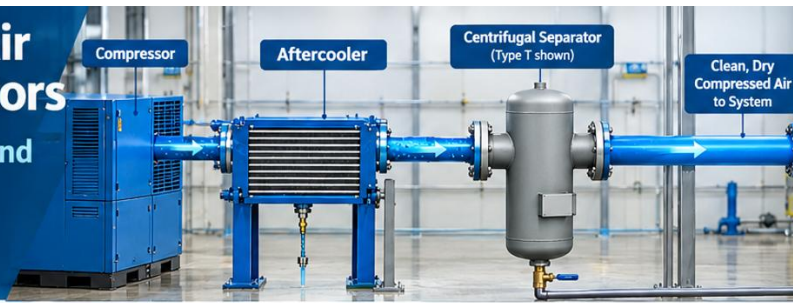


Compressed Air Water Separators

What They Remove and How to Choose One

By: Chris Pasquali, CEO
Factory Direct Pipeline Products, Inc.



What They Remove

A centrifugal air-liquid separator removes entrained liquid droplets and particles from the compressed air stream.

It does not remove water vapor or lower the air's dew point.



Compressed Air Water Separators What They Remove and How to Choose One

Compressed air systems can carry liquid water, oil and solid particles downstream. A centrifugal air-liquid separator removes entrained liquid droplets and particles from the air stream. It does not remove water vapor or lower the air's dew point.

That distinction helps determine where a separator belongs, which design to use and whether a dryer is also needed.

How moisture gets into compressed air

Ambient air contains water vapor. Compression heats the air, and cooling it in an aftercooler can cause some of that vapor to condense into liquid. Further cooling in the receiver or distribution piping can create more condensate. Oil droplets and solid particles may also be present, depending on the compressor and the condition of the system.

Liquid can collect in low points in the piping. If it is later swept downstream, it may travel as a slug. That can expose downstream equipment to more liquid at once than a drain at the low point can remove.

A float drain trap empties liquid that has collected in the trap or drip leg. A separator serves a different purpose: it removes entrained liquid from the moving air stream and can handle liquid slugs when the separator design is suitable for that duty.

What a centrifugal compressed air separator removes

Centrifugal air-liquid separators remove entrained droplets and particles larger than 10 microns with 99% efficiency with some variations able to improve separation efficiency to droplets as fine as >5 microns or even >0.3 microns.

Inside the separator, the incoming air follows a path that deflects it away from the outlet. Heavier droplets and particles impinge on internal surfaces and coalesce. The larger separator body also reduces air velocity, allowing separated liquid to move toward the vessel wall and drain area.

The separators maintain separation efficiency at low flow when sized for the maximum flow condition. Proper sizing and drainage remain important: collected liquid must be removed before it can rise high enough to leave with the air.

What a water separator does not remove

A centrifugal separator removes liquid droplets. It does not remove water that remains in vapor form, and it does not lower the compressed air's dew point.

If compressed air cools farther downstream,

additional water vapor may condense into liquid. A separator can remove that newly formed liquid only if it reaches the separator as entrained droplets. To control the dew point, select a compressed air dryer for the required operating conditions. A coalescing separator can separate fine liquid aerosols, but it does not dry the air or lower its dew point.

A compressed air/water separator is also different from a hydronic air separator. A hydronic separator removes free air from a closed water loop. A compressed air separator removes entrained liquid from a pipeline of compressed air.

Where to install a compressed air moisture separator

A common location is downstream of the aftercooler, where cooling has condensed moisture from the compressed air. Separators may also be used ahead of equipment that should be protected from entrained liquid, or at other locations where liquid is expected in the line.

Where to Install

- Downstream of the aftercooler
- Ahead of equipment that must be protected from entrained liquid
- Other locations where liquid is expected in the line

The right location depends on the system layout, source and amount of liquid, and downstream requirements. A separator does not replace a dryer when a specified pressure dew point is required.

The right location depends on the system layout, the source and amount of liquid, and the requirements of downstream equipment. A separator does not replace a dryer when the application requires a specified pressure dew point.

Choosing between L-style and T-style separators

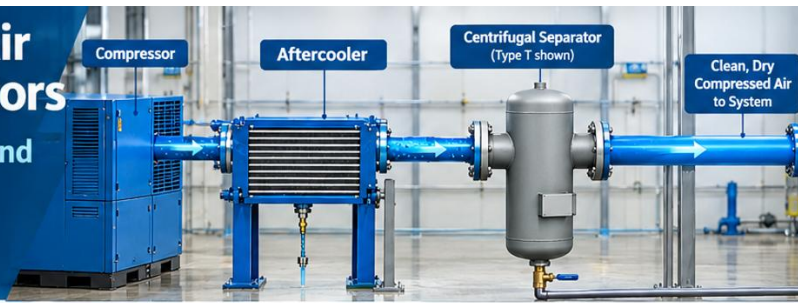
The L and T styles are commonly used in compressed air systems, but their liquid-handling capabilities differ.

