HY-PRO FILTRATION

VAC-U-DRY

VACUUM DEHYDRATION SKIDS

V10

- Remove Free & Dissolved Water Down to 20 PPM (0.002%)
- Remove Free & Dissolved Gasses
- Standard Flow Range 5~100 gpm,18~378 lpm (Larger Units Available)
- Visually Monitor Fluid and Process through Clear Chamber Covers
- High Water Removal Efficiency
- Enhance with Additional Fluid Conditioning Technologies Such as Coalesce, Acid Scavenging and Varnish Removal

- High Efficiency Particulate Filtration
- Low Watt Density Heaters
- Dual Condensate Water Tanks with Automatic Drain Standard for 24 x 7 Unattended Operation
- Electrical Phase Reversal Standard

V3

VAC-U-DRY optimizes the balance between heat, vacuum and process design to rapidly remove dissolved water and gas. Keep your oil clean, dry and healthy!

V10 Model

Large air cooled condenser

Air inlet breather (particulate or desiccant)

Dual stainless steel condensate tanks standard with clear covers for visual process inspection

Several high output vacuum pump options available (lubricated vane dry seal shown)

Clear vacuum chamber and condensate tank covers for visual monitoring of dehydration process

Top loading particle filter assembly with coreless filter element and true Δp gauge

Auto water drain circuit allows for 24 x 7 continuous unattended operation

User Friendly . . . The easiest most reliable vacuum dehydrator to operate! Flexible, we'll listen then customize a VAC-U-DRY for your specific application.

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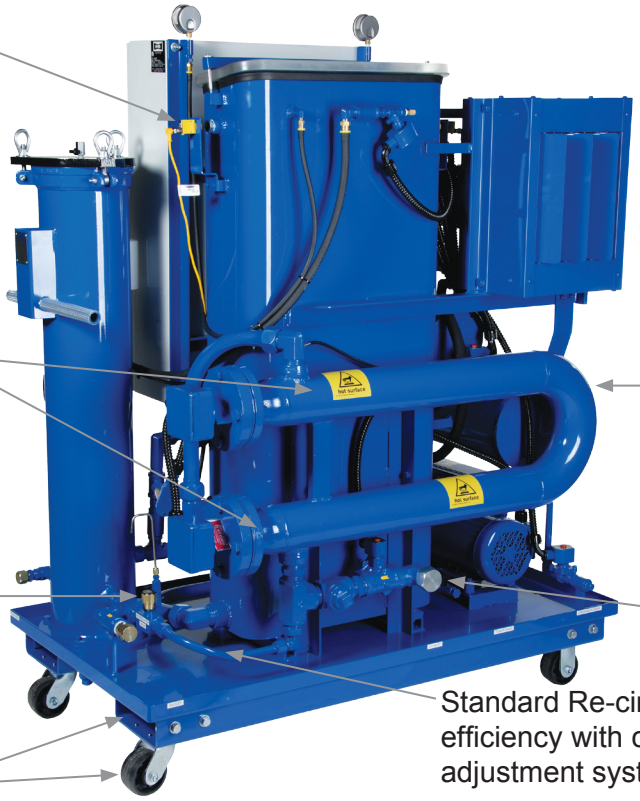
Clear vacuum chamber and condensate tank covers allow you to see the performance (condensation and collected water).

Optional foam sensor and knockdown circuit

All condensate wetted parts are 304 stainless steel (standard)

Low watt density fin tube heaters prevent coking with no direct contact between heating element & fluid



Ample plumbing makes Vac-U-Dry suitable for fluid viscosity to 680 cSt. Ideal for high viscosity lubricating fluids

Re-circulation line control valve

Vac-U-Dry inlet

Solid non-shedding wheels and forklift guides standard

Standard Re-circulating line maximizes efficiency with cold start and allows adjustment system return flow rate

Integrate Coalesce, Varnish Removal or Acid Scavenging Technologies into Vac-U-Dry for the Ultimate in Oil Purification

VUD enhanced with coalesce for gross free water removal.

Combination coalesce & separator element.

