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## Operation | Maintenance | Installation

# RCF 1400 MANUAL

### **ATTENTION:**

Read owner's manual fully before operating pump.  
Failure to do so can result in severe pump damage and may void warranty.



# WARRANTY REGISTRATION

Please fill out this page to register this pump for warranty.  
Make a copy and email it to: [sales@fruitland-mfg.com](mailto:sales@fruitland-mfg.com)

## Date of Purchase

## Model Number

## Serial Number

## Preface

This Manual is given with your pump to help operators and owners understand the working and maintenance of your newly acquired unit.

Please familiarize yourself and any operator with the contents of this booklet. Keep a record of the serial number handy, in case you need any parts or information in the future.

We at Fruitland are committed to quality, reliability, and guaranteed performance.

## Purchased From: (Authorized Dealer's Stamp)

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# RCF MODEL NOMENCLATURE

<b>RCF</b>	<b>500</b>	<b>L   R</b>	<b>U   S</b>	<b>F   E</b>	<b>H   A</b>	<b>HM</b>
MODEL	SERIES	ROTATION	VALVE OPTIONS	FILTER OPTIONS	DRIVE OPTIONS	MOTOR OPTIONS
RCF - ROTARY COMPRESSOR FIBRE (VANE)	250 - RCF 250 PUMP 370 - RCF 370 PUMP 500 - RCF 500 PUMP 870 - RCF 870 PUMP 1200 - RCF 1200 PUMP 1400 - RCF 1400 PUMP	L - COUNTER CLOCKWISE (LEFT)  R - CLOCKWISE (RIGHT)	U - TOP VALVE (UPPER)  S - SIDE VALVE	BLANK - NO FILTER  F - INTEGRATED FILTER  E - ELBOW (FILTER UPGRADE AVAILABLE)	BLANK - BARE SHAFT  H - HYDRUALIC DRIVE ADAPTER  A - RIGHT ANGLE DRIVE ADAPTER	BLANK - NO MOTOR  HM - HYDRUALIC MOTOR
<b>ELIM</b>	<b>A   H   TBRM</b>		<b>G   DH</b>	<b>S   M   AI   JT</b>		
MODEL	DRIVE OPTIONS		ENGINE OPTIONS	COMPONENT OPTIONS		
ELIM - ELIMINATOR PACKAGE	A - ANGLE DRIVE  G - GAS DRIVEN  H - HYDRAULIC DRIVE ADAPTER  DH - DIESEL HATZ  TBRM - TOP BELT PACKAGE		G - GAS DRIVEN  DH - DIESEL HATZ	BLANK - NO COMPONENTS ADDED  S - SECONDARY SHUT OFF  M - OIL CATCH MUFFLER  AI - AIR INJECTION  JT - JETTER (POWER WASHER)		

## Ordering Information

1. Choose Rotation L or R
2. Choose diverter value location U or S
3. Choose filtered or nonfiltered model
4. Choose drive line option A or H; OR specify belt drive or pulley

## Sample Model Code

**RCF 500 L U F H**

Rotary **C**ompressor **F**iber vane pump model

**500** series pump

Left hand rotation

Four-way valve on top (**U**pright)

integrated **F**ilter

**H**ydraulic drive adapter

# INSTALLATION & ADJUSTMENTS

## Lifting

Lift pump by eye bolts, if provided, or with slings around body of pump close to legs.

## Mounting

Secure pump unit to flat sturdy surface with four bolts, washers and lock washers, through holes in the base of the pump legs.

## RPM

Fruitland Vacuum Pumps should never exceed the RPM stated on the plate tag (pump damage is possible). Pump may be run 20% slower than the stated RPM on the tag if required.

## Vacuum-Pressure Gauge

Required to SAFELY operate and monitor the systems performance. Locate this gauge at an Operational location and or after the primary and secondary shut-offs/scrubbers to prevent failure due to foreign material.

## Pressure & Vacuum Relief Valves

Regulates the operating Pressure & Vacuum levels within the system. There should be a minimum of two of each relief valve within your system. One set of reliefs upon the tank and one set of reliefs near the pump. All Relief Valves are rated per CFM (cubic feet per minute) and must be sized accordingly to your vacuum pump system and as recommended by the vacuum tank manufacturer.



### WARNING

Read Operations and Maintenance Manual fully before operating the vacuum pump. Failure to do so may result in severe system damage that may cause severe injury, death, and void the pumps warranty.

# VACUUM & PRESSURE RELIEF ADJUSTMENT

## Fruitland Pressure Relief PART # PRV2"



Release the anti-rotation screw (1) - turn the upper ring (3) - rotate clockwise - CW - to increase pressure OR rotate counter clockwise - CCW - to decrease pressure in vessel.

When the desired pressure in the vessel is achieved, slightly turn the upper ring (3) until the flattened spot upon the wheel's shaft is achieved. Tighten the anti-rotation screw and the pressure relief is now set.

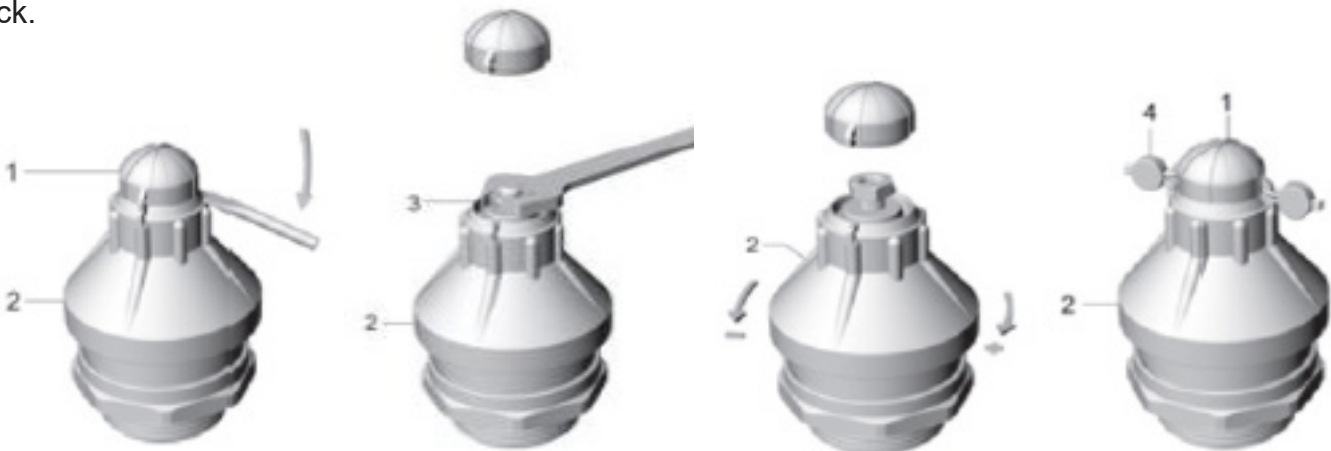
Fruitland suggests this procedure and verification of your pressure reliefs operation within your system are re-checked and or set during your routine maintenance schedule for the tank and truck.

## Fruitland Vacuum Relief - PART # VB

Remove the setting screw cover (1) - insert a flat tip screwdriver into the incision and pry off the cover carefully. Loosen the stop set nut (3) - hold firm the vacuum relief bell (2) - Turn the bell clockwise - CW - to increase pressure and turn the bell counter clockwise - CCW - to reduce pressure in the vessel.

During this adjustment it is not necessary to hold the set nut stem (3) with a screwdriver. When desired pressure in the vessel is achieved, tighten the stop set nut (3) - hold firm the vacuum relief bell (2). Install the setting screw cover (1) - and the vacuum relief is now set. To eliminate tampering with the adjusted setting of the vacuum relief - insert wire through the screw cover (1) and then into bell (2) and connect wire with a permanent seal.

Fruitland suggests this procedure and verification of your pressure reliefs operation within your system to be re-checked and or re-set during your routine maintenance schedule for the tank and truck.



In addition to the incorporation of vacuum & pressure reliefs the outside of these valves, vacuum pump housing, pump shroud and pumps cooling fan blades should, at all times be kept clean of all debris to allow proper pump & system cooling. Failure to allow air to be conveyed through your vacuum pump & system may result in severe system damage that may cause severe injury, death, and void the pumps warranty.



## WARNING

Always verify the correct Relief valve settings with the tank manufacturer. Failure to do so may cause catastrophic failure, injury and/or death.



## ATTENTION

All Fruitland Vacuum pumps should never run for a prolonged period of time without air passing through the pump & system itself. Incorporating vacuum & pressure relief valves is highly recommended .

## SERVICE NOTE USE GENUINE FRUITLAND PARTS ONLY!

If you have any questions, or require further information on installing, operating and or the maintenance of your vacuum pump contact:

**1-800-663-9003 or email: [sales@fruitland-mfg.com](mailto:sales@fruitland-mfg.com)**

\*If you require these components, please contact your supplier or Fruitland Manufacturing (They may not be included in the pump or package you acquired)

# LUBRICATION & APPROVED OILS

**Lubrication:** If the suction temperature is >50°F (summer conditions), a SAE-40 non detergent motor oil or an ISO 150 compressor oil can be used. If the suction temperature is <50°F (Winter Conditions) a SAE-30 non detergent motor oil or an ISO 100 compressor oil is recommended.

**Always check oil level before starting unit.**



## NEVER ALLOW THE OIL RESERVOIR TO GET LOW!

Vacuum pumps dispose of and or consume oil during operation and do not have a return within the system. All vacuum pumps will have an oil sight glass, tube or dipstick. If a remote reservoir is used, verify that this reservoir has oil. Always use the manufacturer's recommended oil. The oil level needs to be checked on a routine basis during the vacuum pumps operation.

## Oils Approved for use in Fruitland Vacuum Pumps

OIL TYPE	WINTER WEIGHT	SUMMER WEIGHT
FRUITLAND® GREEN™ OIL (100% Biodegradable)	SAME	SAME
<sup>1</sup> SHELL TURBO T OIL	32	68 or 100
<sup>1</sup> ISO COMPRESSOR OIL	100	150
MONOLEC COMPRESSOR OIL*	SAME	SAME
MOBIL SHC 525 (Synthesized Hydrocarbon)	SAME	SAME
<sup>1</sup> MOBIL DTE	LIGHT OR	HEAVY MEDIUM
ANDEROL 497	MEDIUM SAME	SAME
<sup>1</sup> CHEVRON GST	32	68
<sup>1</sup> PENNZOIL PENNZBELL TO OIL	32 or 46	68
<sup>1</sup> TEXACO REGAL R & O OIL	32	68
<sup>1</sup> SAE NON DETERGENT OIL	10 or 20	30 or 40
SHELL ROTELLA 15W-40 MOTOR OIL	SAME	SAME

## All Pump Models

**Oil Tank - Important!** During routine cleaning & freezing weather, drain possible condensation build-up in the bottom of the oil tank. Water can enter oil tank and be ingested into the oil pump, this could cause the oil pump to freeze and damage the internal gears of the oil pump. If you suspect water is present within the oil tank reservoir, drain and clean the oil tank with diesel fuel.



