HY-PRO

VAC-U-DRY

VACUUM DEHYDRATOR

- Remove Free & Dissolved Water down to 20 PPM (0.002%)
- Flow range 5~60 gpm,19~225 lpm
- Visually Monitor Fluid and Process through Clear Chamber Covers
- High Operating Vacuum and Water Removal Efficiency
- High Efficiency Particle Filtration
- Low Watt Density Heaters
- Dimensional and Arrangement Design Flexibility
- Condensate Water Holding Tank
- Optional PLC Control

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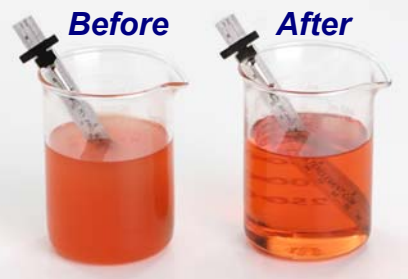
VAC-U-DRY has the ability to develop higher vacuum and flow for speed of dissolved water and gas removal, and the best negative head capability.



Flexibility of design dimensions & process arrangement is an available option. We'll listen then customize a VAC-U-DRY for your specific application.

Model	Length Inch (mm)	Width Inch (mm)	Height Inch (mm)	Weight Lbs (Kg)
V3	36 (914)	32 (813)	48 (1219)	500 (227)
V5	48 (1219)	32 (813)	48 (1219)	750 (340)
V10	56 (1422)	32 (813)	60 (1524)	750 (340)
V15	56 (1422)	32 (813)	60 (1524)	1150 (524)

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

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

Stainless steel (standard) vacuum chamber with dispersal elements

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

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

Standard Re-circulating line assists with cold start and throttle system return flow rate.

Solid non-shedding wheels and forklift guides standard

Model	Length Inch (mm)	Width Inch (mm)	Height Inch (mm)	Weight Lbs (Kg)
V20	72 (1829)	36 (914)	60 (1524)	1200 (544)
V30	84 (2134)	40 (1016)	60 (1524)	1400 (635)
V45	84 (2134)	48 (1219)	60 (1524)	1450 (658)
V60	84 (2134)	60 (1524)	60 (1524)	1650 (748)

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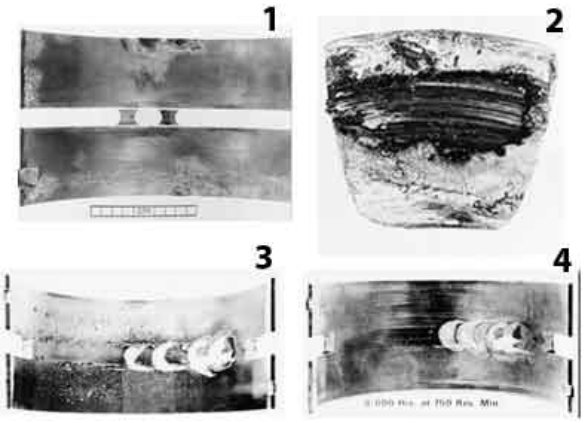


The Harmful Affects of Water in Oil

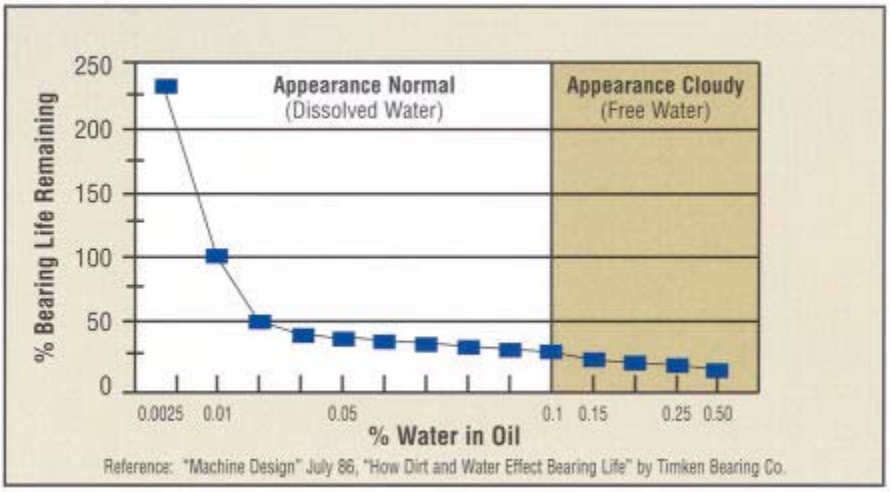
Water is one of the most common and most damaging contaminants found in a lube or hydraulic system. Continuous or periodic high water levels can result in damage such as:

- 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

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

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.