ICB elements for varnish removal (mineral based lube oil). Remove dissolved metals, gels and deposits and control acid (phosphate ester, jet lube).

The Harmful Affects of Water in Oil

Water is one of the most common and most damaging contaminants found in a lube or hydraulic system. Continuous or periodic high water levels can result in damage such as:

- Metal Etching (corrosion)
- Abrasive Wear in Hydraulic Components
- Dielectric Strength Loss
- Fluid Breakdown
- Additive Precipitation and Oil Oxidation
- Reduction in Lubricating Properties

75% of All Hydraulic Component Failures are Caused by Fluid Contamination

The effects of moisture in your oil systems can drastically reduce on stream plant availability. Bearing life and critical component life is greatly reduced by moisture levels above and within the saturation point. Many systems run constantly above this point due to inefficient dehydration technologies and high ingression. This develops acidity and loss of lubrication properties. Free water occurs when oil becomes saturated and cannot dissolve any additional water. This water makes the oil appear cloudy and can even be seen in puddle form at the bottom of a reservoir. Water which is absorbed into the oil is called dissolved water. At elevated temperatures, oil has the ability to hold more water in the dissolved state due to the expansion of the oil molecules. As the oil cools, it loses its capacity to hold water and free water will appear where previously not visible. Fluid type also determines saturation point in addition to temperature changes.

Fluid	Saturation PPM	Saturation %
Hydraulic	300	0.03%
Lubrication	400	0.04%
Transformer	50	0.005%

New Moisture Level PPM (%)

Current Moisture Level (PPM)	1000 (0.1%)		500 (0.05%)		250 (0.025%)		100 (0.01%)		50 (0.005%)	
	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing
5000	2.3	1.6	3.3	1.9	4.8	2.3	7.8	2.9	11.2	3.5
2500	1.6	1.3	2.3	1.6	3.3	1.9	5.4	2.4	7.8	2.9
1000			1.4	1.2	2	1.5	3.3	1.9	4.8	2.3
500					1.4	1.2	2.3	1.6	3.3	1.9
250							1.5	1.3	2.3	1.6
100									1.4	1.2

Component Life Extension by Removing Water*

*Courtesy of Noria

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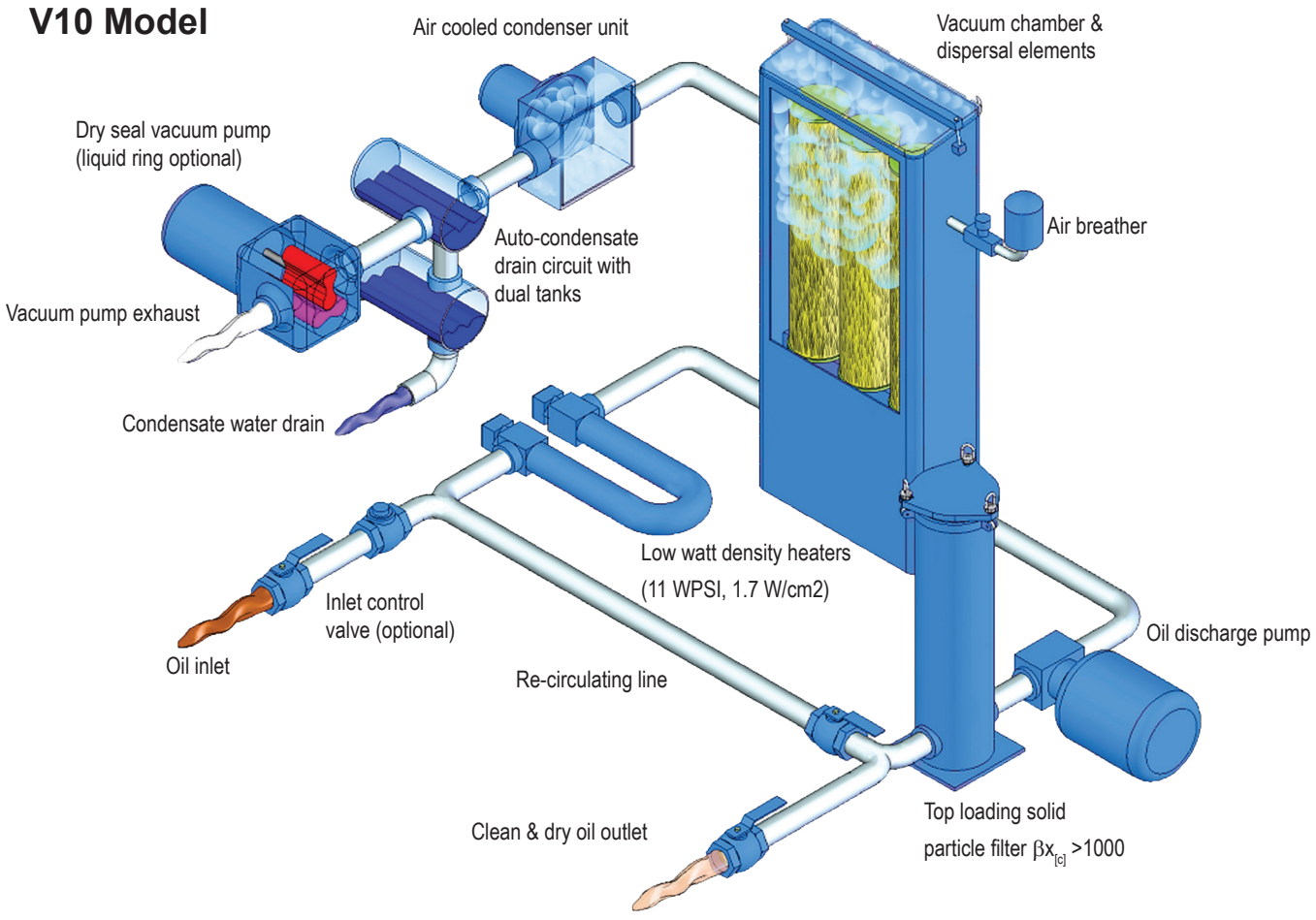
Increase "Must Have" Plant Reliability

