

Raw Power Basic and Extreme Centrifuge Manual

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Sku: 1067 rev A

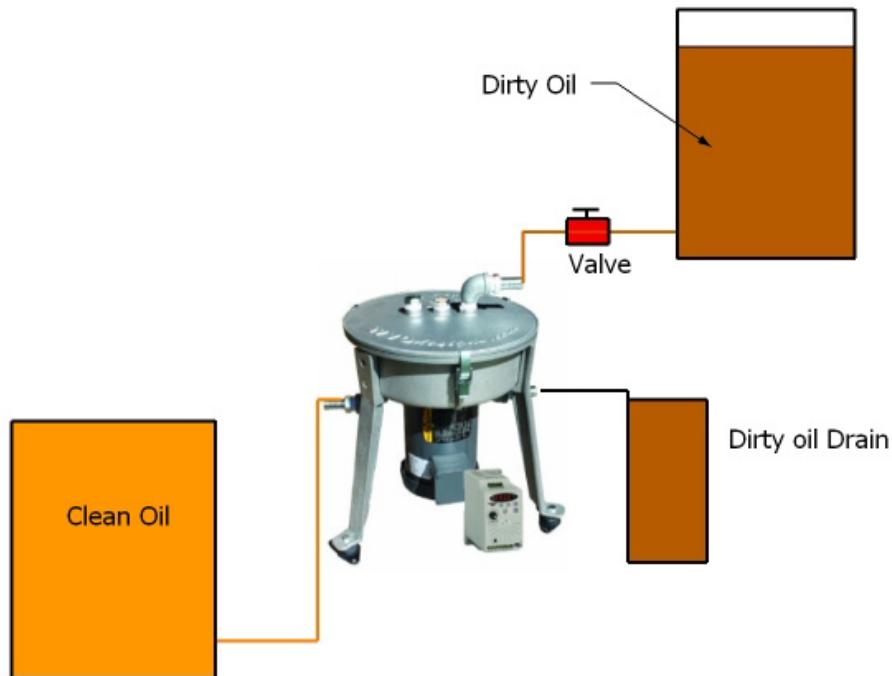


Thank you for purchasing the Raw Power Centrifuge from WVO Designs. This product is designed to remove contaminants (heavy solids and liquids) from waste oils such as waste vegetable oil in a continuous/batch process.

Hose fittings are $\frac{3}{4}$ " ID and threaded ports are $\frac{3}{4}$ " NPT. It is recommended to use clear hose to monitor the flow. PVC hose from the hardware store will work. Polyethylene is better and will last longer, but is more expensive.

Input to the centrifuge is designed to be gravity fed via a container placed higher than the centrifuge. You may use a low flow pump(15 gallons/hr) instead of gravity.

Output flow of oil is processed by the centrifuge and then drains out the clean port by gravity. A container must be placed lower than the centrifuge.



Flow should be 10–20 gallons/hour for fuel quality oil at 150°F. Use a valve to control the flow, otherwise the centrifuge will flood. The restrictor on the lid is not enough to reduce the flow. Measure the flow by timing how long it takes to fill a 5 gallon bucket. Flow over 25 gallons/hour, the centrifuge will flood. Start at the lower flow rates, 10gph, and work your way up.

Heaters should not run dry. When building your own, plumb in a low spot to prevent and include a thermostat. Oil is best cleaned when Hot, at least 150°F.

Cleaning—For a finer clean, slow down the flow of oil into centrifuge. The centrifuge will not clean the dregs or really dirty/water logged oil. It is best used for a fine cleaning, producing a fuel quality oil. If you have lots of debris and water in your oil, let it settle and pull or pour off the top, then into the centrifuge.

-Water and debris will be trapped in the bowl. Stop the bowl to let the water drain every 40 gallons or so. Cleaning of the bowl itself can be done every 200+ gallons or so, when the wall of dirt on the inside of the bowl gets thicker than $\frac{1}{4}$ ".