These oils have been approved for use in Fruitland Vacuum Pumps. Use of these oils will maintain the vacuum pump warranty as well as extend the life of the vacuum pump and ensure proper performance and lubrication.

When operated properly, Fruitland vacuum pumps will run cooler, use less oil and provide much longer service than any other rotary vane vacuum pump.

\*Monolec Compressor Oil is colored red and should not be confused with transmission fluid.

**<sup>1</sup> Recommended for the best performance and lubrication at all temperature levels.**

## Oils & Fluids That Are NOT Approved For Use In Fruitland Vacuum Pumps

OIL TYPE		
BRAKE FLUID	HYDRAULIC FLUID	TRANSMISSION FLUID
DEF FLUID	POWER STEERING	VEGETABLE OIL
GEAR OIL	FLUID SCENTED OIL	USED OIL
SYNTHETIC OIL		



### WARNING

Always check oil level before starting pump. Fill if necessary. Operating your Fruitland vacuum pump with the incorrect oil can result in misuse of this product that may result in severe injury, death, severe system damage, and or void the pump's warranty.

# PUMP FLUSHING PROCEDURE

## Flush the Pump

During your routine scheduled service of your tank truck and vacuum system perform the manufactures suggested Pump Flushing Procedure. This will remove the caked oil and carbon build-up from within the vacuum pump and the oil catch muffler system expelling this carbon & debris build-up out of the oil catch muffler's drain valve. Flushing the system on a routine basis will also help in reducing smoke due to the fact of eliminating varnish and or carbon build-up from within the oil catch muffler and vacuum pump.

## Pump Flushing Procedure

1. Stop the pump and remove ¼ " npt plug located on the pump diverter valve.
2. Connect a brass fitting, rubber hose, ball valve and flushing fluid bottle to this port.
3. Run the Pump, switch to vacuum and slowly open the ball valve.
4. Pass approximately 2 to 3 liters of the flushing fluid through the pump while restricting/controlling the flushing fluid flow through the ball valve.
5. Close the ball valve and run the pump for an additional minute to remove all the flushing fluid from the pump.
6. Drain the oil catch muffler or oil separator.
7. If you remove the Pump flushing fittings from the pump, make sure to re-install the ¼ " NPT plug back into the port.
8. Resume pumping operation.

For ease of operation, Fruitland recommends installing our Pump Flushing Kit (Part #FK500) to assist in this procedure.



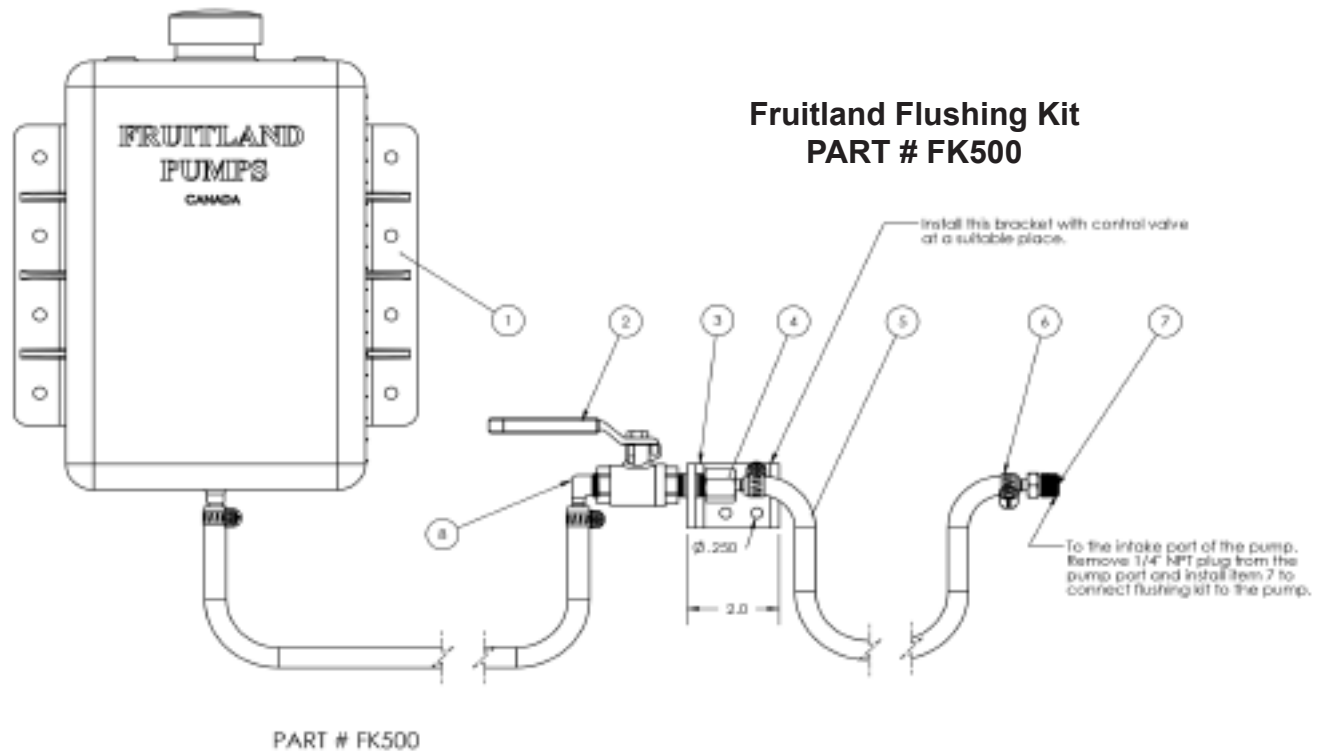
### WARNING

Flushing your Fruitland vacuum pump with the incorrect fluid type can result in misuse of this product that may result in severe injury, death, severe system damage, and or void the pump's warranty.

If you have any questions or require further information on installing, operating, and or flushing your vacuum pump contact:

**1-800-663-9003 or email: [sales@fruitland-mfg.com](mailto:sales@fruitland-mfg.com)**

# VACUUM PUMP FLUSHING KIT



ITEM #	PART #	DESCRIPTION	QUANTITY
1	OR11-A-01	6QT. PLASTIC TANK WITH BREATHER CAP	1
2	FK500-A-01	BALL VALVE, 1/4"	1
3	FK500-01	ANGLE BRACKET FOR REMOTE VALVE INSTL. SEE DWG. FK500-01	1
4	FK500-A-02	STRAIGHT BRASS FITTING, 1/4" NPT FEMALE TO 1/4" ID HOSE BARB	1
5	OR11-A-02	Ø1/4" ID FUEL LINE RUBBER HOSE	10ft
6	OR11-A-03	HOSE CLAMP 7/32"-5/8" (SAE 4)	4
7	FK500-A-03	STRAIGHT BRASS FITTING 1/4" NPT MALE TO 1/4" ID HOSE BARB	1
8	OR11-A-04	ELBOW 1/4" NPT MALE TO 1/4" ID HOSE BARB FITTING BRASS	1

**Flushing Fluid:  $\frac{3}{4}$  of diesel fuel mixed with  $\frac{1}{4}$  of pump oil by volume**

# PUMP & SYSTEM MAINTENANCE



**Secondary Shutoff**

## Drain the secondary moisture trap Before Every Pump Operation!

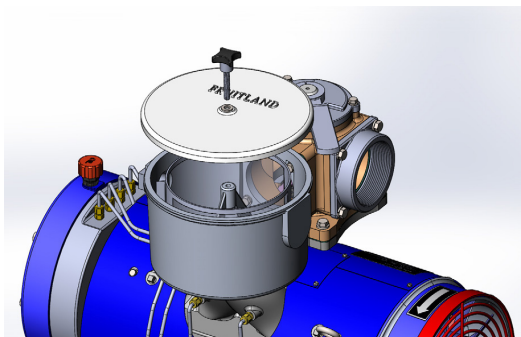
If the secondary moisture trap is full and or starts to fill, you will lose the ability to create pressure and or vacuum. Check the secondary shut-off before every use by opening the drain valve upon the bottom of this moisture trap. If the secondary trap has any substance within it, this could end up running through the vacuum pump and causing catastrophic pump failure. If any substance is within the secondary shut-off, this indicates the tank is full, over-filled and or the primary shutoff upon your vacuum system is not working correctly.

## Check the primary shutoff Daily

The primary shut-off is the first stopping point within the vacuum tank system for the product being loaded into your vacuum tank. This primary shut-off must work correctly every time or the pump & system will fail quickly, and you will certainly have a catastrophic pump failure. Verify each day, before starting, the rubber seat is in proper shape and form, the ball appears to be free of any debris, holes and is operational. The cage in which the ball rests, or sits within must be attached to the primary shut-off assembly correctly.



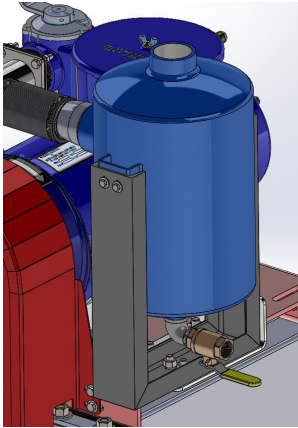
**Primary Shutoff**



**Pump Air Filter**

## Clean the Pump Air Filter Daily

Every vacuum pump system should contain a vacuum pump air filter somewhere between the primary shut-off and the vacuum pump. This filter will prevent any foreign objects from being sucked into the vacuum pump through the tank during normal operation. This air filter must be cleaned each day before the operation of the vacuum system. Remove the stainless-steel mesh filter daily from the air filter.



**Muffler**

## Drain the oil catch muffler Daily

If the oil catch exhaust muffler starts to expel oil, you will lose vacuum performance. This overflow of oil may backfill into the pump. When draining the muffler system, pay attention to the material being expelled from the muffler's drain valve, this is a good way to spot any water and/or debris that may have entered the vacuum pump system.



