



AL-Ayen University
College of Health and Medical Technology
Department of Anesthesia



Pressure Reducing Valve

Lecture (4) theoretical
Basics of Anesthetic Equipment (1)
2nd Stage
2023-2024

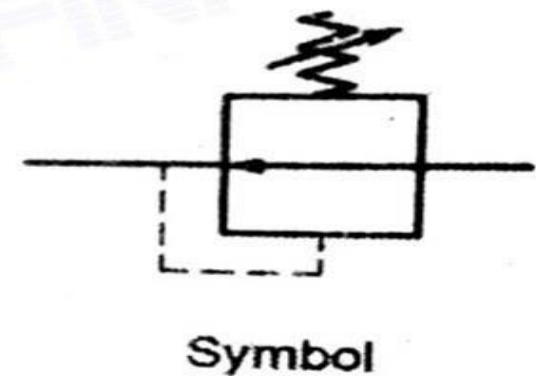
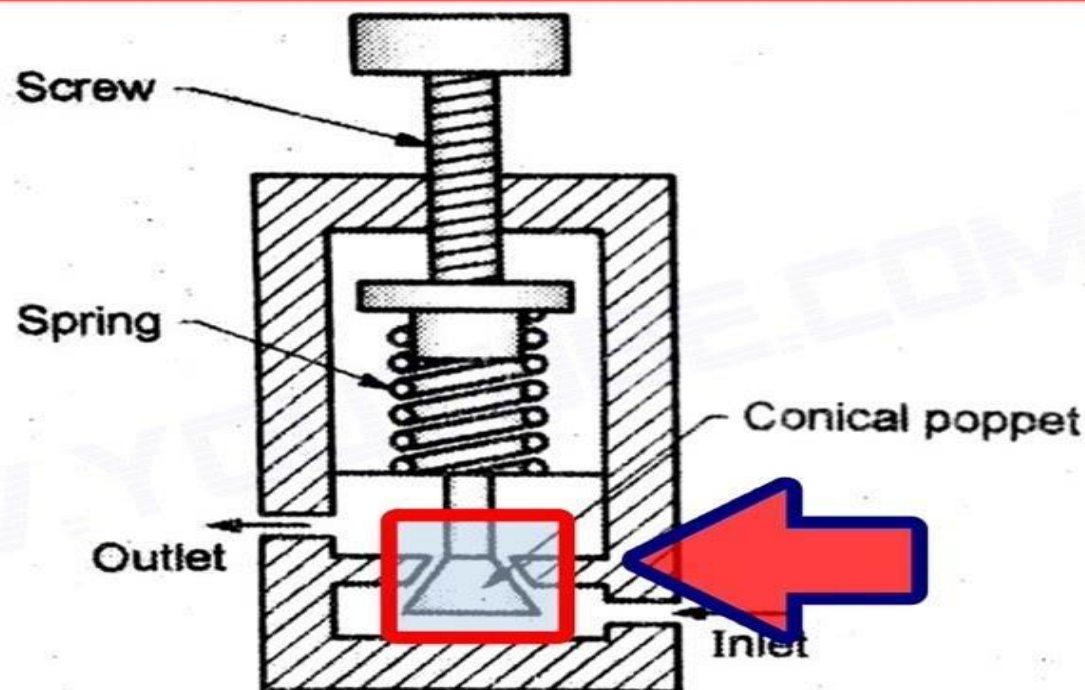
By Mushtaq Twayess
MSc Anesthesia technologist



Pressure regulators:

❖ Anaesthetic machines contain several primary and secondary pressure regulators. Gas in the high pressure chamber of the regulator passes through the valve to the low pressure outlet. As it does so, it exerts a force on a diaphragm that acts to close the valve. The force from a spring acts in the opposite direction on the diaphragm to keep the valve open and the regulator is manufactured so that equilibrium between these two forces is reached at the desired outlet pressure.