-Clean the bowl out with hot soapy water, a scraper and sponge.

Parts List

QUANTITY	DESCRIPTION	PART
1	RPC Rotor	1000
1	RPC Enclosure	1001
1	RPC Lid	1002
3	RPC Leg	1004
1	Breather Vent $\frac{3}{4}$ " NPT Male, 20 Max SCFM, 1" Height..	9833K12
3	Zinc-Plated Steel Barbed Hose Fitting High Flow Barbed X Male for $\frac{3}{4}$ " Hose ID, $\frac{3}{4}$ " Pipe	5350K45
3	Low-Pressure Galv Iron Threaded Pipe Fitting $\frac{3}{4}$ " Pipe, 90 Degree Elbow, Female X Male	4638K224
1	Pltd Stl, $\frac{3}{4}$ " Malex $\frac{1}{4}$ " Fem Hex Bushing, 150PSI..	4638K639
3	Overcenter draw latch, RPC, Cover..	97-50-150-11
1	One-Piece Clamp-on Shaft Collar Black-Oxide Steel, $\frac{5}{8}$ " Bore, $1\frac{5}{16}$ " OD, $\frac{7}{16}$ " Width	6435K15
1	Trantorque-Clamp Bushing for $\frac{5}{8}$ " Shaft Size, for 1" Component Bore	6202115
1	Viton O-Ring AS568A Dash Number 381 (12" x $\frac{3}{16}$ ")..	9464K645
4	Viton(R) Fluoroelastomer O-Ring AS568A Dash Number 013..	9464K18
6	18-8 Stainless Steel Flat Head Sckt Cap Screw $\frac{1}{4}$ "-20 Thread, $\frac{5}{8}$ " Length	92210A539
4	Zinc-Plated Stl Button Head Socket Cap Screw $\frac{3}{8}$ "-16 Thread, 1" Length	91306A419
1	HI-Pressure Forged Galv Stl Thrd Pipe Fitting $\frac{3}{4}$ " Pipe Size, Hex-Head Plug, 3000 PSI	7739K185
1	Steel 37 Degree Flared Tube Fitting Adapter for $\frac{1}{4}$ " Tube OD X $\frac{1}{4}$ " NPTF Male Pipe	50695K162
3	Bolt-down Vibration-damping Mount, $\frac{5}{16}$ "-18 Thread, 50Lb Max Load	64875K61
3	Znc-pltd Stl Low-strength Hex Head Cap Screw, $\frac{5}{16}$ "-18 Thread, $\frac{5}{8}$ " Length, Fully Threaded	91309A580
6	Zinc-Pltd Stl Pan Head Phillips Machine Screw 8-32 Thread, $\frac{7}{16}$ " Length	90272A193
1	Aluminum Seal Bushing	1056
2	Seal Set Screws	92313a238
1	Oil Seal	cr6152
1	Oil Seal	cr6139
1	Motor - .33HP, 3450RPM, 1PH, 60HZ, 56J, 3416L, TEFC, F1..	RPCo13/RPCo12
Optional	GS1 AC drive for Extreme Centrifuge.	

Necessary Tools/Materials:

- $\frac{7}{8}$ Deep Socket
- Thread tape or high temp pipe sealant
- Allen Wrenches: $\frac{7}{32}$, $\frac{5}{32}$, $\frac{3}{32}$
- Tube of Standard Grease
- Phillips head screwdriver
- Crescent Wrench

Assembly Instructions

Legs



STEP
1

Materials: 3 RPC Leg, 1 RPC Enclosure, 6 Allen Head Screws;



STEP
2

Bolt legs onto housing using $\frac{5}{32}$ Allen wrench

Latches



STEP
3

Materials: 3 Latches, 6 phillips head screws



STEP
4

Affix latches with curved piece up

Feet



STEP
5

Materials: 3 x Rubber Dampeners,
3 x Hex cap screws
Affix rubber Dampeners to bottom of legs