### ATTENTION

Disconnect all hydraulic lines prior to any maintenance and do not bypass or inactivate any safety and or protective device. Lock out and tag the engine or main power supply to prevent unexpected application of power. Failure to do so can result in severe injury, death, severe system damage and or void the pumps warranty.

## Vacuum Pump Storage

It is recommended to complete the Pump Flushing Procedure, upon page 12th, prior to the pump being put into storage and not operational for an extended amount of time (2 or more months). Following the Pump Flushing Procedure when storing the vacuum pump for an extended amount of time will prolong the vacuum pumps life exponentially.

### SERVICE NOTE USE GENUINE FRUITLAND PARTS ONLY!

If you have any questions, or require further information on installing, operating and or the maintenance of your vacuum pump contact:

**1-800-663-9003 or email: [sales@fruitland-mfg.com](mailto:sales@fruitland-mfg.com)**

\*If you require these components, please contact your supplier or Fruitland Manufacturing (They may not be included in the pump or package you acquired)

# VACUUM PUMP DRIVE SYSTEMS

## Do not Over-speed or Under-speed the Vacuum Pump

The Drive System must be sized and calculated correctly. Either over and/or under speeding the vacuum pump drive shaft speed will cause catastrophic pump failure and possibly damage the entire vacuum pump & system.

The Power Take Off - PTO - must allow for the vacuum pump drive shaft to slowly engage. Incorrectly configured and or installed PTO's will deteriorate all drive system components prematurely and may cause damage to the vacuum pump.

The tank truck drive system must be set up or dialed into the correct optimal operational input RPM of the vacuum pump during system & pump installation. Every vacuum pump model has a different optimum operational RPM. Contact Fruitland Manufacturing for the correct operational RPM for your vacuum pump model & system.

## Fruitland Vacuum Pump RPM & Power Requirements

The table below provides the recommended input speeds and correlating power requirements for each Fruitland Vacuum Pump Model's optimal overall performance.

HP Requirements												FAD		Torque ft-lbf												
Pressure (PSI)						Vacuum (inch Hg)						CFM	RPM	Pressure (PSI)						Vacuum (inch Hg)						
25	20	15	10	5	0	5	10	15	20	25	28			25	20	15	10	5	0	5	10	15	20	25	28	
1400		64	59	49	38	37	36	35	35	34	33	650	1000		334	310	256	200	192	189	184	184	181	179	173	
1400		83	77	64	51	47	46	45	44	44	43	780	1200		361	337	280	223	206	201	197	193	193	190	188	
1400		89	84	69	54	51	49	48	48	47	47	845	1300		360	339	279	218	206	198	194	194	192	190	190	
1400		95	89	73	58	53	53	52	51	51	50	910	1400		356	334	274	218	199	197	195	191	189	188	188	
1200	65	59	52	45	40	33	33	35	36	38	41	42	600	1000	343	311	273	238	210	174	174	182	190	202	214	222
800	46	40	33	27	21	14	15	15	17	18	18	20	400	1000												
870	44	41	39	37	34	31	29	28	29	30	31	32	500	1375	168	157	149	139	130	118	111	107	111	115	118	122
500	32	30	28	26	24	23	22	21	19	18	18	17	332	1375	123	115	106	100	91	88	85	79	73	71	68	65
370	28	25	21	18	15	12	12	11	10	10	9	8	267	1375	106	94	81	68	59	47	44	41	38	37	35	32
250	14	13	12	10	9	8	7	7	6	6	6	5	163	1375	53	48	44	38	35	29	28	26	24	22	22	21
172	X	10	9	7	5	4	5	5	6	6	7	X	125	1375	X	0	0	0	0	0	0	0	0	0	0	X
344	X	17	15	12	10	8	9	9	10	11	12	X	213	1375	X	0	0	0	0	0	0	0	0	0	0	X

Not Recommended with Belt Drive

The largest contributing factor limiting a Fruitland Vacuum Pumps performance is continued heat generation due to operating the pump above and or below the recommended input speed. This additional heat produced due to incorrect RPM Input speed will negatively impact the overall life of your Fruitland pump.

# Check the Drive Components of the Vacuum Pump

If using a Fruitland right-angled gearbox verify the gear oil level within the gearbox and clean the vent cap upon the top of the gearbox case during your routine service.

If using a belt and pulley to operate the vacuum pump, check the belts for wear and verify the belt's tension during your routine service.

When incorporating hydraulics ensure the fluid is replaced on a routine basis as the viscosity deteriorates in the same fashion as your engine oil.

**Contact Fruitland Manufacturing for the optimum hydraulic circuit, gearbox and belt specifications for your vacuum pump system**



## ATTENTION

Fruitland Vacuum Pumps should never exceed the input RPM stated on the vacuum pump's plate tag - severe pump & system damage will occur & the pumps warranty will be void.



## ATTENTION

Vacuum pump & drive system direction of rotation must be determined and verified prior to procurement of the vacuum pump and all correlating drive system components.



## ATTENTION

Do not attempt to install nor service any type of rotating shaft when engine is running or operational. You can snag clothes, skin, hair, hands, etc. This can cause serious injury and or death!

- Do not go under the vehicle when the engine is running
- Do not work near an exposed rotating shaft when the engine is running
- Never work alone while under a vehicle

# DRIVE SHAFT INSTALLATION & PHASING

If your vacuum pump's drive system utilizes a drive-shaft between the PTO and your vacuum pump it is extremely important to verify your angularity and phasing of your drive-line and yokes. Check your drive-shaft angularity and ensure the drive-shaft falls within all the recommendations on the chart below.

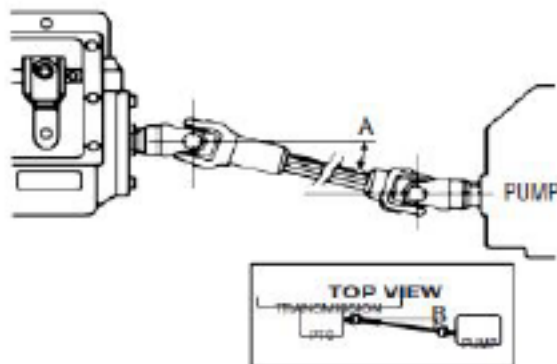
It is imperative the PTO shaft is parallel within 1.5 degrees of the pump shaft and or auxiliary drive shaft or driven unit. Drive-lines must be in phase, that is, the yoke ears on the PTO and the pump shafts must be in alignment as illustrated below.

## Maximum Operating Speed - By Tube Size & Solid Shaft Size

(For Speeds below 500 RPM or over 2500 RPM, contact your PTO Manufacturer)

<b>5WARNING - Always verify below specifications with your PTO Manufacturer</b>					
Tubing Dia. & Wall Thickness Joint & Shaft (W-Welded S-Seamless)	Max. Installed Length in Inches for Given RPM Centerline to Centerline of Joints for a Two Joint Assembly OR Centerline of Joint to Centerline of Center Bearing for a Joint & Shaft RPM - Revolutions per Minute				
	500 RPM	1000 RPM	1500 RPM	2000 RPM	2500 RPM
1750"x.065"W	117"	82"	67"	58"	52"
1250"x.095"S	91"	64"	52"	45"	40"
2500"x.083"W	122"	87"	70"	62"	55"
3000"x.083"W	-	-	-	-	-
Solid Shaft Diameter					
0.750"	60"	42"	35"	30"	27"
0.812"	62"	44"	36"	31"	28"
0.875"	65"	46"	37"	32"	29"
1.000"	69"	49"	40"	35"	31"
1.250"	77"	55"	45"	39"	35"

Max. Speed (RPM)	Max. TJA "A"
3500*	5°
3000*	5°
2500	7°
2000	8°
1500	11°
1000	12°

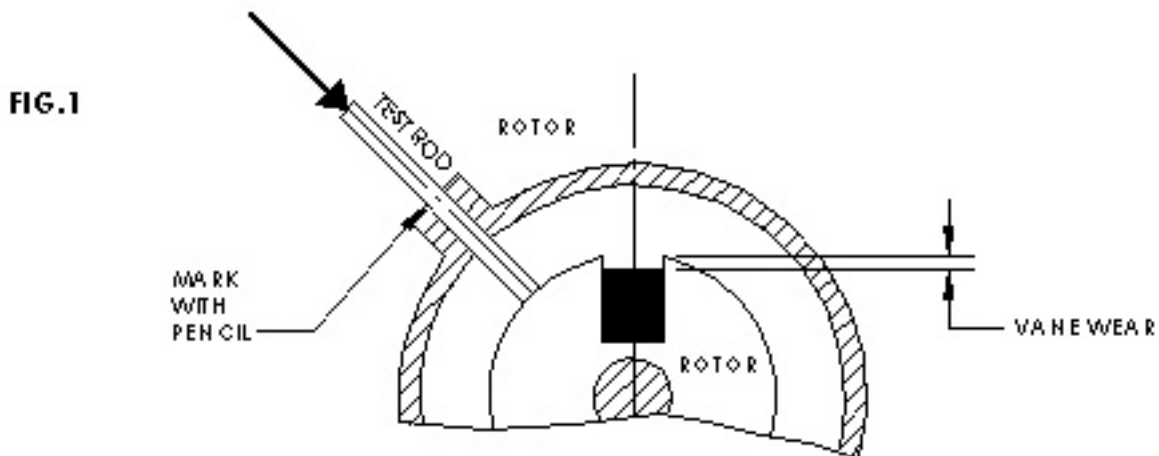


**TJA = True Joint Angle**  
**Incorporate this formula**  
**to calculate your drivelines**

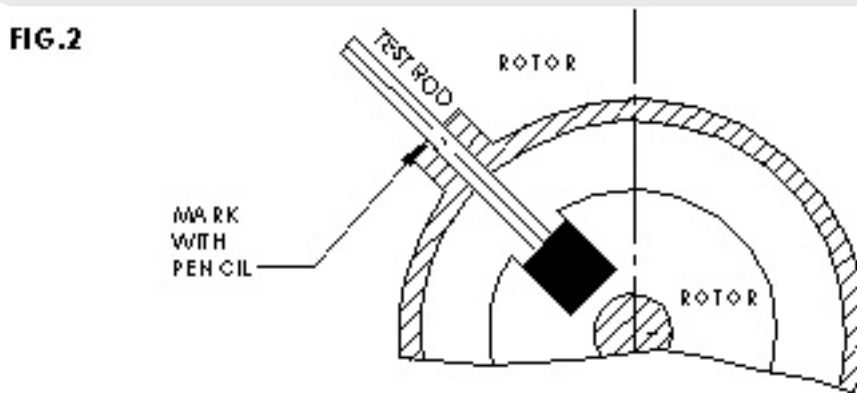
**True Joint Angle TJA =**  
**Square Root of A Squared**  
**+ B Squared**



# VANE WEAR MEASUREMENT



**Note: Be extra careful not to bend the checking rod.**



Vane wear (see diagram above) should not exceed 3/8" in models RCF1200. Fruitland pumps have at least two orifices for checking vane wear, some models have four. These orifices are located on the housing at both ends of the vacuum pump, and are marked with red. A 3/16" diameter test rod is supplied with the pump. We recommend checking the vanes on both ends, as they can wear in a tapered fashion because of excess heat or contamination.

