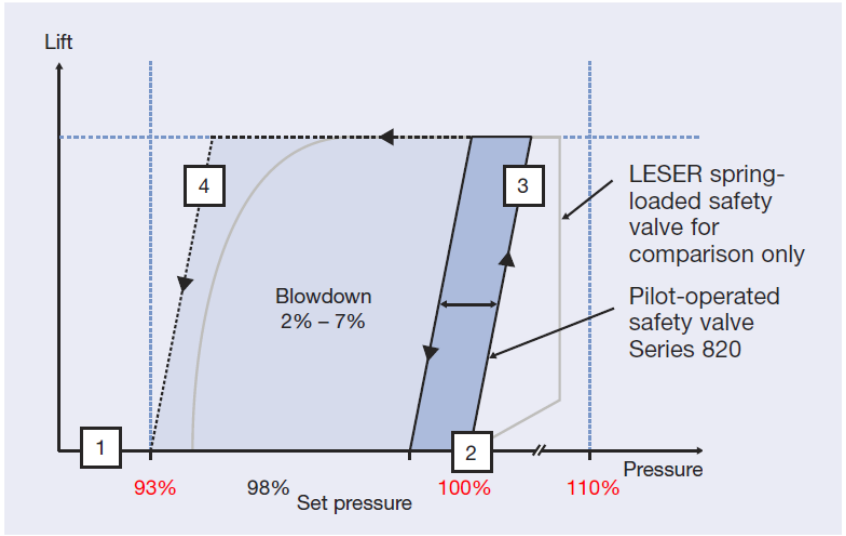
Modulate Action

Modulating action opens in proportion to system overpressure

Differentiation. Lift and Closing Curve – Series 820.

1 4





1 – Below set pressure: normal operation
2 – At set pressure
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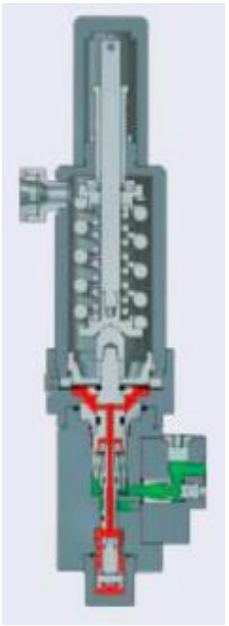
2 3



Design and Function. Series 820 – Modulate Action Pilot Control.

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Thank you for your attention.