Seal

STEP
6



Materials: Seals 6152, 6139; 2 x seal set screws; seal bushing

STEP
8



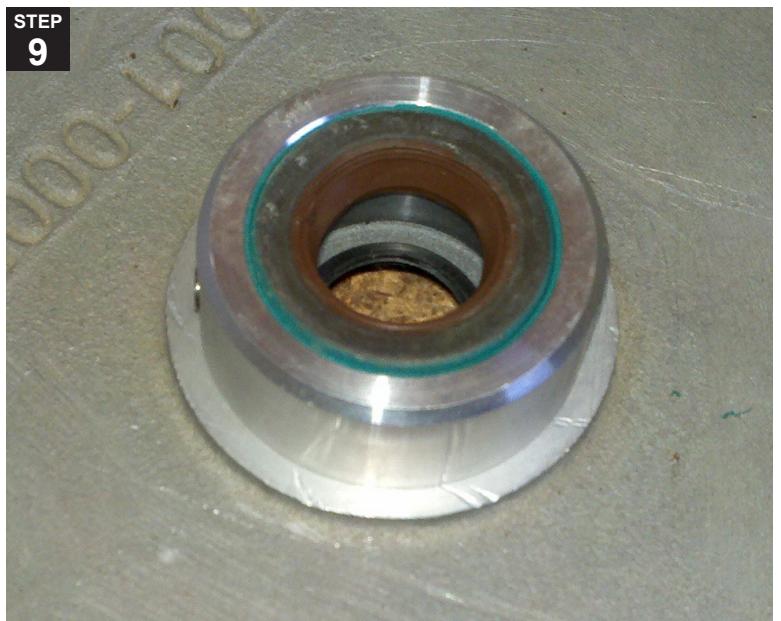
Pound large seal (6139) into the top of the aluminum bushing. Leave set screws out or partially in for now.

STEP
7



Press the smaller seal, 6152 into the hole on the bottom of the centrifuge housing. Seal should have open side facing up. Seal will be pressed in with aluminum bushing later.

STEP
9



Carefully (use a soft object like wood or plastic) pound aluminum seal into the centrifuge housing. The bottom of the bushing should be flush with the centrifuge casting.



Outlet Ports



Materials: 2 x $\frac{3}{4}$ " Elbows, 2 x barbed hose fittings



STEP 11
Tape elbows and screw it to bottom of the centrifuge housing. Note that the port on the outside is for clean oil and the inner port is for the drain/sump.

Motor



Materials: Motor; 4 x o-rings; 4 allen screws



STEP 13
Place o rings in holes. Lift motor through and bolt down with $\frac{7}{32}$ allen wrench. Be careful not to crimp seal when pushing motor though.



STEP 15
Fill seal with grease and attach set screw/plugs with $\frac{3}{32}$ Allen wrench.



STEP 16
Add 13" o-ring to top of casting.

Bowl Mounting



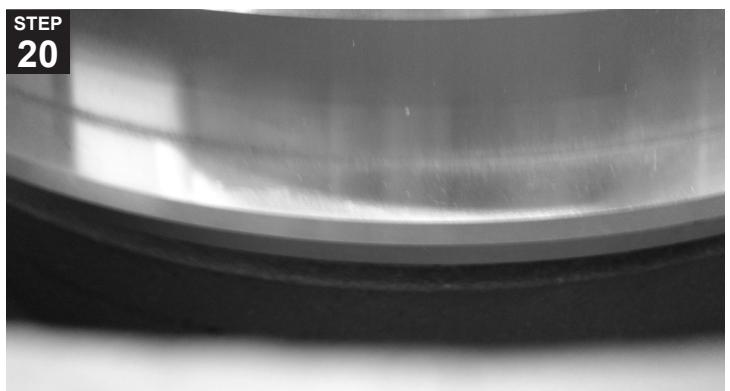
Materials: Centrifuge Bowl, Trantorque clamp