To measure vane wear, remove the plug from the orifice and insert the test rod until the rod touches the rotor. Mark the rod with pencil as shown in diagram (fig.1). Turn the pump shaft until the rod drops into the vane slot in the rotor. Mark with pencil again (fig.2). Distance between the pencil marks is the amount of wear you have on the vane. If the vane is tapered from end to end, take the largest measurement as the amount the vane is worn.

Replace the complete set of vanes when worn to the maximum recommended amount for your pump model. Failure to replace the vanes at the recommended time can result in pump failure. Vane wear and subsequent damage are not covered under warranty. Instructions for replacing vanes are given on page 18.

The Recommended first check of vane wear is after approximately 10 hours of operation; next check after 50 hours of operation; thereafter, check every 200 hours or once a month if no significant wear has been detected on the 2 initial checks.

# Vane Wear

Life expectancy of Fruitland fiber vanes is hundreds of working hours. It greatly depends on the cleanliness of the intake air. Any contamination that enters your pump (e.g. sand, rust or soil particles) will shorten their life expectancy. It is the owner's responsibility to keep contamination out of the pump. Keep filters clean.

Many factors can contribute to rapid or premature vane wear:

1. Overheating of the pump (check overheating in trouble shooting page 19.)
2. Contamination entering the pump, or anything that can affect the action of the oil such as abrasives, fumes and or chemicals.
3. Running the pump too fast (over and or under speeding) (check RPM of pump drive shaft)
4. Wrong oil or no oil.
5. Oil pump failure.
6. Pump housing damage.
7. Rotor slots worn. If contamination has gotten into the pump and has caused the rotor slots to wear unevenly, extra force is required to return the vanes into the slots as the rotor turns. This extra load can cause housing wear, vane wear and increase the pump temperature.

# Vane Replacement

Refer to pump rebuild video at: <https://fruitlandmanufacturing.com/troubleshooting/>

- Disconnect drive/power source from pump - Turn engine off! Put Keys in your pocket!
- Drain oil from oil tank - inspect for debris & water
- Remove oil tank cover by removing the hex bolts and aluminum sealing washers
- Disconnect all oil lines and remove oil pump. (Held on by two bolts and lock washers).
- Do not lose the oil pump coupling
- Remove the seal housing by removing hex bolts and aluminum sealing washers
- Remove the hex bolts and lock washers from the housing end cap
- Slide the end cap off the rotor shaft.
- The rotor bearing, shims, wave spring, & seals should be kept in order.
- Note their positioning if you remove the bevel springs/washers for replacement
- Remove old vanes and replace with new vanes that have been dipped/soaked in oil
- Inspect housing bore, interior finish & bearings
- We recommend replacing all seals and all related gaskets during this process
- Reassemble in reverse order
- The housing end cap bolts should be tightened evenly to 22 ft./lbs. torque
- Fill oil tank with correct oil & hook up drive/power source
- Resume Operations

**Note:** Special attention is to be given that the oil pump coupling is engaging the roll pin in the rotor shaft. Turn rotor by hand, it should turn freely.

*\*Since there are many factors that cause rapid vane wear, we do not warranty vanes or any related damage from vanes worn beyond the recommended amount, unless a defect in material or workmanship caused the vanes to wear prematurely.*

# TROUBLE SHOOTING PUMP & SYSTEM MALFUNCTIONS

## Verify Before Starting

Visually Inspect the entire system – Each day before use, make a visual inspection and verify your vacuum pump system has no kinked hoses and or loose connections. Verify all components appear to be in safe operating condition. Verify all drive components appear to be free of any visual defects and or debris. Clean all debris from the vacuum pump, drive system, air filter, and vacuum system shut-off tank components within the tank truck and or tank trailer prior to any operation.

## Vacuum Pump does not vacuum

- Verify vacuum tank and ALL tank components are sealed.
- Verify ALL Hose connections and or Hose collapsed and or clogged.
- Vacuum pump back up valve assembly has debris within assembly, also causes pump to rotate backwards after stopping.

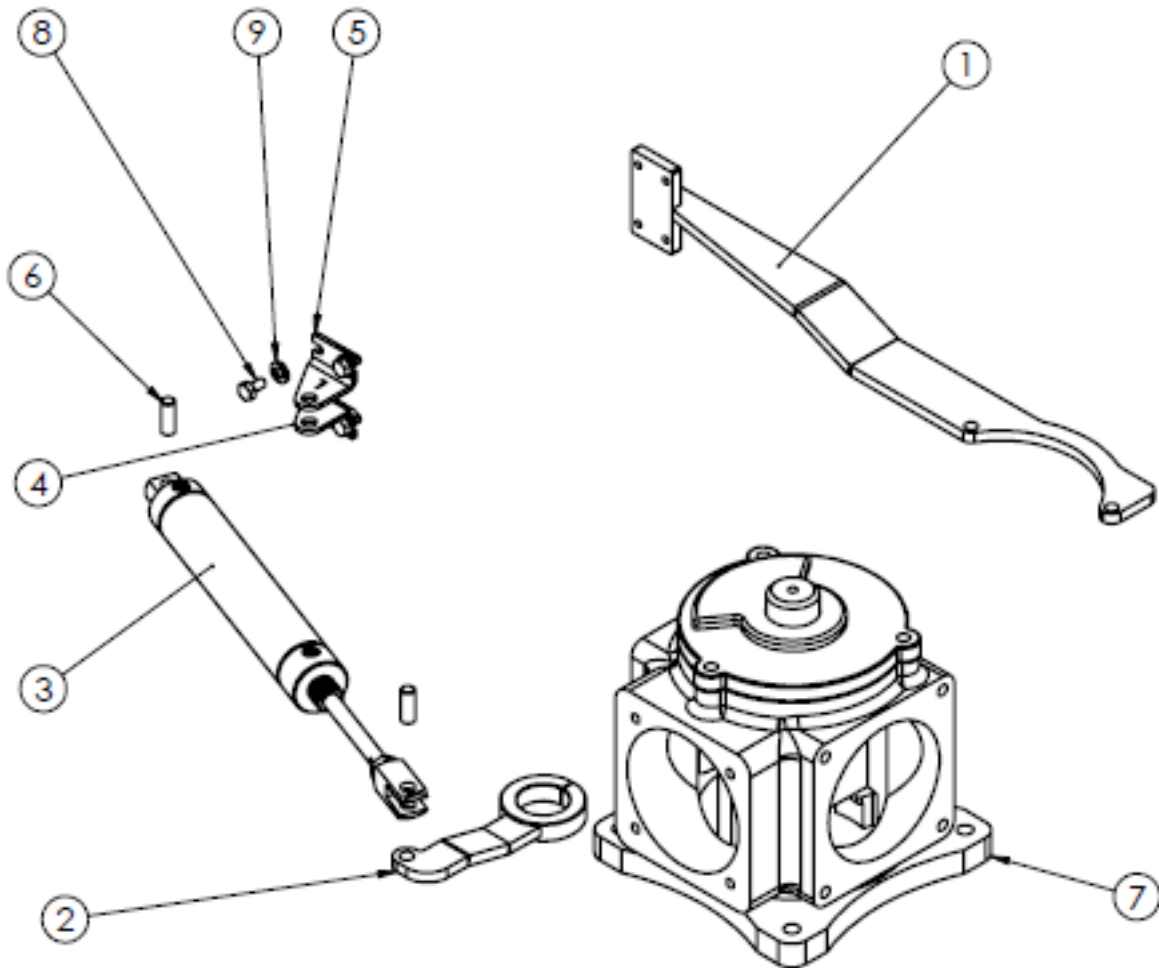
## Pump not turning

- Damaged/Broken Vane.
- Drive System Failure - Inspect all pump drive system components.
- Foreign material in vacuum pump.
- Pump is FROZEN - Winter Conditions - Avoid vacuum pump FREEZING Problems by dispensing a small amount of diesel fuel into the pump after completion of daily operations.

## Vacuum Pump Overheating

- Lack of Oil and or incorrect type of oil - Also - verify oil pump operation.
- Input speed - verify pump shaft speed during operation - Too High and or Too Low.
- Clean all exterior surfaces & air filter of vacuum pump.
- Exhaust Outlet Reduction or Blockage.
- Overall air flow system plumbing sized incorrectly.
- Collapsed or Clogged hose.
- Filter body needs to be cleaned
- Empty the Oil Catch Muffler.
- Empty the Secondary Scrubber/Shut-off.
- Worn vacuum pump vanes.

