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BUYER'S GUIDE

AUTOMATIC MODULES FOR CONTINUOUS DISTILLATION

HEI-VOLUME DISTIMATIC PRO

Published On: August 14, 2024

AUTOMATIC MODULES

for Optimal Solvent Management

Whether you concentrate, recover, process, or recycle solvents in the daily use of a high-volume rotary evaporation, filling, draining and cleaning take most of the time. While the typical thought process may be to increase with the rotary evaporator, automation can be a more elegant solution to increasing the throughput without increasing the man-time or footprint.

What is the Hei-VOLUME Distimatic Pro?

The Hei-VOLUME Distimatic Pro is the only automatic module for continuous distillation on the market, pairing with either benchtop Hei-VAP Rotary Evaporators or process-scale Hei-VAP Industrial Large Scale Rotary Evaporators. Hei-VOLUME Distmatic Pro utilizes a multitude of sensors along with over and underpressure fluid transfer to completely automate the filling and draing process, either in large batch or continuous process flow. This allows it to maintain the efficiency of a rotary evaporator, the scale and convenience of the reactor, and the cost-effectiveness of the heating mantle.

How Does the Hei- VOLUME Distimatic Pro Automate Continuous Distillation?

When evaporation becomes a bottleneck, the solution is not always to go bigger. Hei-VOLUME Distimatic Pro fully enables you to do more automatically with your current bench-top or industrial scale evaporator. Throughput is improved through the reduction of downtimes that involves replacing, emptying, and filling flasks, while also pushing your evaporator into hours of the day and night where an operator would typically not be present. The automation the Hei-VOLUME Distimatic Pro provides also removes all operator fluid handling steps, leading to safer fluid handling of solvents.

Hei-VOLUME Distimatic Pro utilizes sensors and/or preset timers to automate the evaporation flask filling, the receiving flask draining, and the residue removal.

1. The Hei-VOLUME Distimatic Pro automatic module uses the internal vacuum of the Heidolph Rotary Evaporator to pull the initial product (educt) into the evaporation flask until it hits the level sensor.
2. The evaporation process will run, refilling the evaporation flask as needed
3. Once the receiving flask system (valve matrix) reaches a certain fill level, it will be cut off from the system and the solvent (distillate) will be drained with a slight overpressure.
    - After the valve matrix flask is being drained, a vacuum will be pulled inside it to match the rest of the evaporation system. This prevents the water hammering effect and allows the evaporation to be unaffected by draining.