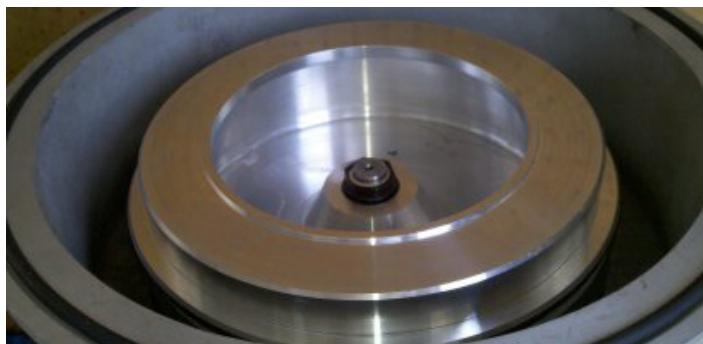
Place the trantorque clamp inside the bowl, nut up



Slide bowl with clamp over the shaft and tighten with $\frac{7}{8}$ socket.



Height should be $\frac{1}{8}$ " to $\frac{1}{4}$ " above bottom lip, ridge on casting.



Lid



Materials: CenCentrifuge Lid, $\frac{3}{4}$ " Elbow, Hose barb adapter, $\frac{3}{4}$ " to $\frac{1}{4}$ " reducer, $\frac{1}{4}$ " flare tube fitting, $\frac{3}{4}$ " vent plug, $\frac{3}{4}$ " plug



Add vent, plug and $\frac{3}{4}$ " elbow and barb to lid.
*Booster cone customers need to modify...see additional instructions

**STEP
23**



Add $\frac{3}{4}$ " to $\frac{1}{4}$ " reducer and flare fitting to inside of lid, on same port as inlet fittings.

**STEP
24**



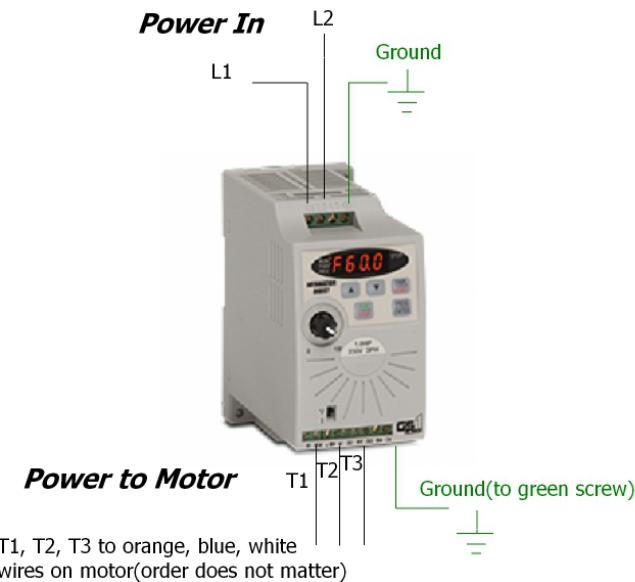
Complete Centrifuge!

Motor Wiring

Basic Centrifuge—Motor is already wired and ready to plug into a standard 120V outlet.

Extreme Centrifuge—Motor need to be wired through GS1. You also need to program the GS1 to get the full 6000 RPM out of the motor. Read the Manual! Wire with caution.

Your Extreme centrifuge includes the GS1 controller to convert your standard power to run the 230V, 3 Phase Motor.



Your Extreme (6000 rpm) motor should be 230v 3 phase motor. The included GS1 controller converts the power from your region's standard voltage, listed on the controller to run the 230V 3 phase motor. So you can run your 120V or 230V single phase power into the GS1 Controller. GS1-10P5 accepts 120V single-phase power, while the GS1-20P5 accepts 230V single phase power.

Wiring of the Extreme centrifuge is done as follows:

L1, L2 and Ground symbol on the GS1 controller connect to your standard single phase power wiring. You can purchase a cord that has a plug for a standard outlet on one side and loose wires on the other end for connecting to the GS1. Use an old extension cord if you'd like. 14 awg wire is recommended. The order of the L1, L2 wires do not matter, the grounds need to be matched however. Reference user manual page 2-8, bottom figure.

