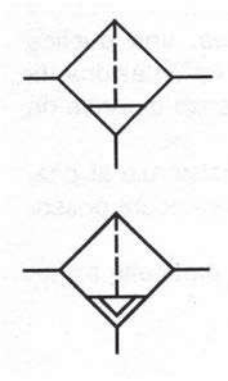
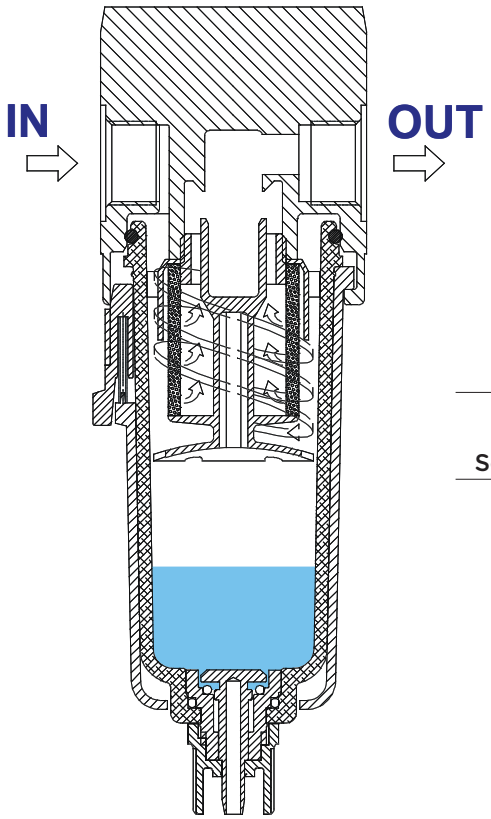
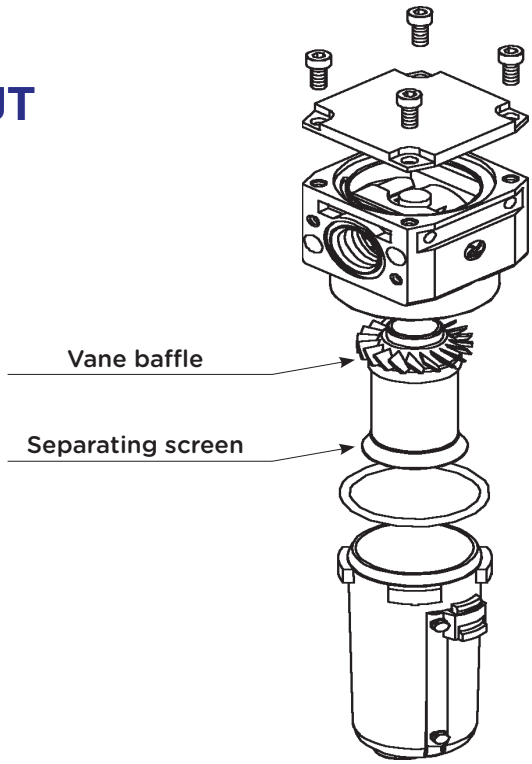
It is known that air does not contain only water vapor, but also solid particles and degraded oil vapors produced by the compressor, etc.
The task of any filter, at the user's point, is to clean the air completely from the moment it is placed in-line, after the suction and line filters have carried out the first rough filtering.

Manual drain



Automatic drain

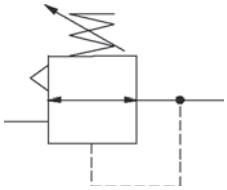




These diagrams are helpful in order to choose the right filter.
If the flow rate requirements may call for a 900 Nl/min standard filter with an operating pressure of about 6 bars, rising from the axis of the flow rate up to the respective 6.3 bar curve, we can detect a pressure drop equal to 0.35 bars at the respective vertical axis. This means that during absorption of the mentioned flow rate, the pressure of the filter downstream has decreased to about 5.9 bars.
Moreover, the diagram shows that if the air requirements should increase considerably, the drop also increases and should turn intolerable when its value is about 1 bar. In these cases it is necessary to choose a greater sized device.
For coalescent filters with equal size, the flow rate is lower due to cartridge porosity and it is therefore advisable to follow the indications described in the respective diagram for optimal operation.
All flow rate and drop values included in the area below the dotted line are to be considered correct.