An L-style separator has a horizontal cylindrical body and a compact layout. Their design has a limited liquid capacity and is unsuitable for handling liquid slugs. It may be

Compressed Air Water Separators

What They Remove and How to Choose One

By: Chris Pasquali, CEO
Factory Direct Pipeline Products, Inc.



What They Remove

A centrifugal air-liquid separator removes entrained liquid droplets and particles from the compressed air stream.

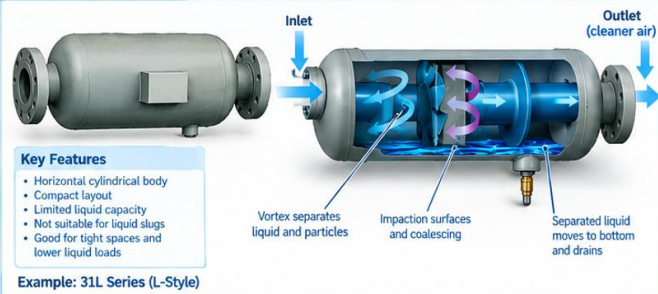
It does not remove water vapor or lower the air's dew point.



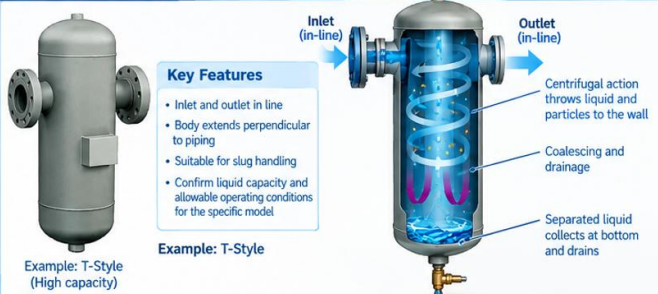
appropriate when space is limited and the expected liquid load is within the model's rating.

A T-style separator has its inlet and outlet in line, with the separator body extending perpendicular to the piping. T-style models are suitable for slug handling. Confirm the liquid capacity and allowable operating conditions for the specific model during selection.

L-Style Separator (Horizontal)



T-Style Separator (Vertical)



Other body configurations are available for different piping orientations. Choose a design that matches the installation, expected liquid load and downstream requirements.

Separator sizing depends on operating conditions

The separator body size is not necessarily the same as the connected pipe size. Selection depends on factors that include:

- Maximum flow rate
- Minimum operating pressure
- Design temperature
- Estimated liquid load
- Whether liquid slugs are possible
- Compressor type
- Available space and piping orientation

For reciprocating compressors, use twice the rated flow for the sizing charts or calculator. Confirm that guidance against the specific compressor and separator application before finalizing a selection.

Drainage is part of separator selection

Separated liquid needs a reliable way to leave the vessel. A float drain trap is a common automatic method for removing condensate while preventing compressed-air loss. The drain must be suitable for the expected liquid rate and contaminants; dirty or oily condensate can affect drain operation.

The separator and drain should be selected as a system. If the drain cannot keep up, liquid can accumulate and may be carried out through the separator outlet.

Information to provide when requesting a size

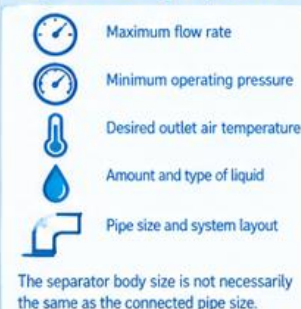
For a sizing review, provide the maximum flow, minimum operating pressure, design temperature and an estimate of the liquid load. Also note whether the compressor is reciprocating, whether slugs are possible, the existing pipe size, the piping orientation and any limits on materials or pressure-vessel code requirements.

Those details help determine the separator body size and style, connection arrangement, and drain requirements.

Required body size may differ from the existing pipe size.

A sizing review should check the separator's flow rating, pressure drop, liquid-handling capability and connection arrangement rather than relying on pipe size alone.

Separator Sizing Depends On



The Bottom Line

- ✓ Removes entrained liquid and particles (not water vapor)
- ✓ L-Style = compact, lower liquid capacity
- ✓ T-Style = higher capacity, slug handling
- ✓ Proper sizing and drainage are critical
- ✓ Use a dryer when you need a specific dew point



Eliminate the guesswork! Call or email or complete our online inquiry form today for expert advice for your specific application!