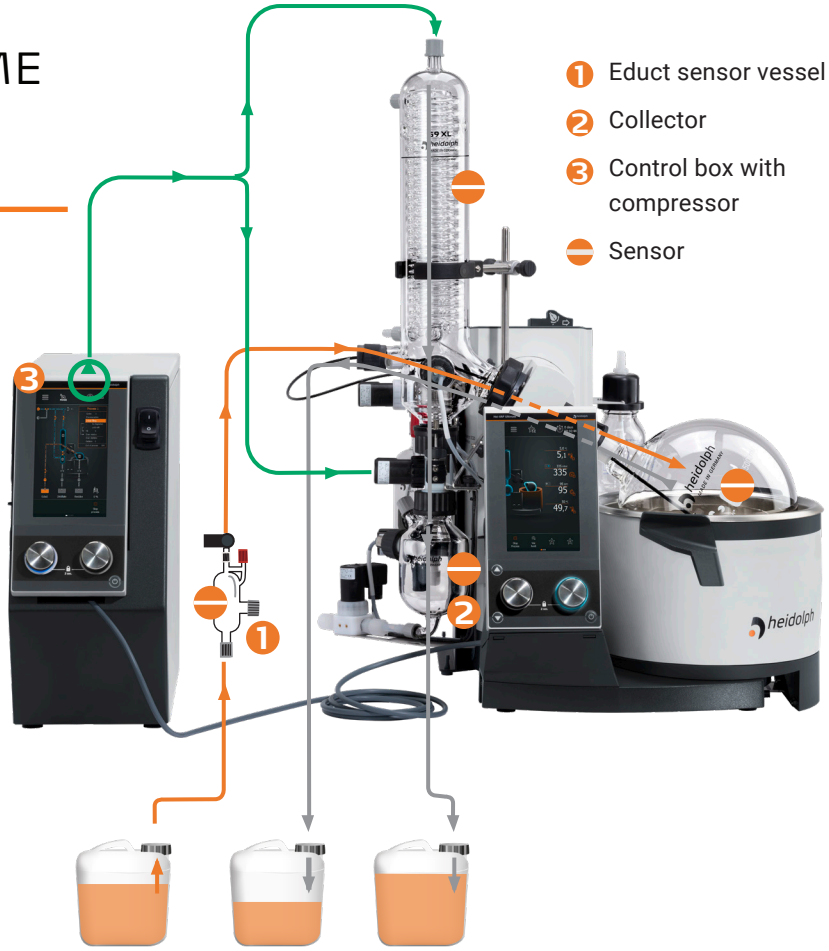


Figure 1: Overview of Continuous Distillation Process

The Hei-VOLUME Distimatic Pro automating the rotary evaporation process, highlighting efficient solvent management through filling, draining, and cleaning stages.

To see the full process in action visit our Youtube page.

4. This process will continue until either:
    - The evaporation flask is filled to the level sensor with product (residue) with solvent (distillate) removed
    - A predetermined number of distillate drains have occurred
    - There is no longer product to fill the system with
5. Once one of the above has been achieved, a slight overpressure is applied to the evaporator to push out your residue into the container of your choice, and the process will reset and continue 24/7 or until there is no educt left to fill the system.

How Do You Operate the Hei-VOLUME Distimatic Pro?

The overview panel (Panel A) of the Hei-VOLUME Distimatic Pro provides a full display of everything operating simultaneously inside the evaporator and automatic module at the same time. A color system makes visible the process steps: Blue highlights for vacuum, orange for fluid transfer, and green for overpressure. The parameter panel (Panel B) enables customization of the evaporation solution. The stagnation time dictates how long a product will sit on the sensor before determining whether evaporation is complete. Refill will dictate the time after the solvent has dropped below the level of the sensor before filling with more product solvent mix. Then, you can choose for this fill to continue indefinitely or for a predetermined amount of fill.

Below that, the number of times the distillate is removed from the system can be adjusted. The distillate is removed in 350 ml (benchtop) or 1000 ml (industrial) increments, and this parameter can be adjusted to allow for concentration-based drying.

Finally, at the top, you can choose for this to cycle through indefinitely until there is no more product to evaporator, or after a certain number of cycles if we are aiming for a batch volume.

Watch our On-Demand Demo to see the Hei-VOLUME Distimatic Pro in action!

Panel A: The Overview Panel

Panel B: The Parameter Panel

Bench-top or Industrial?

The first step to automation is determining the volume of the material to be processed. If the material you are looking to process requires more than one bench-top evaporator to complete in a given day, the Hei-VOLUME Distimatic Pro may be a simpler method of scale-up than purchasing a larger unit. If you are currently working with a 20 L unit, it may also be more efficient to automate the unit to triple its throughput as opposed to purchasing a new 50 or 100 L evaporator.

