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RSPT 1410

Pressure & Flow Regulating Devices

Cairo: Chapter 3, p. 59-64
Wilkins: Chapter 34, p. 817-825

2

Pressure Regulators

- devices that reduce high-pressure gases from cylinders or bulk storage units to lower working pressures, usually _____ psi
- classified as single-stage or _____
- within those classifications are preset and adjustable

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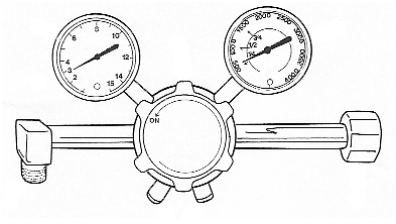
Typical Pressure Regulator



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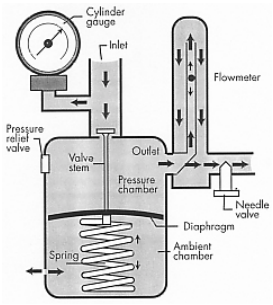
Single-stage Preset Regulator



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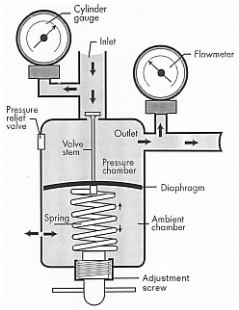
Single-stage Adjustable Regulator



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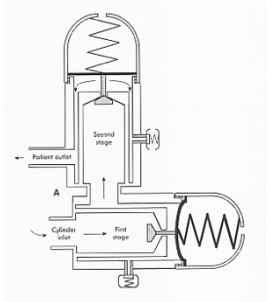
Multistage Regulator



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Flowmeters

- devices that _____ and indicate the _____ delivered to patients
- three types
  - Thorpe tube flowmeters
  - Bourdon flowmeters
  - flow restrictors

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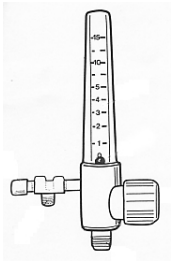
Thorpe tube flowmeters

- Thorpe tubes are the most common flowmeters used.
- consist of a tapered flow tube with a scale marked in liters per minute (lpm, L/min), a float and a needle valve
- delivered flow is read at the center of the float against the scale



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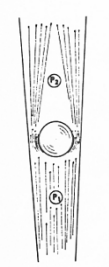
Thorpe flow tube

- gas flowing through the tube pushes the float higher, allowing more gas to flow around it
- the height of the float depends on the force of gravity pulling down on it and the force of the flow pushing it up
- the float becomes stationary when the pressures above and below it are equal



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Thorpe tube flowmeters

- classified as pressure-compensated and non-pressure-compensated
- in pressure-compensated flowmeters the needle valve is located _____ to the flow tube allowing the pressure in the flow tube to be maintained at 50 psi
- in non-pressure-compensated flowmeters the needle valve is located _____ to the flow tube allowing the pressure in the flow tube to be equal to ambient pressure

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The term distal means *remote; farther from any point of reference.*

In this usage, it means the needle valve is located after or downstream of the flow tube, therefore, back pressure has no effect on float position.

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Thorpe tube flowmeters

- classified as pressure-compensated and non-pressure-compensated
- in pressure-compensated flowmeters the needle valve is located distal to the flow tube allowing the pressure in the flow tube to be maintained at 50 psi
- in non-pressure-compensated flowmeters the needle valve is located proximal to the flow tube allowing the pressure in the flow tube to be equal to ambient pressure

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The term proximal means *nearest to a point of reference, as to a center or median line or to the point of attachment or origin.*

In this usage, it means the needle valve is located before or upstream of the flow tube, therefore, back pressure will effect float position.

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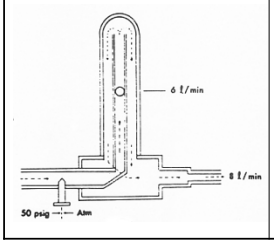
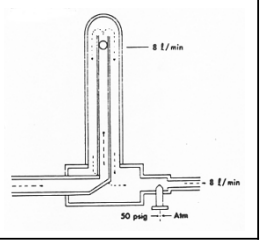
Thorpe tube flowmeters

back pressure uncompensated	back pressure compensated
	

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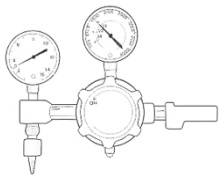
Bourdon flowmeters

- a Bourdon flowmeter is actually a _____ that controls the pressure gradient across an outlet with a fixed orifice
- as such, it does not directly measure flow - it *measures pressure* and *indicates flow*



- ***HUH???***

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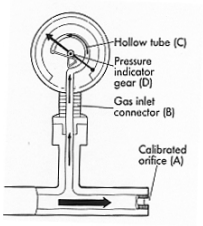
Bourdon flowmeters

- remember back to our discussion on adjustable regulators…flow is determined by adjusting the pressure against a fixed orifice….
- if the size of the orifice is known, the amount of pressure needed to produce a specific flow can be calculated



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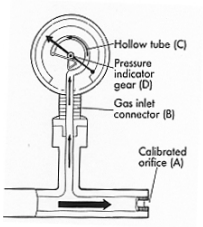
Bourdon flowmeters

- if that pressure can be calculated, then the gauge can be calibrated to indicate the flow being delivered
- therefore, the device is *measuring pressure*, but *indicating flow*



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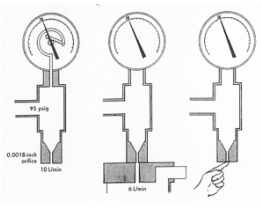
Bourdon flowmeters

- these flowmeters are accurate as long as the orifice remains clearly _____
- if a restricting device is placed on the flowmeter, flows may read falsely _____ because the device is calibrated for the orifice size and pressure without any resistance



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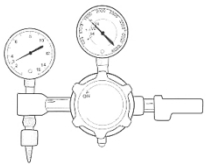
Bourdon flowmeters

- Bourdon flowmeters are used on cylinders and are a part of the regulator assembly
- these devices are particularly useful in situations when the cylinder may not remain in an _____ position



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Flow restrictors

- operate on a principle similar to that of the Bourdon flowmeters – the higher the driving pressure, the higher the resulting flow
- have the same problem with inaccuracy as Bourdon flowmeters when a restriction is place downstream to the orifice
- there are 2 types of restrictors
  - fixed orifice
  - adjustable, multiple-orifice

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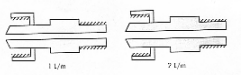
Flow restrictors

fixed-orifice



multiple-orifice