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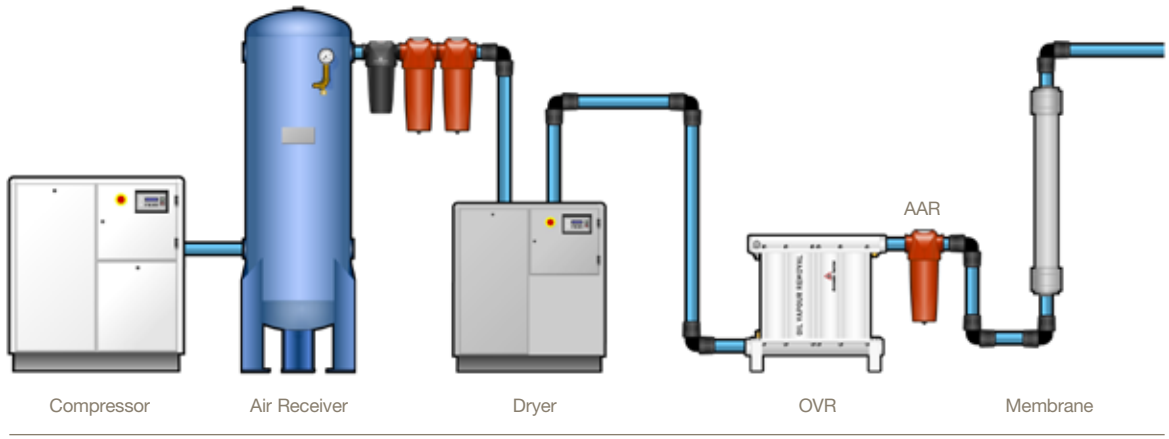
Required Filtration for Parker Membrane Modules

Technical Bulletin

To ensure a long life for Parker membranes modules, feed-air needs to comply with the following specifications:

Residual oil content:	<0.01 mg/m³
Particles:	filtered at 0.01 µm cut off
Relative humidity:	< 100% (non condensing)
Air quality:	clean air free of solvents, hydrocarbons etc.

To reach this feed-air quality the following system set-up is advised:



KEY

WS	Water Separator	**AA**	Coalescing Filter	**AAR**	Dry particulate Filter
AO	Coalescing Filter	**OVR**	Oil Vapour Removal		

Compressor

Due to varying nitrogen or oxygen enriched-air demands, the feed-air requirements will also vary. Parker advises to use a variable speed screw compressor to get the highest efficiency and best working conditions for the compressor. At pressures of 7 to 8 barg, standard industrial screw compressors have their highest efficiency which is also the most optimal pressure with the lowest energy use for the Parker membranes modules.

Air tank

In case a variable speed screw compressor is used, it is not necessary to use an air receiver tank. When a non-modulating compressor is used with an air receiver tank, the tank must be of such a size that the compressor will not switch on and off at a high frequency as this will cause increased oil carryover.

Refrigerant dryer

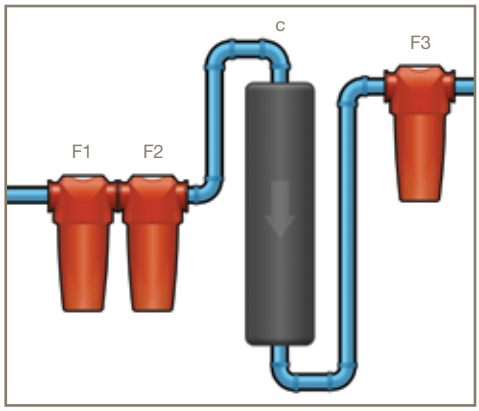
To create a non-condensing feed-air supply it is necessary to lower the dewpoint of the compressed air stream and remove the condensate that is formed.

The pressure dew point of the compressed air needs to be at least 5 °C lower than the lowest ambient temperature to be expected!

A refrigerant dryer is sufficient to lower the dew point to an acceptable level. When a nitrogen or oxygen enriched-air system is located in an environment where the temperature cannot drop below 8 °C a refrigerant dryer that creates a dew point of 3 °C is sufficient. Should the ambient temperature drop below 8 °C, another drying method is required, for example an adsorption dryer. The refrigerant dryer should be sized correctly and should be equipped with sufficient condensate removal.

Filtration

To protect the Parker membrane module from oil, hydrocarbons and particles the following filtration is required:



F1 Coarse coalescing filter, minimum 93% efficiency for 0.01 Micron particles.

F2 Fine coalescing filter, minimum 99.99% efficiency for 0.01 Micron particles.

C Carbon absorber, bed-type. This needs to be a tank filled with carbon granulates.

F3 Dust filter to prevent carbon dust carryover. This can be a fine coalescing filter, like filter 2.

A carbon filter element is not sufficient!

The absorption capability of carbon is directly related to the carbon surface area available for absorption. Once an oil molecule has absorbed on a spot on the surface of the carbon, this spot is no longer available for absorption as the oil will stay there.

If there is a small amount of carbon present such as is the case in a carbon element filters this can only absorb a small amount of oils and hydrocarbons.

The general rule is that carbon can absorb 25% of its weight in oil. Meaning 10 grams of carbon can absorb 2.5 grams of oil.

A typical carbon element filter for a 1/2" filter housing contains 22 grams of carbon. This filter can therefore absorb 5.5 grams of oil (25% of the carbon weight).

If the air contains 1 mg/m³ oil in the compressed air*, an average carbon element filter can filter 5500 m³ of air (5.5 grams of oil / 1 mg/m³ of oil content). The Parker carbon absorber B-04-0100 has 1202 grams of carbon and can absorb 300 grams of oil which corresponds with (300 grams/1 mg/m³ =) 300 000 m³ of feed-air.

Example

Parker HiFluxx ST6010 at following conditions

Feed-air pressure:	12 barg
Nitrogen purity:	95%
Feed-air usage:	65 m³/hr

Carbon filter saturation time:	5,500 m³ / 65 m³ = 84 operational hours
Carbon absorber B-04-0100 saturation time:	300,000 m³ / 65 m³ = 4615 operational hours

Summary

- **Use a refrigerant dryer to make sure the feed-air pressure dew point is at least 5 °C lower than the lowest ambient temperature**
- **Use a coarse and fine coalescing filter to remove particles and liquids**
- **Use a carbon absorber, bed type and not a carbon element filter to remove hydrocarbons and oil fumes**
- **Use a dust filter to prevent carbon dust carryover**

Depending on the system requirements Parker has a wide range of compressed air pre-filtration products to select from.

* Compressor manufacturers specify this for a standard screw compressor with refrigerant dryer ISO 8573-1 class 3

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