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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Aim Dryer with the VAC-U-DRY Dehydrator

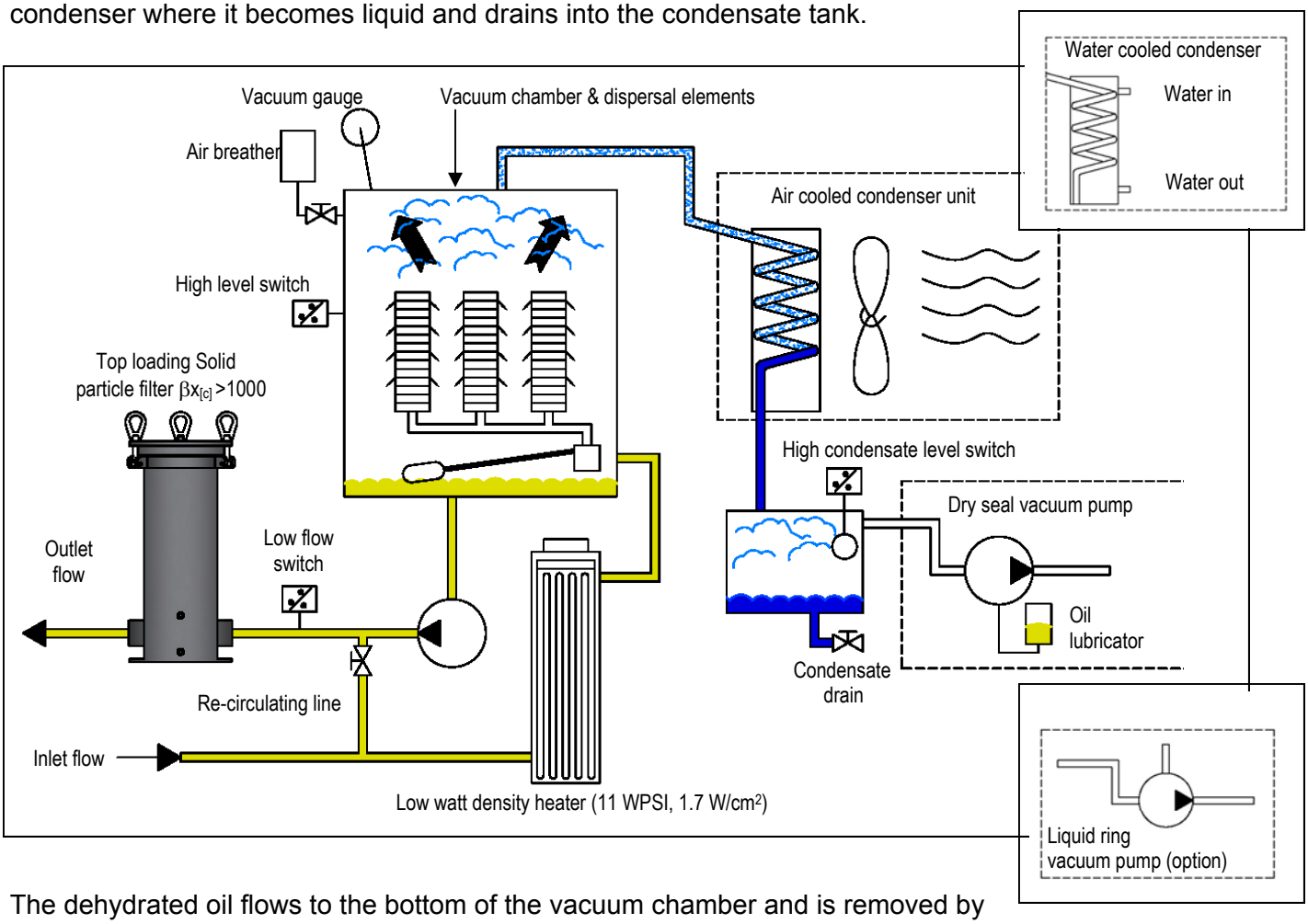
Centrifuges only remove free water that is well above the saturation point leaving harmful quantities of free and dissolved water in the oil. Desorbers and coalescing filters can break dissolved water out of emulsion but the process is much slower than vacuum dehydration. VAC-U-DRY rapidly removes water down to 5 ppm (0.0005%) with 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

Increase "Must Have" Plant Reliability

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 re-circulating line helps the VAC-U-DRY reach optimum temperature in cold start situations and can be used to throttle machine inlet and outlet flow.