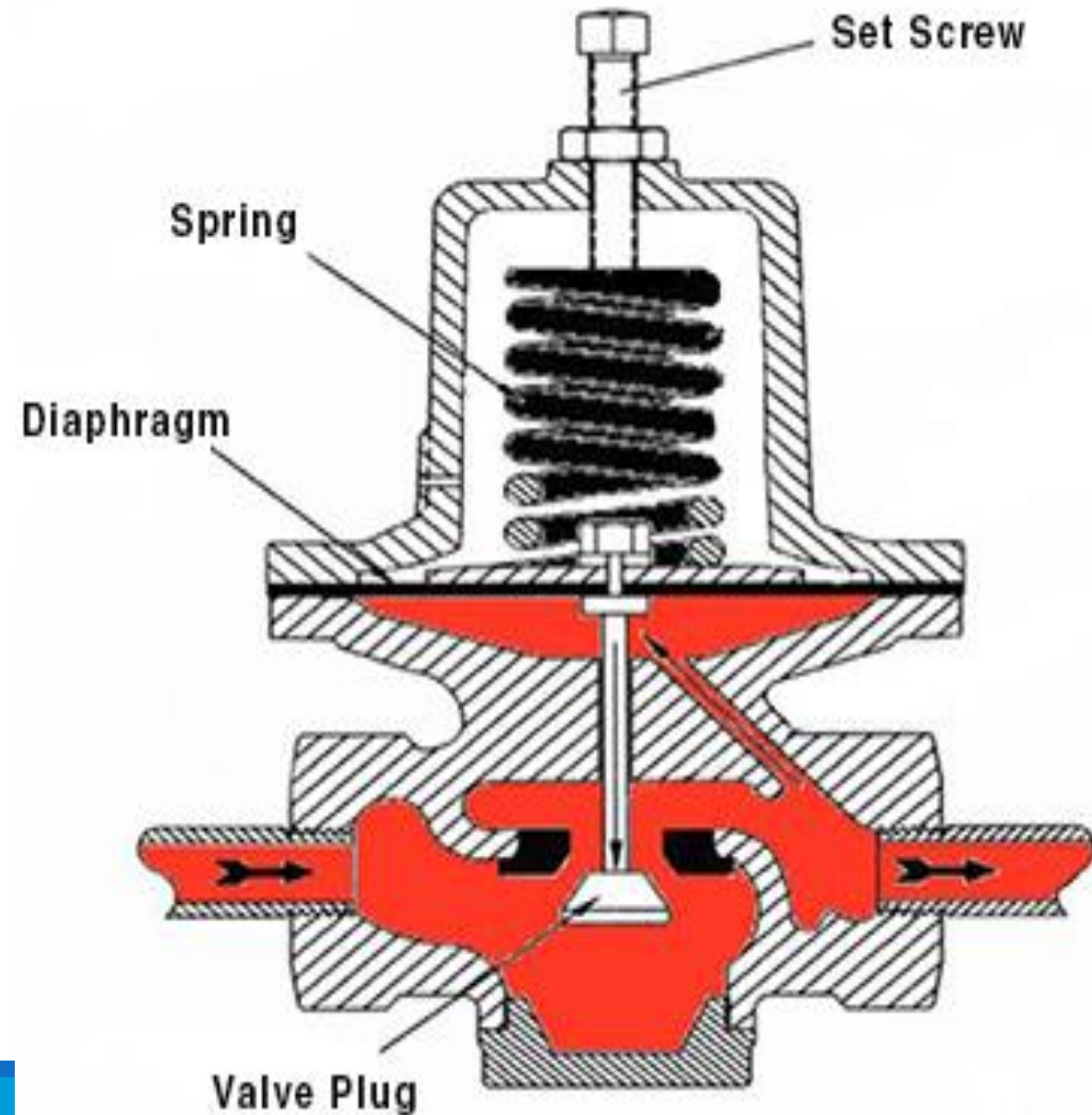
Pressure Reducing Valve



- ❖ Primary regulators reduce high cylinder pressures to a constant pressure of around 400kPa. In many designs, cylinder primary regulators set the pressure at just below pipeline pressure, so that the pipeline gas is preferentially used. Despite this, regulators may leak cylinder contents, and so the cylinder should be turned off when not in use. Secondary regulators are located prior to the flowmeters to smooth out fluctuations in the pipeline supply pressure.

The component of pressure regulators:

1. Inlet High pressure
2. Spring
3. Diaphragm
4. Valve plug
5. Outlet Low pressure



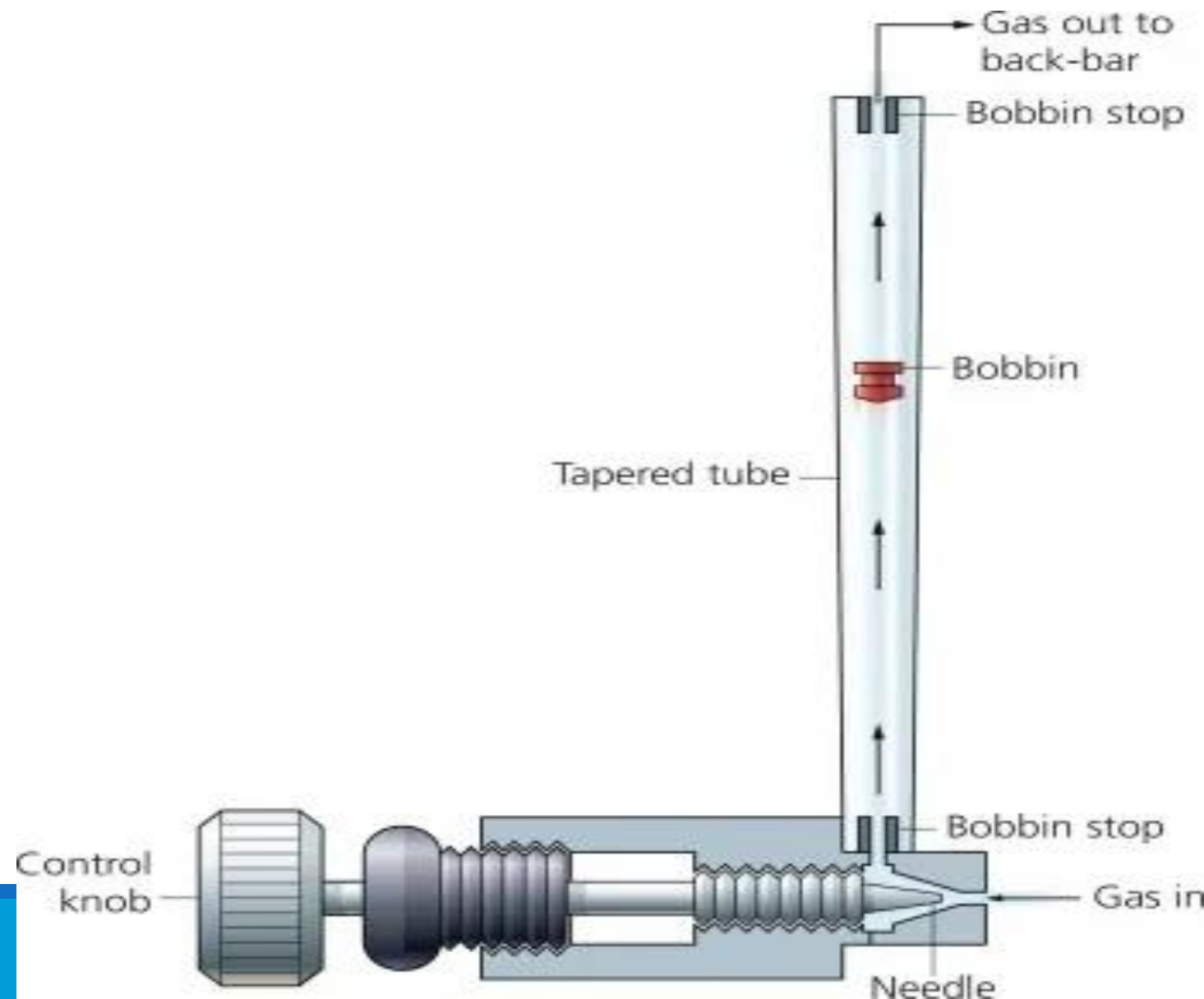
➤ Pressure relief valve :

Pressure relief valves are located downstream of each pressure regulator as a backup in case of regulator failure. The relief pressure is set at 700kPa. They utilize a similar mechanism to the adjustable pressure limiting valve but are not user-adjustable. In the low-pressure system, there is a non-return pressure relief valve situated after the back bar and set at 35kPa (35 kPa is 357 cmH₂O, so this valve offers no protection to the patient). This valve is designed to protect the flowmeters and vaporizers from high downstream pressures and may be activated by occlusion of the common gas outlet. The non-return design also helps prevent back pressure effects when using minute volume divider ventilators.

➤ Needle valve:

Needle valves are located at the base of flowmeters. They perform two functions, acting as a control for gas flow and also reducing pressure from the high pressure system (around 400kPa) to the low pressure system (just over atmospheric pressure).

The pressure drop across the valve occurs because of the high resistance to flow through the narrow lumen



➤ Back bar:

The back bar is part of the low pressure system situated downstream of the flowmeter block. It provides mounts for the vaporizers which are sealed with a rubber O-ring. A missing ring, or poorly seated vaporizer, will result in a leak





Thank you!