T1,T2,T3 on the bottom GS1 controller connect to the orange, blue and white wires on the motor(order does not matter). The 4th wire will be from the ground on the controller to the green screw on the motor. You can use something called "1/4 with ground" wire rolls from the hardware store. Wiring should be done according to local code. Use 14 awg wire.

Programming of GS1

The GS1 drive needs to be programmed to run the motor for 6000RPM. Refer to Section 3-2 in the manual. We also made a video at www.vimeo.com/8093365

You will need use the parameters off the motor for programming. Hit the Program/Enter button to get to the right parameter setting.

Settings:

Parameter 0-00: 230
Parameter 0-01: 1.4
Parameter 0-02: 60
Parameter 0-03: 3450
Parameter 0-04: 6000

Now you are ready to go. There are quite a few other settings to play with, like ramp up and ramp down speed. If you get errors, check the manual appendix for possible issues. The tech support number for the GS1 is 770-844-4200, they can help with error codes and possible issues.

Troubleshooting

***Oil will not flow is too slow**—make sure there is not debris clogging your hose, tip of the inlet on the lid or flow valve. Make sure the outlet hose/pipe has a way to let air escape or vent.

***Motor stops**—Be sure you are not flooding the centrifuge. The centrifuge can handle 25 gph (95 lph) maximum. The restrictor tube is not enough to reduce the flow. Flow needs to be adjusted with a ball or gate valve before the centrifuge

***Oil is coming out the dirty port while running**—slow down the flow. This only happens when the centrifuge is flooded

***Quality of the centrifuged oil is poor**— the first thing to try is slowing down the flow of oil through the centrifuge. A slower flow will give the oil more time to be cleaned in the centrifuge. Also, make sure you do some preliminary settling of the oil. If you dump garbage or sludge in the centrifuge, the quality of the oil coming out may not be as good. Think of the centrifuge as a fine cleaner, not a garbage separator.

***Centrifuge oil still has water**— the centrifuge can remove all of the water from oil if the water content is 5% or less. If you have over 5% water in your oil(which is not normal), pre-settle the oil. You can also open up the vent in the lid and attach a short piece of hose for better water removal. The centrifuge cleaning ability is limited by the capacity of the bowl, so when the bowl is full of contaminants like dirt or water, it must be drained or cleaned. I stop my centrifuge and let it drain every 40-50 gallons processed.

Booster Cone Assembly(Optional)



This is our Raw Power Centrifuge Cleaning Power Booster Cone. This upgrade will allow for faster oil processing and/or finer cleaning. It reduces turbulence by spinning the oil before it enters the bowl. It also puts the new oil in at the very bottom of the bowl, so it has to work its way through then entire contents before leaving. The cone bolts right into the bowl, and the inlet needs to be modified on the centrifuge lid.

Parts List:

QUANTITY	DESCRIPTION	PART #
1	RPC Booster Cone	1031
1	18-8 Stainless Steel Flat Head Sckt Cap Screw $\frac{1}{4}$ "-20 Thread, $\frac{1}{2}$ " Length	92196A537
1	$\frac{1}{4}$ " male X $\frac{1}{8}$ " fem Hexbushing adapter	4638K651

Assembly Instructions



Bolt down Booster Cone to centrifuge bowl with $\frac{3}{16}$ " Allen wrench.



Add $\frac{1}{4}$ " hex bushing to $\frac{3}{4}$ " hex bushing and place in center of the lid. Inlet port should reach just below the top of the booster cone.



Move oil inlet to the center of the lid.



Attach bowl inside centrifuge with Trantorque clamp.

Bolt-On Heater Assembly(Optional)



This is our optional heating attachment for the centrifuge. It is a thermostatically controlled heating element for on-demand heating of oil as it goes into the centrifuge. For best results oil should be at least 150°F as it goes into the centrifuge. Heating the oil makes a huge difference in the quality of oil coming out and the speeds which you can process.