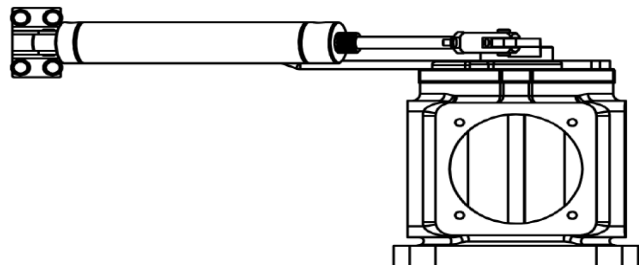
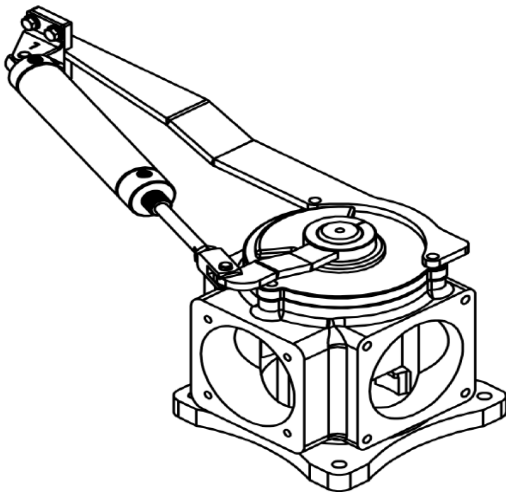
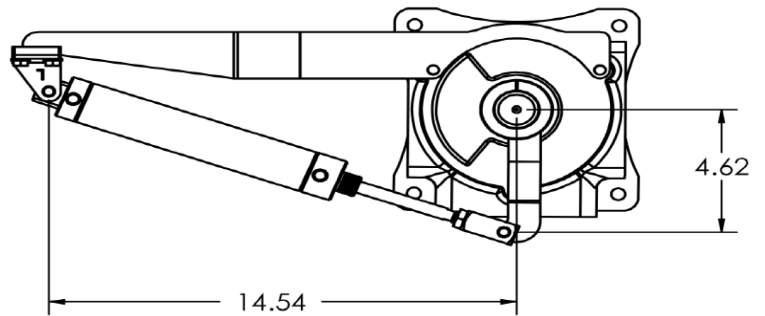
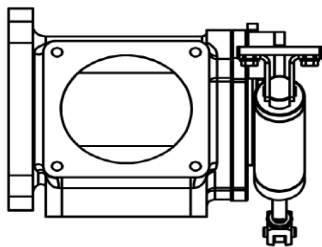
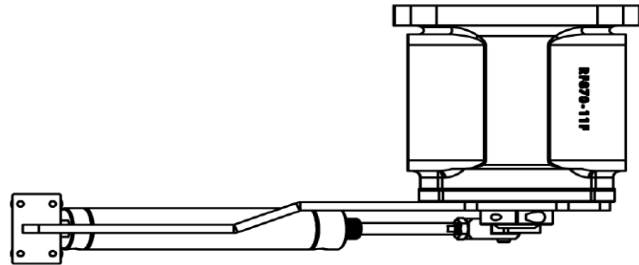
# CYLINDER MOUNTING ARM & LEVEL (BOM) (FOR 6" STROKE 1.5" CYLINDER)



ITEM #	PART #	DESCRIPTION	QUANTITY
1	RF870-CMA	Cyl. Mounting Arm for RF870, Dwg# RF870-PDA	1
2	RF500-13M	Lever Arm Assy, , Dwg# RF870-PDA	1
3	CYL1.5-6	1-1/2" Bore 6" Stroke Cyl. C/W Pivot Bracket, Clevis & Nut	1
4		Pivot Bracket D-229 (Right)	1
5		Pivot Bracket D-229 (Left)	1
6		Pin .0375 Dia. X 1.00	2
7	RF870-11F	RF870 Diverter Housing	1
8		1/4"-NC x 1/2" Hex Bolt	4
9		1/4" Lock Washer	4

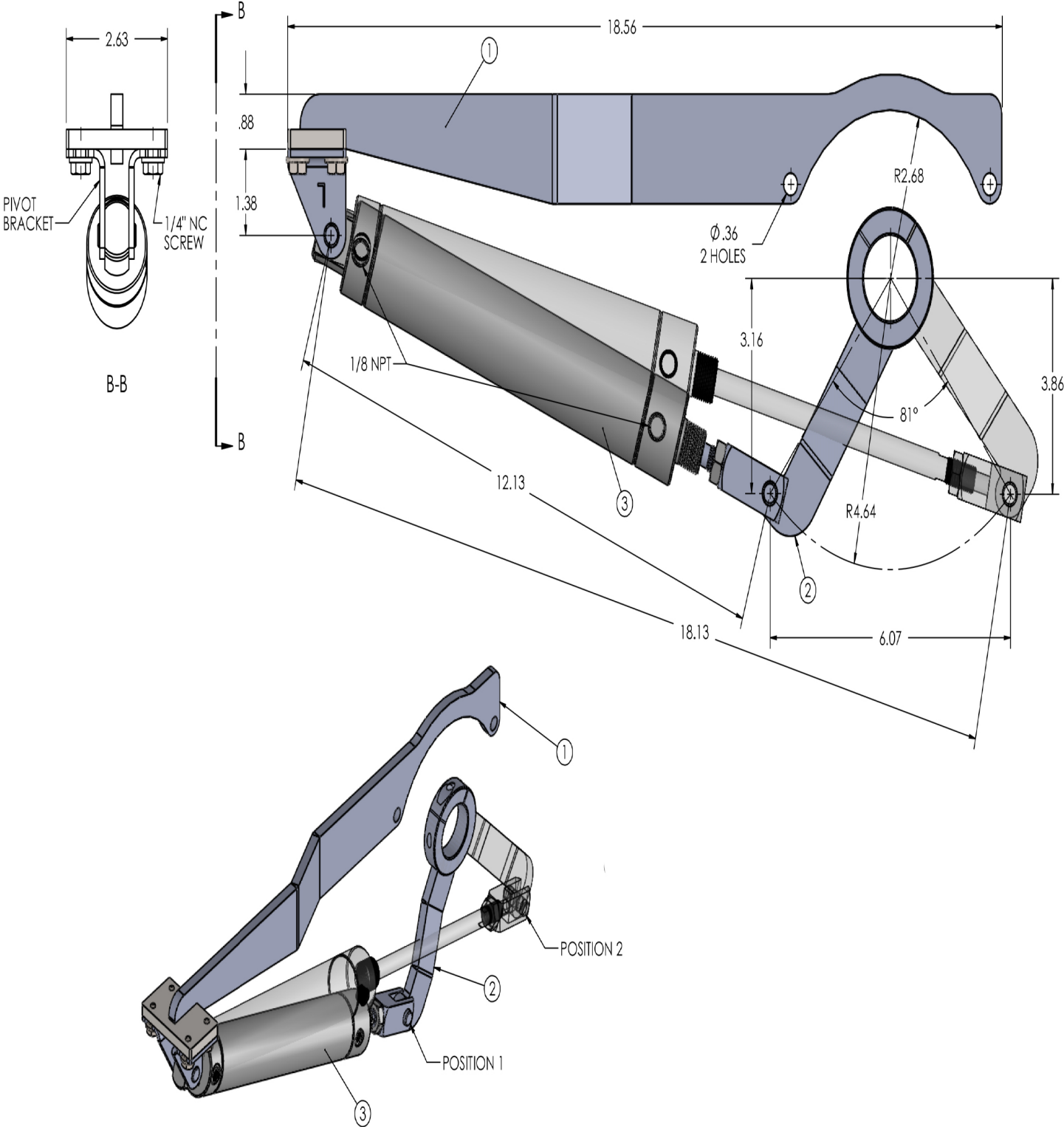
# CYLINDER MOUNTING ARM & LEVEL (DIMENSIONS)