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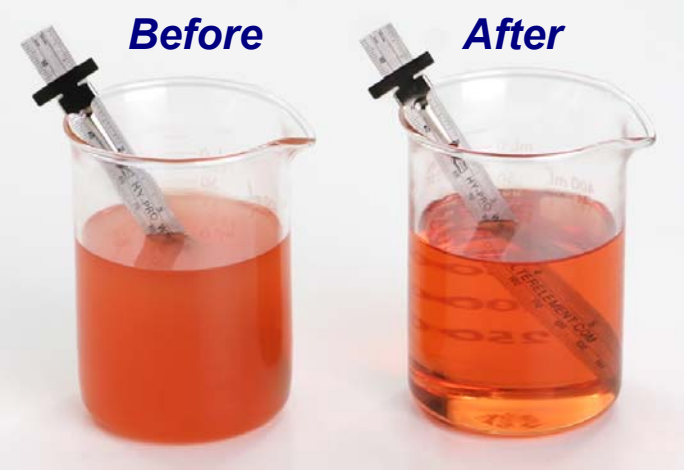
Feature	Description
All wetted parts stainless	Better fluid compatibility with no cost price adder (stainless standard)
Flexible design & dimensions	Flexible dimensions, process setup to suit your application (others won't)
Programmable thermostat	Precise temperature control, prevents overheating, unattended operation
Vacuum process	27.0" Hg vacuum yields rapid water and gas removal. Operational up to 20 meter (60 ft) negative head
Visual access	Plexiglas covers on vacuum chamber and condensate tank allow visual inspection of oil condition and process

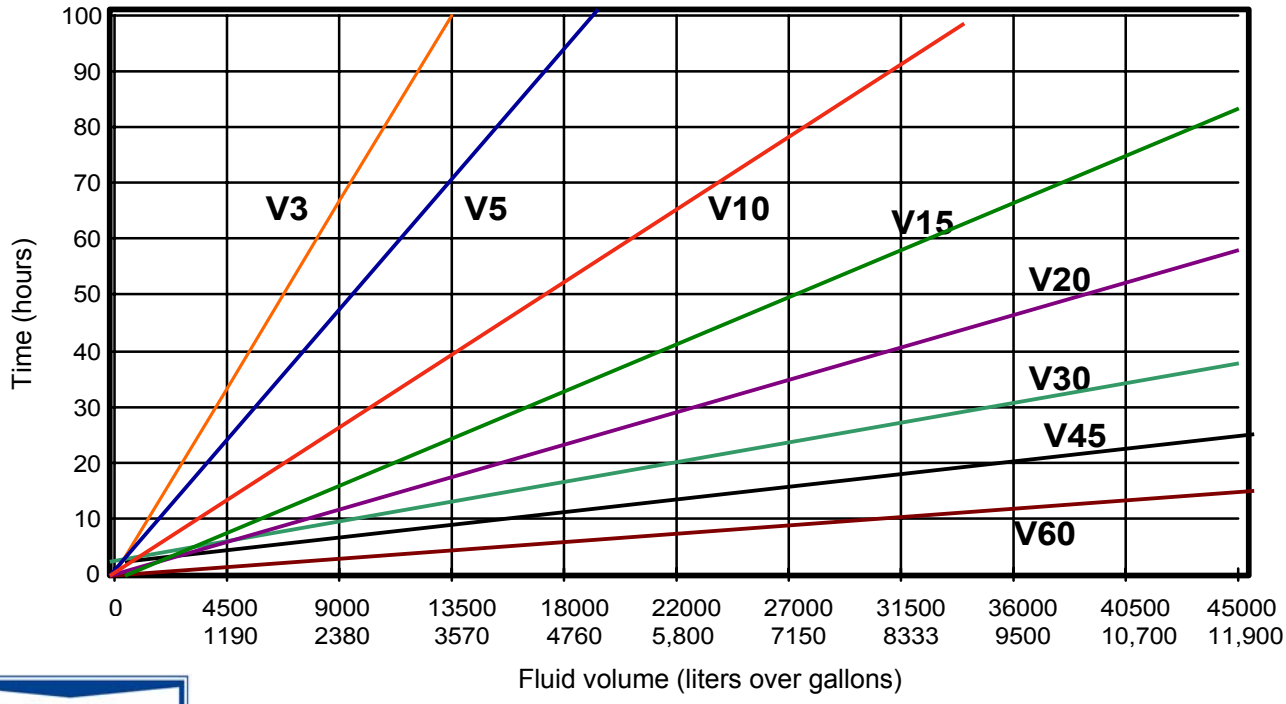
Feature	Description
Re-circulation line	Achieve optimum temp faster. Reduce flow rate for smaller systems. Maintain several systems with one VAC-U-DRY
Condensate collection	All water removed does not go through vacuum pump extends vac pump life.
Heater system	Low watt density heaters prevent coking No direct heat element contact with oil Heat applied only when necessary
Wheels & forklift guides	Heavy duty solid wheels and forklift guides provide safety and portability
PLC control & water sensor	Remote monitoring & start/stop (option) PPM sensor Auto-start/stop (option) Visual display PPM water sensor