Centrifuges only remove free water that is well above the saturation point leaving harmful quantities of free and dissolved water in the oil. Desorbers and coalescing filters can achieve water levels of 150 ppm, but the process can be much slower or impossible with the presence of surfactants and additives. VAC-U-DRY rapidly removes water (below 20 ppm [0.0020%] with desiccant breather) with high efficiency to control water levels under normal ingression and regain control of high ingression conditions in hours instead of weeks or months.

Contaminant Type	VAC-U-DRY Capability
Water	Remove 100% free water 90% + dissolved water
Particulate	ISO Cleanliness Code 13/11/8 per ISO4406:1999
Gases	Remove 100% free gases 90% + dissolved gases
Air	Remove 100% free air 90% + dissolved air

The VAC-U-DRY Purification Process and Flow Diagram

Contaminated oil is drawn into the VAC-U-DRY purifier by a high output vacuum pump. The oil passes through the low watt density heater where heated to optimum temperature for the dehydration process (150°F, 66°C). The oil enters the vacuum chamber passing through specially designed dispersal elements which create a thin film of oil that is exposed to the vacuum. The water is vaporized and then drawn into the condenser where it becomes liquid and drains into the condensate tank.



The dehydrated oil flows to the bottom of the vacuum chamber and is removed by the discharge pump. The oil is pumped through the high efficiency particulate filter assembly ($\beta x_{[c]}$ >1000) and returned to the system. The recirculating line helps the VAC-U-DRY reach optimum temperature in cold start situations and can be used to throttle machine inlet and outlet flow.