ASSEMBLY PART #  
RF870-PDA FOR RCF870 PUMP  
RF500-PDA FOR RCF500 PUMP



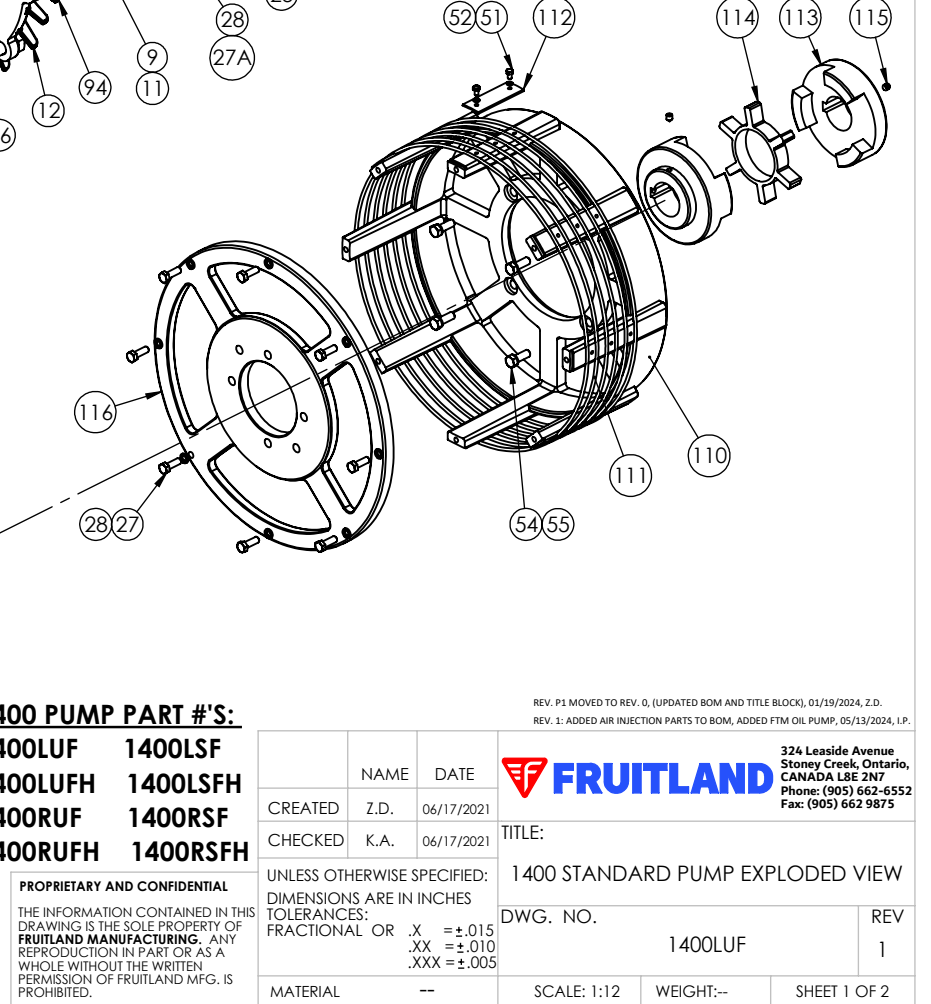
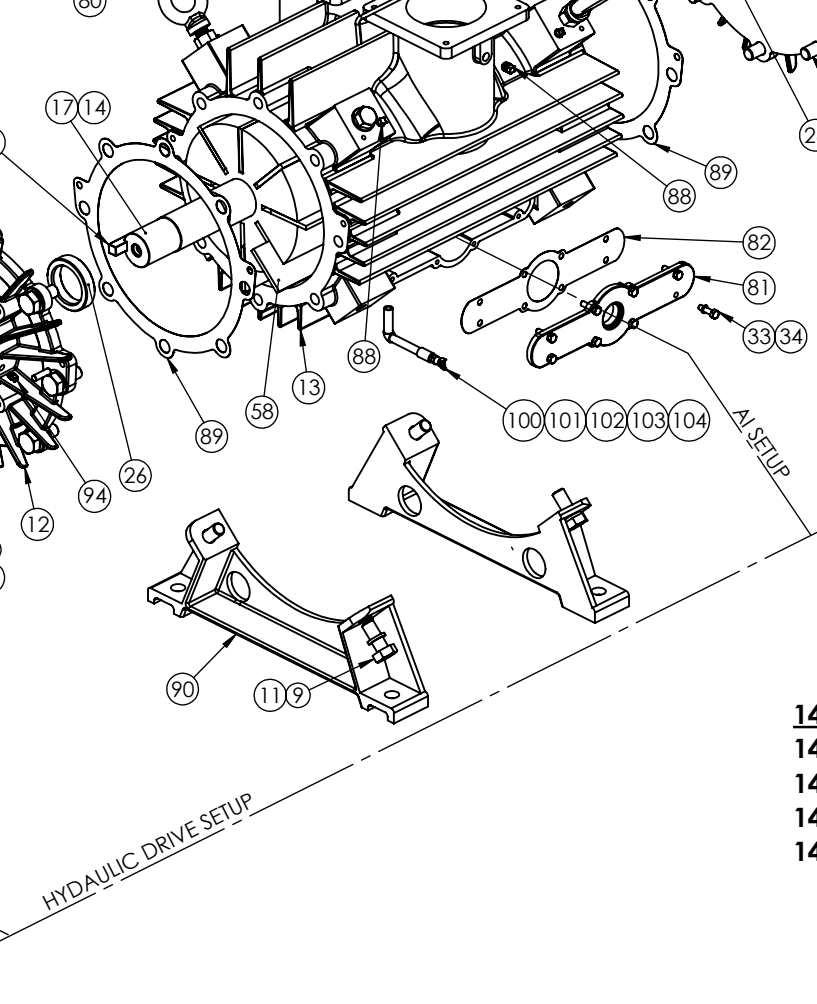
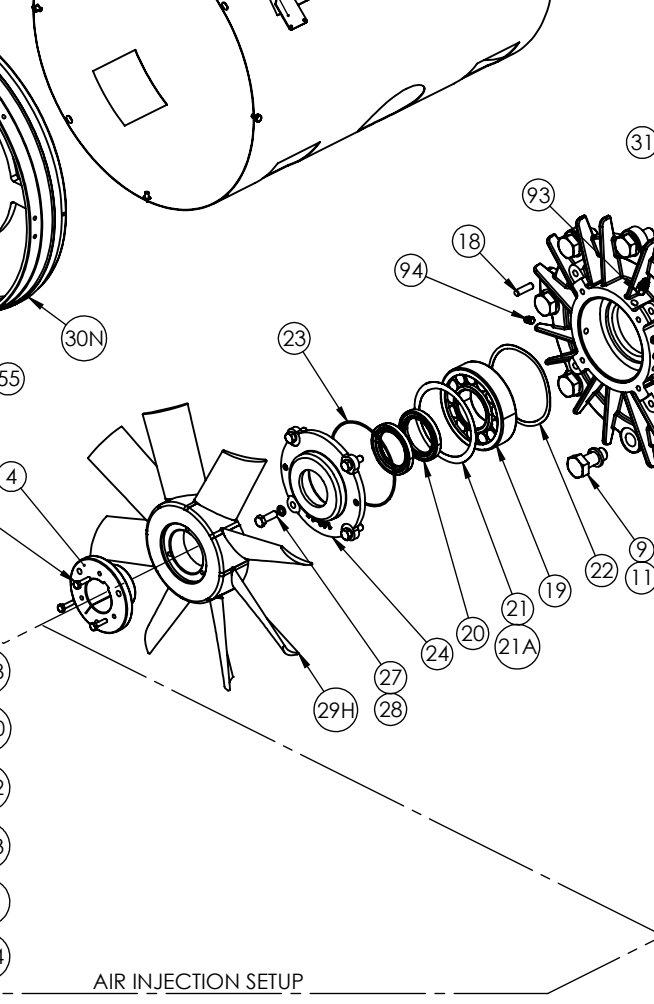
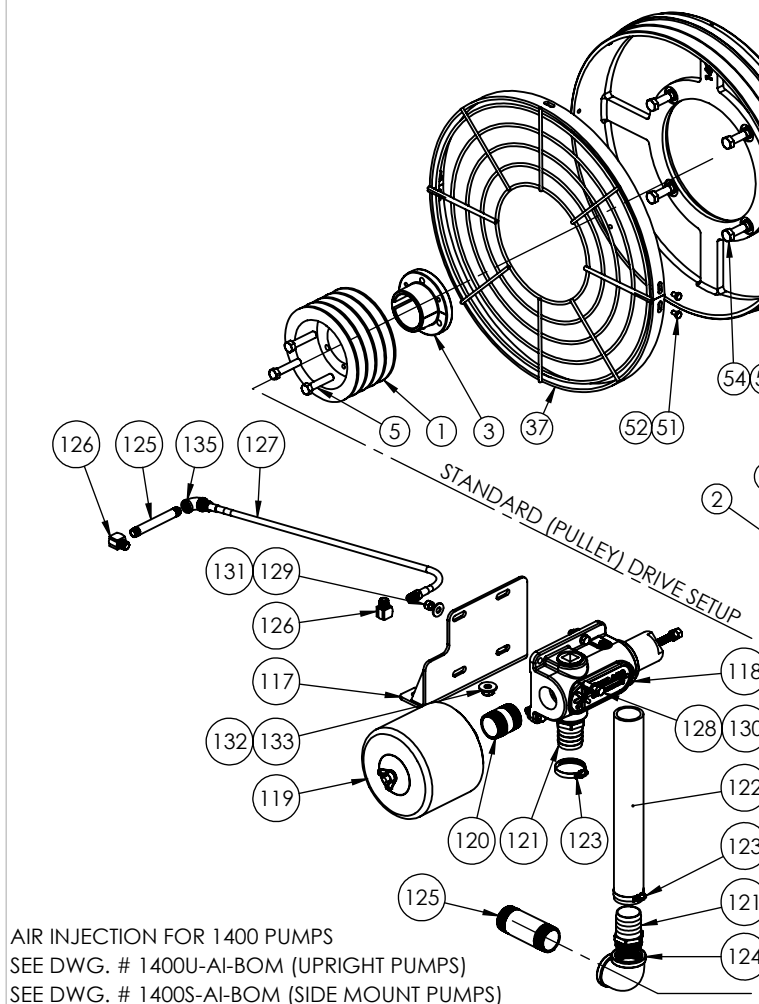
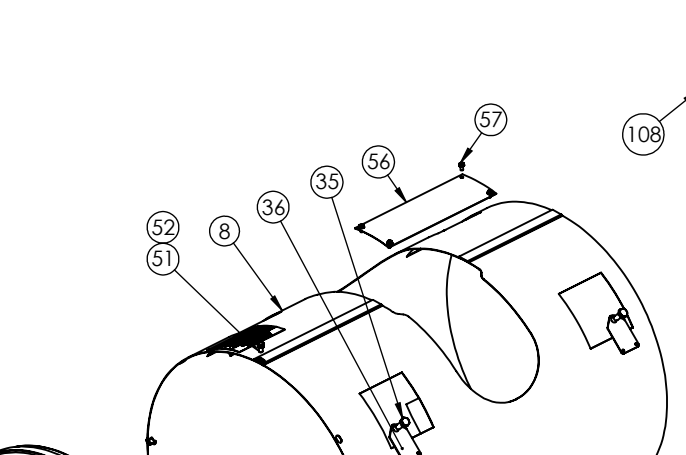
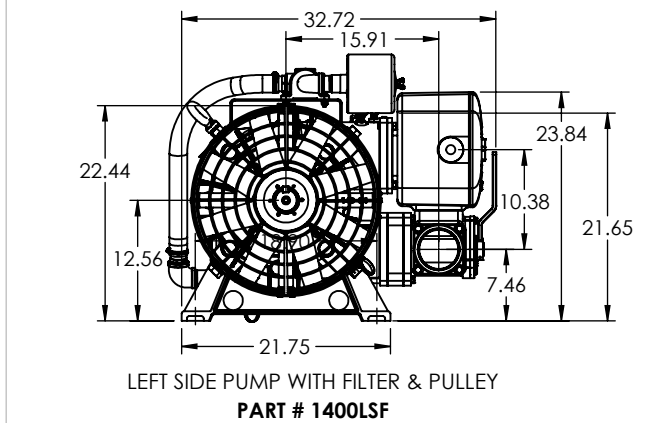
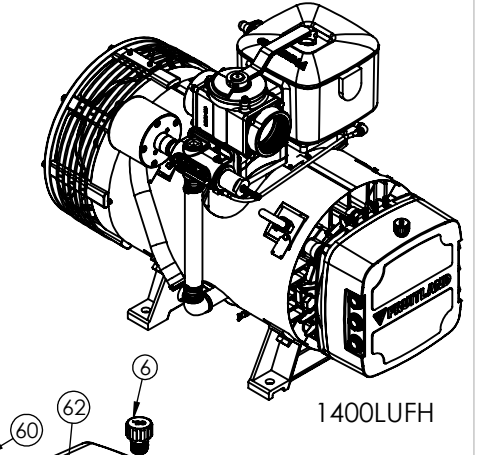
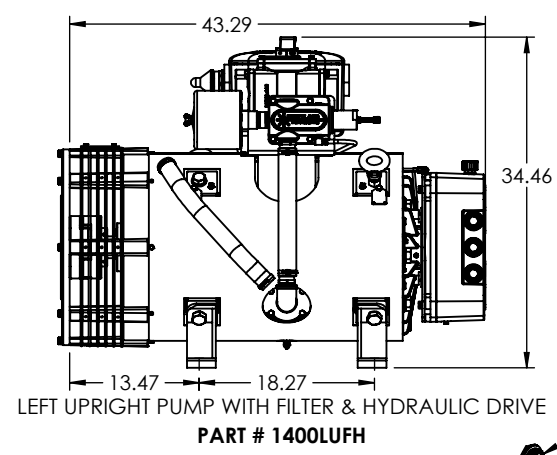
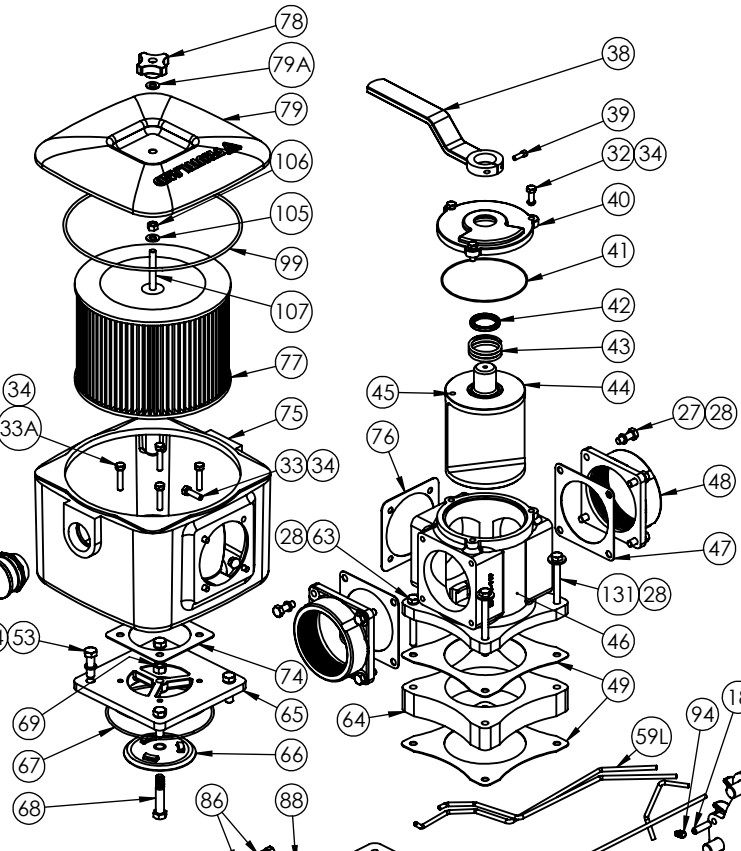
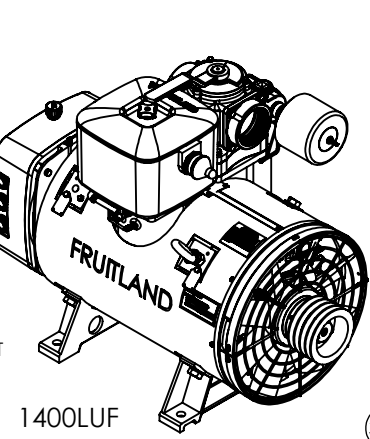
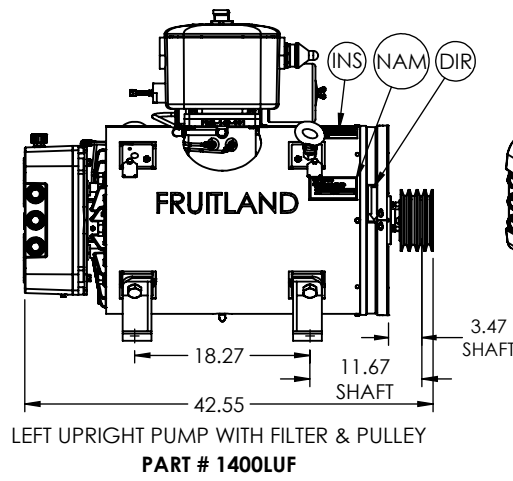
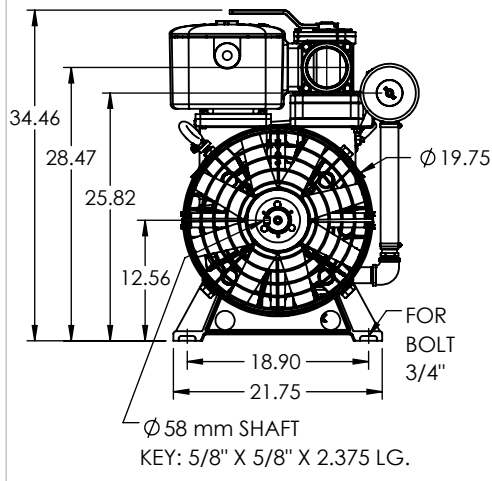
NOTE:  
RCF870 DIVERTER SHOWN