*Do not let the heater run dry.

Parts List

QUANTITY	DESCRIPTION	PART
1	RPC Heater Manifold Casting	1015
1	1000W@ 120V/230V Heater Element w/ Thermostat....	TSPo3333
1	High-Temp Silicone Rubber Heater Hose 3/4" ID	5133K15
2	Worm-Drive Hose Clamp	5415K14
2	Zinc-Plated Steel Barbed Hose Fitting High Flow Barbed X Male for 3/4" Hose ID, 3/4" Pipe..	5350K45

Assembly Instructions



Attach 2 x $\frac{3}{4}$ " hose barb fittings along with the $\frac{3}{4}$ " plug on the bottom of the heater manifold. Use thread tape or high temp sealant to prevent leaking.



Remove screws from one of the legs.

**STEP
3**

Substitute two leg screws with the longer screws to hold on heater manifold.

**STEP
4**

Attach heater manifold

**STEP
5**

Seal heater threads and screw into manifold

**STEP
6**

Attach heater hose with hose clamps. Note oil flows into bottom of the heater and out the top into the centrifuge.

Wiring

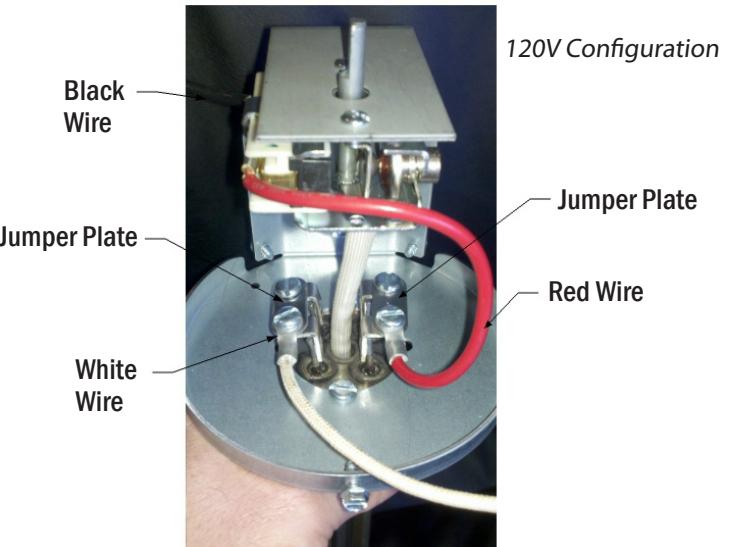
The Pro Heater is set at 230V default. So 120V users must modify the wiring to use for 120V which is standard N. American power. See the instruction booklet under cap for wiring diagrams.



Stock 230V Configuration

Black Wire
White Wire
Red Wire

Jumper Plate



120V Configuration

Black Wire
Jumper Plate
Jumper Plate
White Wire
Red Wire

Heater is Pre-wired stock for 230V. No modifications needed for 230V Power

In order for heater to work with 120V power, Relocate white and red wires as shown. Add jumper to left connection as show.



Where is the jumper? We conveniently hid it for you underneath the heater cap.



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Checkout our **Raw Power** line of WVO specific Conversion Components, Centrifuges and Transfer Pumps. We constantly refine our products and are adding new products to our website. Ideas and feedback are more than welcome.



RAW POWER CENTRIFUGE—Clean waste oils with ease with this high power, high capacity centrifuge. Comes in 120V and 230V power. Easy to setup and use. Durable and effective.



RAW POWER BEAST CENTRIFUGE—High Capacity, Auto-cleaning Industrial Centrifuge. Produce fuel quality oil at a rate of 50-150 gallons per hour. Includes Auto-purge for self-cleaning. Continuous duty.



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RAW POWER HEATED FILTER COMBO—Onboard filtration for veggie systems in vehicles. Has a 12V heater wrap, heated head and high quality 10 micron filter.



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