Feature	Description
Condensate wet parts stainless	Better fluid compatibility with no price adder (304 stainless standard)
Flexible design & dimensions	Flexible dimensions, process setup to suit your application (others won't)
Programmable thermostat	Precise temperature control, prevents overheating, allows unattended operation
Vacuum process	24" - 25" Hg vacuum yields rapid water and gas removal. Operational up to 20 meter (60 ft) negative head
Visual access	Clear cover on vacuum chamber and condensate tank allow visual inspection of oil condition and process

Feature	Description
Re-circulation line	Achieve optimum temp faster. Reduce flow rate for smaller systems. Maintain several systems with VAC-U-DRY
Condensate collection	All water removed does not go through vacuum pump, extends vac pump life
Heater system	Low watt density heaters prevent coking No direct heat element contact with oil Heat applied only when necessary
Auto condensate drain	Automatic condensate drain standard Maximizes uptime (24/7 operation)
Electrical phase reversal standard	Electrical phase reversal automatically controlled in the control panel No guess work or switch to throw

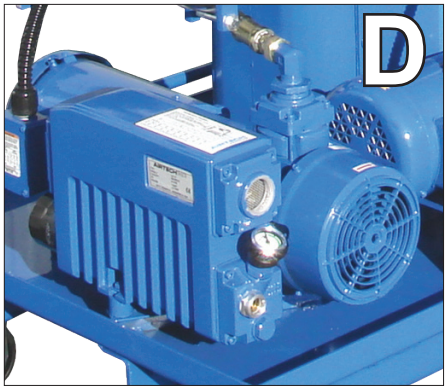
Operator Friendly Smart Relay - Smart relay enabled control panel performs controlled start-up & shut-down routines for ease of operation and keeps operators out of the control box. Includes machine drain sequence & automatic phase reversal (internally controlled, no guess work or switch to throw).

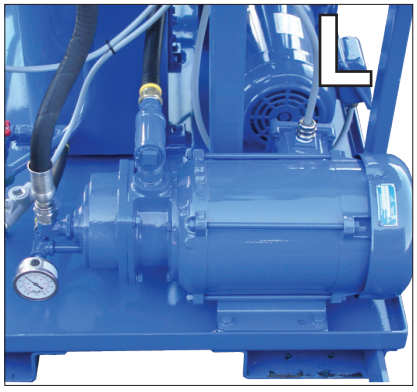
Programmable Thermostat - Programmable temperature controller for ease of operation and variable temp control with high limit safety setting.

Heater Selector Switch (keyed) - Optional keyed selector switch for all units above 12KW. Suitable with mobile unit when AMP circuit does not allow for AMP draw with heat > 12KW (Multiple heaters can be deselected).

Vacuum Pump Option Selection

Code	Description	Maintenance	Requirements
C	Dry seal (dry rotary claw)	20,000 hour maintenance oil change	Long maintenance interval plus excellent portability
D	Dry seal (lubricated rotary vane)	500~750 hour maintenance oil/filter change	Excellent portability
L	Liquid ring (external process water line ~ 3 gpm required)	Monitor water supply line filter, vacuum pump compound gauge (positive pressure)	Ideal for hot, humid ambient conditions, limited portability