# PNEUMATIC DIVERTER HANDLE ASSEMBLY FOR RCF870 AND RCF500



# **RCF 1400 PUMP PARTS & DIMENSIONS**

1400 SERIES VACUUM PUMP



AIR INJECTION FOR 1400 PUMPS  
SEE DWG. # 1400U-AI-BOM (UPRIGHT PUMPS)  
SEE DWG. # 1400S-AI-BOM (SIDE MOUNT PUMPS)

**1400 PUMP PART #'S:**

1400LUF	1400LSF
1400LUFH	1400LSFH
1400RUF	1400RSF
1400RUFH	1400RSFH

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CREATED	Z.D.	06/17/2021	NAME	DATE		324 Leaside Avenue Stoney Creek, Ontario, CANADA L8E 2N7 Phone: (905) 662-6552 Fax: (905) 662-9875
CHECKED	K.A.	06/17/2021	TITLE:			
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL OR .X = ±.015 .XX = ±.010 .XXX = ±.005					DWG. NO.	1400LUF
MATERIAL					SCALE: 1:12	WEIGHT:--
					SHEET 1 OF 2	REV 1

REV. P1 MOVED TO REV. 0, (UPDATED BOM AND TITLE BLOCK), 01/19/2024, Z.D.  
REV. 1: ADDED AIR INJECTION PARTS TO BOM, ADDED FTM OIL PUMP, 05/13/2024, I.P.




ITEM #	PART #	DESCRIPTION	QTY.
1	4-5V8.0	SHEAVE - Ø8" OD 4, 5-GROOVE, V-SECTION	1
2	HBI-310-201	HEX BOLT - 5/16"-18 NC x 2" LONG - Z.P.	3
3	E58	TAPER E BUSHING - Ø58mm BORE	1
4	SK60	SK BUSHING - Ø60mm	1
5	HBI-501-271	HEX BOLT - 1/2"-20 NF x 2-3/4" LONG - Z.P.	3
6	RF500-190P	FILLER BREATHER CAP	1
8	RF140-46LU	HOUSING SHROUD - 1400LU PUMP	1
9	HBM-200-501	HEX BOLT - M20 x 50mm LONG - Z.P.	20
10	HNM-200-H1	HEX NUT - M20 x 2mm - Z.P.	2
11	HWM-200-21	LOCK WASHER - M20 - Z.P.	20
12	RF140-3	HOUSING END CAP - 1400 PUMP	2
13	RF140-1	PUMP HOUSING - 1400 PUMP	1
14	HPI-25R-350	ROLL PIN - Ø1/4" x 3-1/2" LONG	2
17	RF140-4	ROTOR ASSEMBLY FOR 1400 PUMP	1
18	HPI-38D-200	DOWEL PIN - Ø3/8" x 2" LONG	4
19	RF140-19	ROLLER BEARING (NJ313 SINGLE ROW CYL.)	2
20	RF140-20	OIL SEAL ROTOR SHAFT	3
21	RF140-21	BEARING SHIM .003IN THK (0.08mm) 5.433 X 4.567	1
21A	RF140-21A	BEARING SHIM .005IN THK (0.12mm) 5.433 X 4.567	1
22	RF140-24	WAVE SPRING (138mm OD x 88mm ID)	2
23	RF140-23	O-RING - SEAL HOUSING	2
24	RF140-15	SEAL HOUSING - 1400 PUMP	1
25	RF140-22	OIL SEAL HOUSING - 1400 PUMP	1
26	RF120-8	ROTOR COLLAR	2
27	HBM-100-301	HEX BOLT - M10 x 30mm - Z.P.	16
27A	HBM-100-401	HEX BOLT - M10 x 40mm - Z.P.	4
28	HWM-100-21	LOCK WASHER - M10 - Z.P.	20
29H	RF120-33L	FAN (LEFT HAND) - 1200 & 1400 PUMPS	1
30N	RF140-34N	FAN SHROUD - 1400 PUMP	1
31	RF120-74	KEY (5/8" x 5/8" x 2-3/8" LONG)	1
32	HBM-080-251	HEX BOLT - M8 x 25mm - Z.P.	3
33	HBM-080-301	HEX BOLT - M8 x 30mm - Z.P.	12
33A	HBM-080-401	HEX BOLT - M8 x 40mm - Z.P.	4
34	HWM-080-21	LOCK WASHER - M8 - Z.P.	19
35	HBM-080-201	HEX BOLT - M8 x 20mm - Z.P.	4
36	RF120-151	SHROUD BRACKET	4
37	RF120-290	FAN GUARD HALF 1200 PUMP (2PIECE = 1 GUARD)	2
38	RF500-13F	LEVER ASSEMBLY FOR FRUITLAND VACUUM PUMPS	1
39	HBI-251-756	SHCS - 1/4"-28 NF x 3/4" LONG	1
40	RF120-12	DIVERTER VALVE CAP	1
41	RF120-12-OR	O-RING - DIVERTER VALVE CAP	1
42	RF500-62A	OIL SEAL - DIVERTER VANE	1
43	RF500-14A	SPRING - DIVERTER VANE	1
44	RF870-10F	DIVERTER VANE	1
45	HPI-310-125	ROLL PIN - Ø5/16" x 1-1/4" LONG	1
46	RF870-11F	DIVERTER HOUSING - FILTER PUMPS	1
47	RF870-65	GASKET - DIVERTER FLANGE	2
48	RF870-4NPT	DIVERTER FLANGE - 4" NPT	2
49	RF870-62	GASKET - PUMP OUTLET FLANGE	2