Field Trial Results

Tank Volume	100 Gallons (375 litres)
Time Elapsed	95 Minutes
VAC-U-DRY Model	V10 (10 gpm, 37 litres)
Water content	Start: 10,000 PPM (1.0%) Stop: 50 PPM (0.005%)
ISO Cleanliness code	Start: ISO 21/18/16 Stop ISO 15/13/10

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



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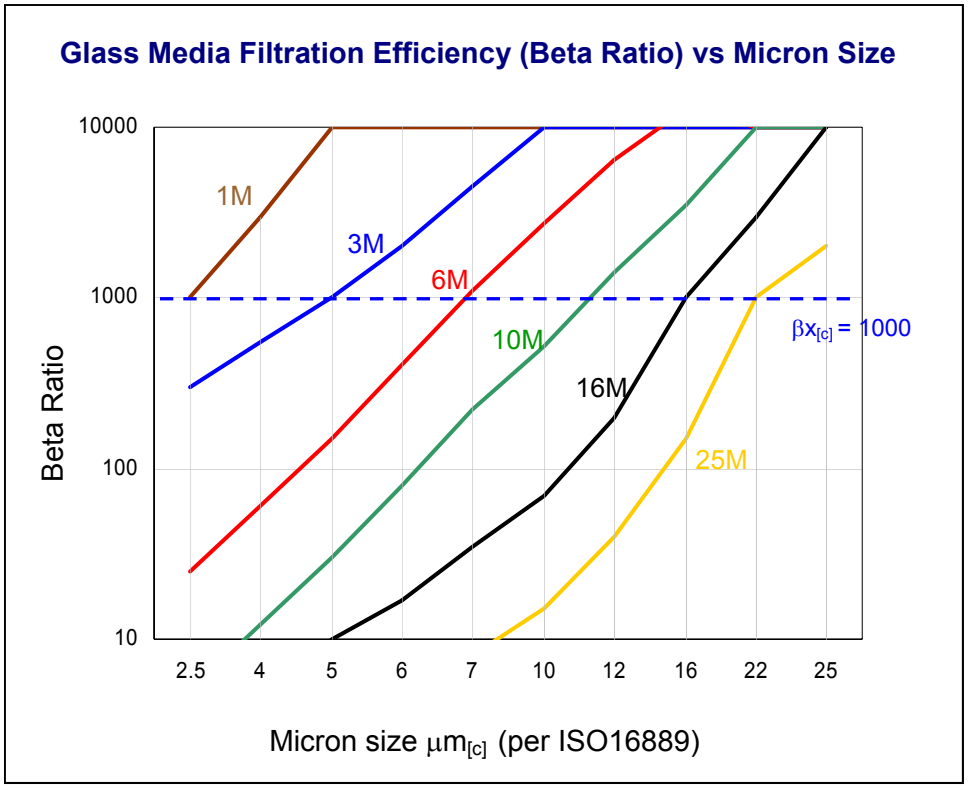
High Performance Particulate Filter Elements βx[c] > 1000