11.2 PRESSURE REGULATORS

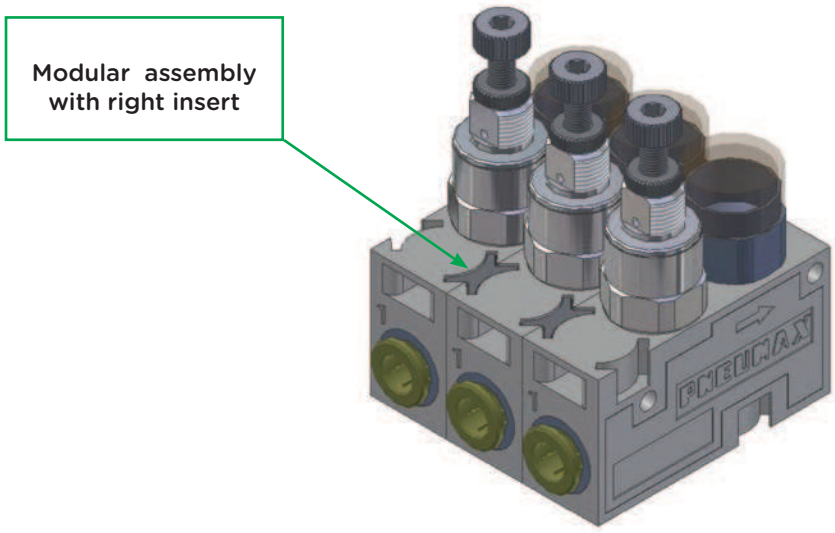
A pressure redugulator is a device that allows reducing and stabilizing the air pressure available in the system.
It works according to the proportionality principle of supplying a pressure at its outlet that is proportional to a reference signal.
Its employment is always necessary to supply the correct downstream pressure in order for the equipment to function properly.
In most cases the reference signal is constituted by the force produced by charging a spring with a regulation screw.
As high is the produced force, as high shall be the pressure returned at the outlet.



Operation

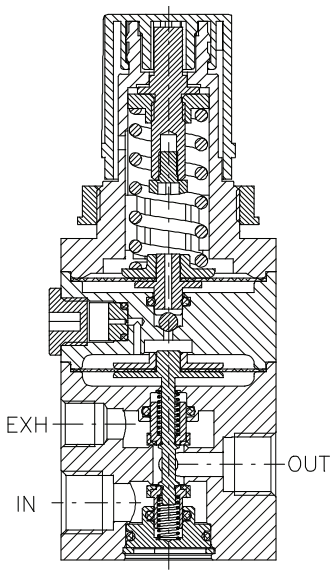
In order to set up a secondary pressure that shall be mandatorily lower than the operating pressure, we must act on a screw that loads the regulating spring, which, acting on a membrane, pushes a shaft integrated to a shutter.

Even in miniaturized versions, similar solutions that include the modular assembly system with its own incorporated pressure indicator are possible.