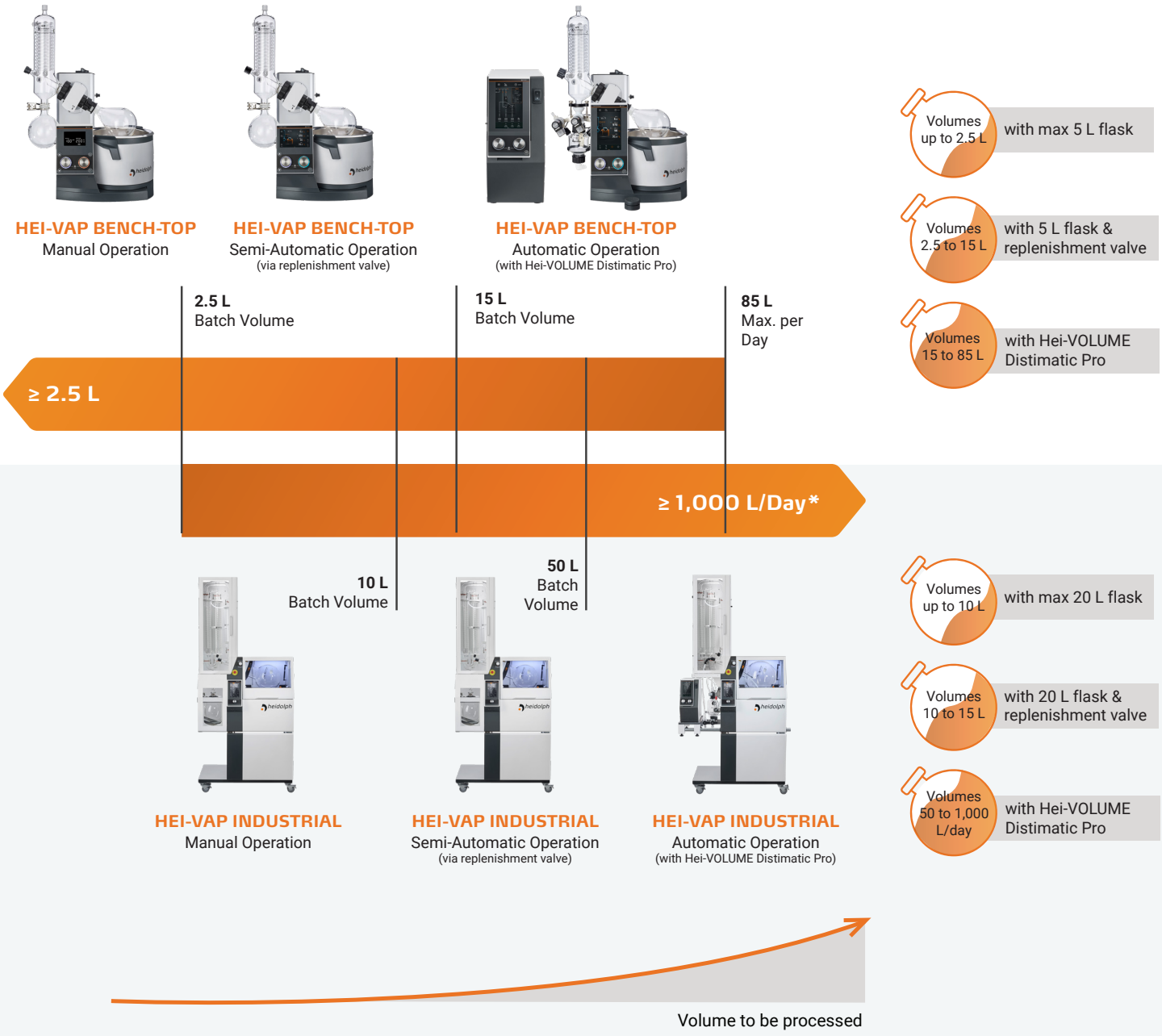


Figure 2: Upscaling Overview - Hei-VAP Series

The right system for every volume.

*depending on the solvent used (max. values are based on the evaporation rates of hexane)

Residue Removal or No Residue Removable?

The last question to answer when choosing your Hei-VOLUME Distimatic Pro is what does your end process material look like? Is it an aqueous, wax, oil, or powder? The final material will determine how to utilize the residue-removal feature of the automated module. If the end material is solid, it may be advantageous to replace the flask manually at the end stage. Alternatively, it may also be useful to leave a small amount of solvent to enable automatic pumping.

Medium	Viscosity/mPas (at 25°C)	Quantity ml/min (at 25°C)	Quantity ml/min (at 40°C)	Quantity ml/min (at 60°C)	Quantity ml/min (at 80°C)
Sunflower Oil	57	516	1,860	2,258	2,618
PEG-Oil	265	263	573	1,312	1,860
Glycerin	605	103	333	793	1,587
Corn Syrup	1,160	41	262	590	722
Water	1	2,600	-	-	-