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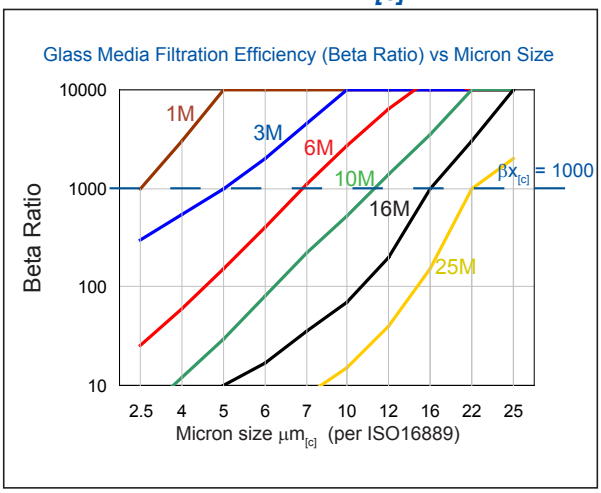
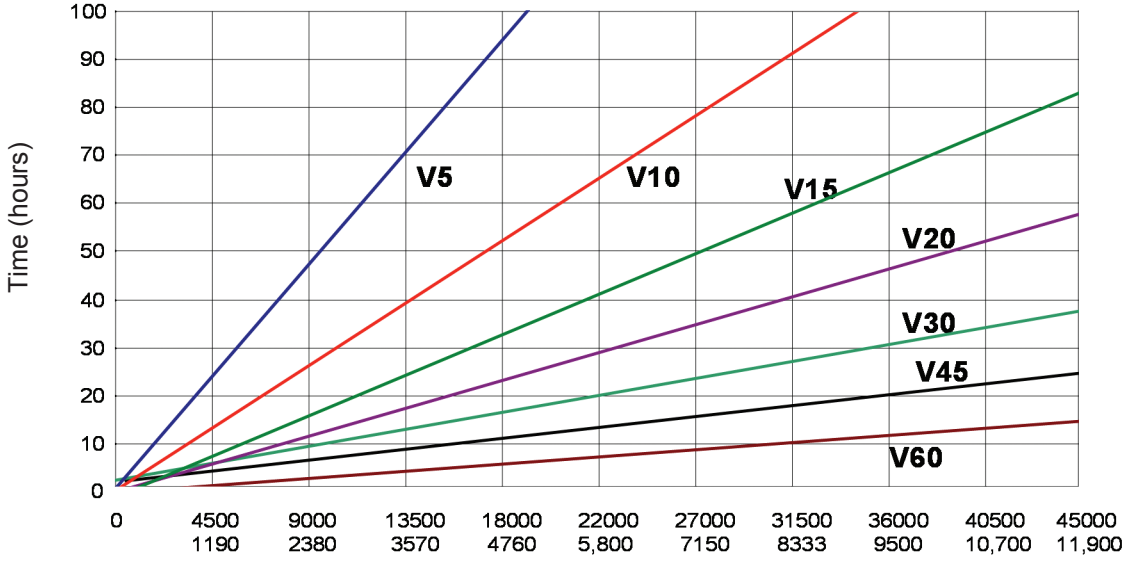
High Performance Particulate Filter Elements $\beta x_{[c]} > 1000$

Particulate Filter - A generously sized filter with a high efficiency filter element yields lower ISO Fluid Codes and enhances overall reliability. Achieve world class turbine lube reservoir cleanliness down to 14/12/9 with Vac-U-Dry high efficiency coreless filter elements. All elements include an integral bypass valve so the bypass valve is new with each element.

Media Selection - Vac-U-Dry is available with a wide assortment of filter element media options to fit your specific application. Whether you're running low viscosity turbine lube oil requiring super cleanliness or conditioning high viscosity steel mill lubrication systems Hy-Pro will help you make the right selection.



Estimated Water Removal Time - 5000 ppm (0.5%) to 150 ppm (0.015%)



Model	Length Inch (mm)	Width Inch (mm)	Height Inch (mm)	Crated Weight Lbs (Kg)	Dispersal Element Qty.	Inlet Connection	Outlet Connection
V3D	48 (1220)	32 (813)	50 (1270)	850 (386)	2	1" Male JIC	3/4" Male JIC
V5C	56 (1422)	40 (1016)	75 (1905)	2000 (908)	2	1" Male JIC	1" Male JIC
V10C	72 (1829)	40 (1016)	75 (1905)	2400 (1089)	3	1 1/2" Male JIC	1" Male JIC
V15C	72 (1829)	40 (1016)	75 (1905)	2500 (1134)	3	1 1/2" Male JIC	1" Male JIC
V20C	84 (2134)	40 (1016)	75 (1905)	2800 (1270)	4	1 1/2" Male JIC	1" Male JIC
V30C	84 (2134)	40 (1016)	89 (2261)	3100 (1406)	4 (ext. length)	2" Male JIC	1 1/2" Male JIC
V45C	84 (2134)	48 (1219)	89 (2261)	3400 (1542)	8 (ext. length)	2" Male JIC	2" Male JIC
V60C	96 (2439)	60 (1524)	89 (2261)	3700 (1678)	8 (ext. length)	3" Female NPT	2" Female NPT
V100C	120 (3048)	96 (2439)	89 (2261)	4600 (2087)	16 (ext. length)	3" Female NPT	3" Female NPT

*Dimensions and weights are for standard models with C vacuum pump except V3. Selecting D vacuum pump option will decrease the pan size used. For more exact dimensional information we invite you to build your part number and then contact us for possible deviation from standard dimensions.