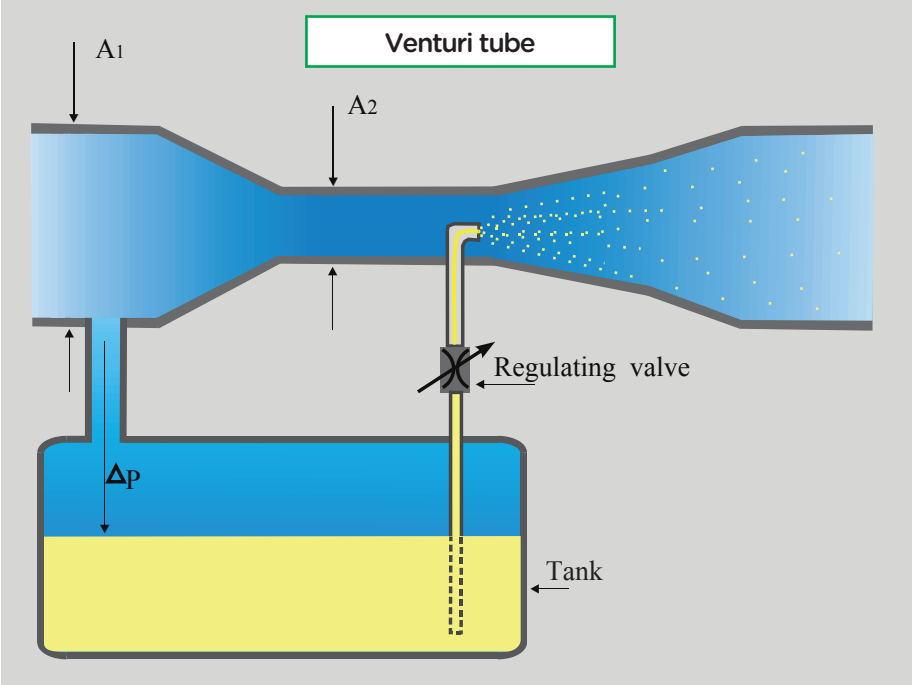
Precision regulators

Precision pressure regulators guarantee maintenance of the set-up secondary pressure at an almost perfect value, if their performance is kept within the limits recommended by the technical datasheet.
Its operation is based on the same principle of standard regulators, with the difference that control of the secondary pressure is assigned to a double membrane system. The first membrane in the upper part, pushed by the spring, intercepts an air leak (5 Nl/min) by means of a sphere on a calibrated hole.

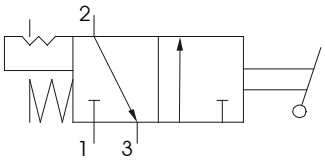


11.3 LUBRICATORS

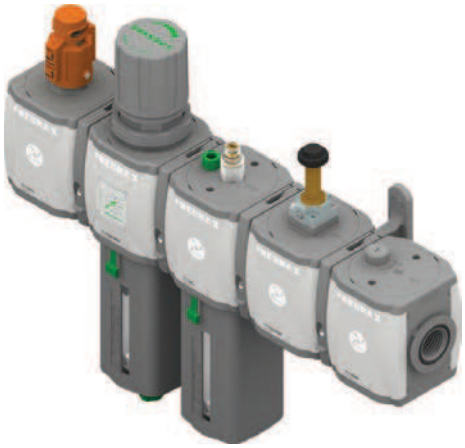
Lubricators have the function of sending lubricating oil to pneumatic system's whenever needed.
Currently, lubricators tend to be used less frequent because some devices employed are suitable to operate without any further lubricating oil. The need for lubricators is sustained in particular applications, such as high-frequency performances or for actuators with long running and high actuating speeds.
Once a system is supplied with lubricants it will need to be lubricated always, even if the equipment is declared to be in conditions to operate without new lubricant supply. In fact, the oil tends to wash away the greases used for moving parts during their assembly, and therefore, if no lubrication is supplied, after certain movements dry operating condition would take place.
Lubricators use the Venturi principle to operate, and therefore they need to be crossed by an air flow to begin the phenomenon.



The design shows lubricators performance schematically, and how the oil mist is transported suspended along the compressed air ducts.
It produces a difference of pressure between sections A1 and A2 of the tube. In section A2 the pressure decreases and the flow speed increases. This difference in pressure causes the oil in the tank to be sucked rising along the small tube.
A flow control valve measures the oil introduced into the area where the air moves faster. The air breaks the drops and the smaller parts are dragged with it in suspension. The air and oil mixture may cover relatively large distances (up to 10 or 12 meters) but this depends on the system's structure.



The following figure shows a complete modular group assembly. The simplified symbol represents only the filter + regulator + lubricator.



11.7 FILTER REGULATOR

The filter regulator is a device that integrates a filter and a pressure regulator in the same body.
The combined unit maintains the technical features of each device.
As we see in the figure, the filter is located in the lower part with the same performance of its respective size, the air being carried to the upper part where the regulator is located, that sends the regulated pressure toward the outlet. This unit allows cost savings and a reduction of space.