Figure 3: Viscosity Benchmarks

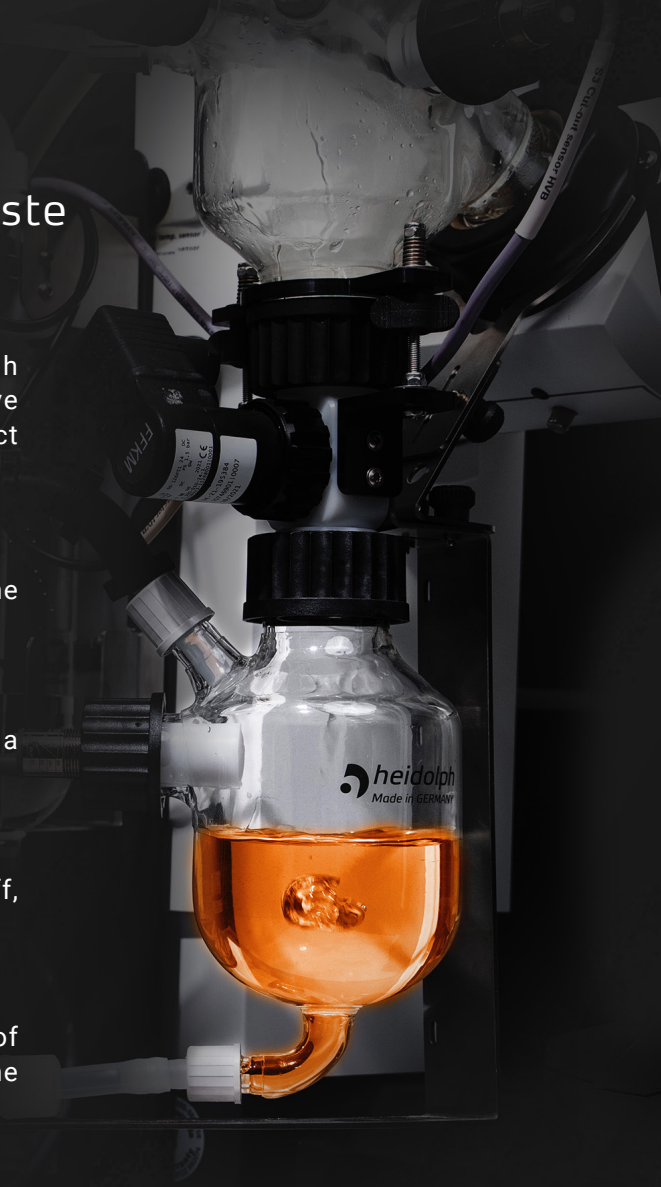
Flow rates of the residue pump with maximum viscosity of approx. 1,000 mPas. Please consider that temperature has an influence on viscosity.

Research Made Easy

At Heidolph, we are dedicated to helping you maintain focus by providing robust, user-friendly devices without compromising on quality, endurance, or reliability. Our Rotary Evaporators, along with all our products, are crafted with exceptional workmanship and premium materials that are uniquely designed to make research easier and more efficient.

View our full line-up of solutions us at **heidolph.com**

Glossary - From Automation to Zero Waste



BUFFER TANK

The tank the solution being evaporated (educt) passes through before going into the evaporation flask. This detects that we have material to put into the flask, and facilitates cutout if no more educt is available for evaporation

DISTILLATE

The solution being evaporated off and condensed, typically the solvent

EDUCT

Initial material that will be placed in evaporation flask, typically a solute and solvent mixture

RESIDUE

The material left over after the solvent has been evaporated off, typically a solute

VALUE MATRIX

The receiving vessel for condensed solvent (distillate), consists of a sensor and valves to facilitate draining of the distillate from the system

MODES

MANUAL MODE

The mode for single batch processes while still utilizing the automatic module

RINSE MODE

A process that automatically cleans the system when a cleaning solvent is utilized. Rinses the PTFE lines, valve matrix, and residue extraction thanks to preset parameters

SENSOR MODE

The standard mode of the automatic module involves using the sensors with a few key parameters in order to facilitate the continuous distillation process

TIMER MODE

The mode of the automatic module that allows for manual time set-points for each part of the continuous distillation process

PROCESS

CYCLE

A cycle is a full run of an evaporation process, involving x fills and y distillate drains, with the cycle ending on residue removal

STAGNATION TIME

The amount of time the solution (educt) inside the evaporation flask has been touching the level sensor

UNTIL REFILL

How long after the educt is no longer touching the level sensor before filling occurs

INITIAL FILLING

First fill of the evaporation flask with educt

PRE-EVACUATION

Vacuum pull before the process begins

SENSORS

CUT-OUT SENSOR

A sensor placed in the condenser that will “cut out” the system (safe state shut down) in the event of an overflow.

LEVEL SENSOR

Detects the level of solution (educt) In the evaporation flask

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