

Application Note:

## Concentrating Extract in a Rotavap

After winterized extract has been filtered, a rotary evaporator, or rotavap, is used to concentrate the extract by evaporating off most of the remaining ethanol. Major objectives in this process are to quickly concentrate the mixture of crude oil and ethanol to the point where it is only a few percent ethanol, to recover the evaporated ethanol for later use, and to keep the evaporation process under control to prevent loss of crude oil.

### A Great Balancing Act

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Running a rotavap efficiently, and completing the evaporation at the fastest possible speed, is a matter of balancing the rate of evaporation in the rotating flask with the rate of condensation at the rotavap's condenser. The vacuum pump's role in this process is to reduce the pressure inside this system to the vapor pressure of ethanol – or other solvent – that is evaporating. Generally, the deeper the vacuum inside the rotavap, the lower the bath temperature needs to be. This is extremely important when working with temperature-sensitive products.

Since deep vacuum and higher bath temperature both tend to accelerate evaporation, why not use the deepest vacuum and highest temperature possible? Because the process will run out of control. Product will evaporate with the ethanol, both of which will blow out the pump exhaust and be lost.

So how do you complete the process as fast as possible and maintain control? Sizing a vacuum pump for the right vacuum depth and flow rate are critical to maintaining the right balance. If the pump takes the vacuum too deep, product will start to evaporate. Look for a pump that is designed to operate in the same range as the vapor pressure of ethanol. In terms of flow, the pump only needs to have enough flow to account for the difference between the rate of evaporation and the rate of condensation. This will minimize process time and maximize throughput and profitability.

### A Better Vacuum

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But there is a better way. Using a variable speed pump with automated control can further accelerate your production and maximize solvent recovery. With intelligent, automated control the pump will quickly adjust to the continuously-changing process conditions. This keeps the evaporation and condensation rates in balance, completing the process quickly and keeping the solvent recovery rate as high as possible. Perhaps best of all, automating the process means that the evaporation process will run unattended, freeing time up from otherwise labor-intensive work.

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### Solutions for Rotary Evaporation

VACUUBRAND® has a range of pumps for rotavaping crude oil that is unmatched. All our chemistry-rated diaphragm pumps have fluoropolymer wetted materials and 15,000-hour service intervals for years of low-maintenance performance. We offer economical workhorse pumps to complete your evaporation quickly. Our line of VARIO® select pumps feature intuitive automation capabilities that deliver unparalleled precision and reproducibility.

#### [MD 4C NT](#)

1.1 torr ult. vacuum, 63 LPM

- Reliable workhorse pump for ovens and rotavaps
- High flow + Deep vacuum = Fast process

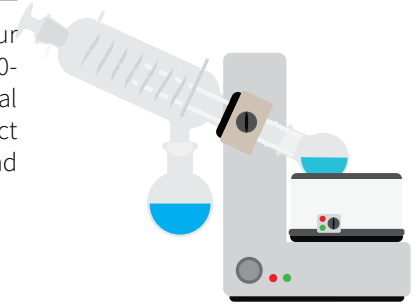
#### [PC 3004 VARIO® select](#)

1.1 torr ult. vacuum, 77 LPM

- VARIO control holds ultra-precise vacuum, use the same pump for filtration and rotavaping/concentrating
- Automate processes at the touch of a button

### Get the Right Pump for Your Rotavap

VACUUBRAND® will work with you to find the right pump to meet your technical and budgetary requirements. Contact our factory-trained technical team to find the best pump for you.



VACUUM PUMP  
Selection Guide  
FIND THE RIGHT PUMP FOR YOUR APPLICATION