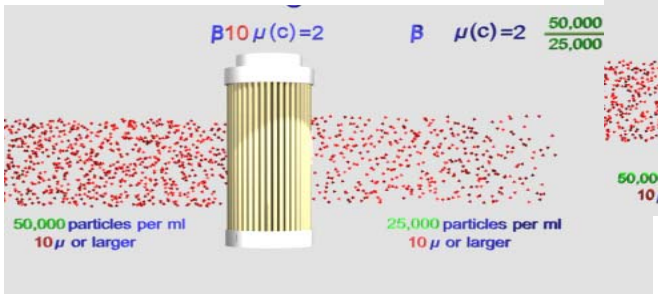
Dynamic Filter Efficiency (DFE) Testing - Revolutionary test methods assure that DFE rated elements perform true to rating even under demanding variable flow and vibration conditions. Today's industrial and mobile hydraulic circuits require elements that deliver specified cleanliness under ALL circumstances. Wire mesh supports the media to ensure against cyclical flow fatigue, temperature, and chemical resistance failures possible in filters with synthetic support mesh. Contact your distributor or Hy-Pro for more information and published articles on DFE testing.

Media Options - Through extensive testing we have developed media choices to handle any application. Media options include G7 Dualglass, and Stainless steel wire mesh.

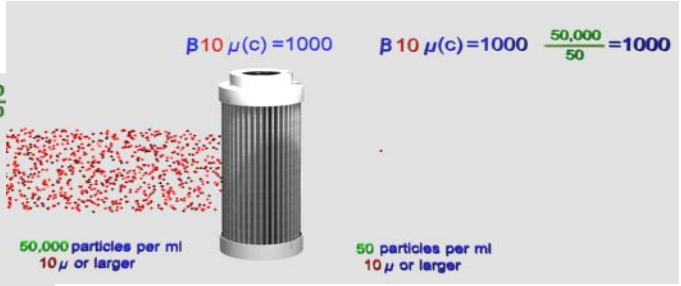
Fluid Compatibility - Petroleum based fluids, water glycol, polyol ester, phosphate ester, High water based fluids, Skydrol and many other synthetics. Contact us for material selection assistance and compatibility questions.



Typical cellulose media performance



Hy-Pro G7 Dualglass media performance



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VAC-U-DRY PART NUMBER GUIDE

V | flow rate | pump seal | power | dispersal element | media | seal | heater | con-denser | special options

table 1 code	flow rate gpm (lpm)
5	5 (19)
10	10 (38)
15	15 (56)
20	20 (75)
30	30 (113)
45	45 (169)
60	60 (225)

table 2 code	vacuum pump
D	Dry seal
L	Liquid ring

table 3 code	power options
23	230 VAC, 3P, 60Hz
38	380 VAC, 3P, 50Hz
41	415 VAC, 3P, 50Hz
46	460 VAC, 3P, 60Hz
57	575 VAC, 3P, 60Hz

table 4 code	dispersal element
D	dispersal (coalesce)
P	packed

table 5 code	Filtration rating
1M	β2.5[c] = 1000 (β1 = 200)
3M	β5[c] = 1000 (β3 = 200)
6M	β7[c] = 1000 (β6 = 200)
10M	β12[c] = 1000 (β12 = 200)
16M	β17[c] = 1000 (β17 = 200)
25M	β22[c] = 1000 (B25 = 200)
25W	25μ nominal wire mesh
40W	40μ nominal wire mesh
74W	74μ nominal wire mesh
149W	149μ nominal wire mesh
250W	250μ nominal wire mesh

table 6 code	seal material
V	Fluorocarbon Viton (standard)
E	EPR

table 7 code	heater (KW)
5	5 KW
10	10 KW
12	12 KW
24	24 KW
36	36 KW
48	48 KW

table 8 code	condenser type
A	air cooled
L	liquid cooled
B	air & liquid cooled

table 9 code	special options
3	LFM3 filter assembly (3 filter elements)
4	LFM4 filter assembly (4 filter elements)
8	8" solid wheel upgrade
A	automatic condensate drain (V5~V60)
C	CE mark (V5~V60)
D	dirty filter indicator alarm light (V5~V60)
E	carbon vacuum pump exhaust filter (V5~V60)
F	vacuum chamber foaming sensor (V5~V60)
G	304 stainless all oil wetted parts (316 standard)
H	manual reset hour meter (V5~V60)
J	304 stainless condensate tank (316 standard)
K	sight flow indicator (wheel type)
L	lifting eye (V5~V60)
M	flow meter (V5~V60)
N	no-reset hour meter (V5~V60)
P	PPM sensor + PLC control auto start/stop
R	electrical phase reversal switch (V5~V60)
T	12 gallon seal water tank (V5~V60)
V	inlet control valve (for positive head inlet)
W	PPM sensor
X	explosion proof (consult factory)

TBVUD-041406

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