ITEM #	PART #	DESCRIPTION	QTY.
50	HBM-060-161	HEX BOLT - M6 x 16mm LONG - Z.P.	2
51	HBM-060-101	HEX BOLT - M6 x 10mm LONG - Z.P.	14
52	HWM-060-21	LOCK WASHER - M6 - Z.P.	16
53	HBM-120-401	HEX BOLT - M12 x 40mm LONG - Z.P.	4
54	HWM-120-21	LOCK WASHER - M12 - Z.P.	8
55	HBM-120-301	HEX BOLT - M12 x 30mm LONG - Z.P.	4
56	RF140-47	SHROUD PLATE	1
57	HBI-06R-380	SELF DRILLING SCREW	4
58	RF140-6	VANES FOR 1400 PUMP	8
59L	1400LUOL1	1400LU EXTERNAL OIL LINE 1	1
	1400LUOL2	1400LU EXTERNAL OIL LINE 2	1
	1400LUOL3	1400LU EXTERNAL OIL LINE 3	1
	1400LUOL4	1400LU EXTERNAL OIL LINE 4	1
59S	OPX-050-700	PLASTIC OIL LINE - 7" LONG	2
	OPX-050-800	PLASTIC OIL LINE - 8" LONG	2
60	RF500-25SG	SIGHT GLASS - 1" BSPP	6
61	RF140-189	OIL TANK COVER - 1400 PUMP	1
62	RF140-62	O-RING - OIL TANK	1
63	HBM-100-801	HEX BOLT - M10 x 80mm - Z.P.	4
64	RF140-64	TRANSITION PLATE - 1400 PUMP	1
65	RF140-BV1	BACK-UP VALVE FLANGE - 1400 PUMP	1
66	RF140-BV2	BACK-UP VALVE DISC - 1400 PUMP	1
67	RF140-BV3	O-RING - BACK-UP VALVE	1
68	HBM-12H-445-130	SHOULDER BOLT - M12mm x 44.5mm LONG - Ø13mm SHOULDER	1
69	HNM-120-L1	LOCK NUT - M12 x 1.75mm - Z.P.	1
73	RF140-7L-OR	O-RING - FILTER BOX LID	1
74	RF870-61	GASKET - INTAKE FLANGE	1
75	RF140-7	FILTER BOX - 1400 PUMP	1
76	RF870-64	GASKET - DIVERTER TO FILTER	1
77	RF140-FC	FILTER CARTRIDGE	1
78	RF140-F00	FOUR ARM KNOB - 3/8"-16 NC	1
79	RF140-7L	FILTER BOX LID	1
79A	HWM-100-06	FLAT WASHER - M10 - COPPER	1
80	HBM-20E-040	EYEBOLT - M20 x 40mm LONG	2
81	RF870-16	AIR INJECTION COVER	1
82	RF870-63	GASKET - BALLAST COVER	1
85	FPP-121-SBR	PIPE PLUG - 1-1/4" NPT - BRASS	1
86	FCE-011-250-BR	COMP. ELBOW - 1/8 NPT x 1/4" TUBE OD - BRASS	10
88	FPP-021-BSQ	PIPE PLUG - 1/4" NPT - SQ HEAD (BLACK IRON)	6
89	RF140-89	GASKET - HOUSING END CAP	2
90	RF120-9	PUMP BASE - 1200 & 1400 PUMPS	2
91	HPI-15R-125	ROLL PIN - Ø5/32" x 1-1/4" LONG	1
93	FCS-011-250-BR	COMP. FITTING - 1/8" NPT x 1/4" TUBE OD - BRASS	4
94	FPP-011-HCS	PIPE PLUG - 1/8" NPT - SOCKET HEX - STEEL	4
96	RF500-27	GASKET - OIL PUMP	1
97	OPA-140L*	FRUITLAND OIL PUMP LH	1
	OPA-140R*	FRUITLAND OIL PUMP RH	1
98	OPM-140-15	INTAKE PIPE - 1/16" NPT x 5-1/2" LONG	1
100	FPN-021-350-BI	NIPPLE - 1/4" NPT x 3-1/2" LONG - BLACK IRON	2

ITEM #	PART #	DESCRIPTION	QTY.
101	FVP-021-BR	DRAIN/PLUG VALVE - 1/4" NPT - BRASS	1
102	FPE-022-90-BI	PIPE ELBOW (FXF) - 1/4" NPT - BLACK IRON	1
103	FPN-021-450-BI	NIPPLE - 1/4" NPT x 4-1/2" LG - BLACK IRON	1
104	FPC-022-BI	PIPE COUPLING - 1/4" NPT - BLACK IRON	1
105	HWI-380-32	FLAT WASHER, SAE (SMALL) - 3/8" - Y.Z.P.	1
106	HNI-380-H1	HEX NUT - 3/8"-16 NC - Z.P.	1
107	RF140-7TR	THREADED ROD - 3/8"-16 NC x 7-1/2" LONG - Z.P.	1
108	VB	VACUUM RELIEF VALVE - 1-1/2" NPT	1
110	RF140-BH	BELL HOUSING - 1400 PUMPS	1
111	RF120-GR	GUARD RINGS	4
112	RF120-02	CLAMP PLATE FOR BELL HOUSING	1
113	WT358	WT358 COUPLING FLANGE CAST	2
114	WT358H	COUPLING FLANGE SPECIFY BORE	1
115	HBI-38S-503	SET SCREW - 3/8"-16 NC x 1/2" LONG	2
116	RF120-MP	HYD. MOTOR MOUNTING PLATE	1
117	RF870-AI-U	AIR INJECTION VALVE MOUNTING PLATE	1
118	RF870-AI	AIR INJECTION VALVE ASSEMBLY	1
119	AI-870-F	AIR INJECTION FILTER	1
120	FPN-121-020-CS	PIPE NIPPLE - 1-1/4" NPT x 2" LONG	1
121	FPA-121-155-BR	PIPE ADAPTOR - 1-1/4" NPT x 1-1/2" BARB	2
122	RHS-150-EXF	RUBBER HOSE - Ø1-1/2" - EXTREMEFLEX 13-1/2" LONG (UPRIGHT)	1
123	HCM-080-055	HOSE CLAMP - 1-1/2" (52-55mm)	2
124	FPE-122-90-CS	PIPE ELBOW 90° (FxF) - 1-1/4" NPT	1
125	FPN-121-040-CS	PIPE NIPPLE - 1-1/4" NPT x 4" LONG	1
126	FPE-020-91-BR	STREET ELBOW 90° (MxF) - 1/4" NPT - BRASS	2
127	AI-870-84	S.S. BRAIDED HOSE - 1/4" NPT x 23" LG. x 3/8" OD	1
128	HBI-310-121	HEX BOLT - 5/16"-18 NC x 1-1/4" LG - Z.P.	4
129	HNI-310-N2	NYLOCK HEX NUT - 5/16"-18 NC - Y.Z.P.	4
130	HWI-310-32	FLAT WASHER, SAE (SMALL) - 5/16" - Y.Z.P.	4
131	HWI-310-42	FLAT WASHER, USS (LARGE) - 5/16" - Y.Z.P.	4
132	HBM-100-1051	HEX BOLT - M10 x 105mm LONG - Z.P.	2
133	HNM-100-N1	NYLOCK NUT - M10 x 1.5mm - Z.P.	2
134	HWM-100-01	FLAT WASHER - M10 - Z.P.	2
135	FPE-022-90-BI	PIPE ELBOW, 90° (FxF) - 1/4" NPT	1
136	FPN-021-040-CS	PIPE NIPPLE - 1/4" NPT x 4" LONG	1
DIR	RF500-DIR	DIRECTION TAG	1
INS	RF500-INS	INSTRUCTION TAG	1
NAM	RF500-NAM	NAME PLATE	1
MAN	RF500-MAN	MANUAL	1

**1400 PUMP PART #'S:**  
**1400LUF 1400LSF**  
**1400LUFH 1400LSFH**  
**1400RUF 1400RSF**  
**1400RUFH 1400RSFH**

\* SPECIFY PUMP ROTATION "L" OR "R" AND 4-WAY VALVE LOCATION — UP OR SIDE.

NAME	DATE	 <small>324 Leaside Avenue Stoney Creek, Ontario, CANADA L3E 2N7 Phone: (905) 662-6552 Fax: (905) 662-9875</small>
CREATED	Z.D. 06/17/2021	
CHECKED	K.A. 06/17/2021	TITLE:
UNLESS OTHERWISE SPECIFIED:		1400 STANDARD PUMP EXPLODED VIEW (PARTS LIST)
DIMENSIONS ARE IN INCHES		DWG. NO.
TOLERANCES:		1400LUF
FRACTIONAL OR	.X = ±.015 .XX = ±.010 .XXX = ±.005	REV
MATERIAL	--	1
SCALE: 1:12	WEIGHT:--	SHEET 2 OF 2

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# PUMP WARRANTY

**WARRANTY POLICY — WHAT WE COVER:** Subject to the terms of this warranty (the “WARRANTY”), vacuum pumps (the “PRODUCT”) manufactured by R.T. Hamilton and Associates Ltd. (FRUITLAND MANUFACTURING) are warranted to be free from defects in material and workmanship for a maximum period of two (2) years from the date of shipment to Buyer. THIS IS THE SOLE AND EXCLUSIVE PRODUCT WARRANTY GIVEN BY FRUITLAND MANUFACTURING TO BUYER AND IS IN LIEU OF, AND EXCLUDES, ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. COMPONENTS WHICH MAY BE SUPPLIED AS PART OF AN ASSEMBLY, OR SPARE PART(S), AND NOT MANUFACTURED BY FRUITLAND MANUFACTURING ARE LIMITED ONLY TO THE WARRANTY EXTENDED BY THE MANUFACTURER(S) OF THE COMPONENT(S).

**2. WARRANTY CLAIMS — HOW WE RESPOND TO WARRANTY ISSUES:** In the event of a defect in a PRODUCT covered by this WARRANTY, FRUITLAND MANUFACTURING shall repair or replace the affected PRODUCT, or components of the affected PRODUCT, at its sole discretion. This is the BUYER’S sole and exclusive remedy. BUYER shall comply with FRUITLAND MANUFACTURING’s WARRANTY Claims Process in order to enforce this WARRANTY.

### **3. WARRANTY EXCLUSIONS — THINGS THAT WILL RESULT IN LOSS OF WARRANTY COVERAGE OR WHICH ARE NOT COVERED:**

a. This WARRANTY shall be void if:

- i. BUYER fails to maintain the PRODUCT through proper care and maintenance procedures;
- ii. BUYER fails to operate and/or use the PRODUCT in the manner in which it was intended, and in accordance with the PRODUCT manual(s), or otherwise misuses or abuses the PRODUCT;
- iii. BUYER fails to notify FRUITLAND MANUFACTURING of a PRODUCT defect covered under this WARRANTY within 72 hours of discovery of the defect, or fails to cooperate with FRUITLAND MANUFACTURING in investigating the PRODUCT defect;
- iv. Personnel who have not been approved by FRUITLAND MANUFACTURING make repairs or modifications to the PRODUCT;
- v. Replacement parts that have not been approved by FRUITLAND MANUFACTURING are used in the PRODUCT; or
- vi. BUYER fails to pay for the PRODUCT in full.

b. Damage to the PRODUCT arising from extreme weather conditions or affixing equipment or materials to the PRODUCT that have not been approved by FRUITLAND MANUFACTURING, is not covered by this WARRANTY. LIMITATION OF DAMAGES: FRUITLAND MANUFACTURING SHALL HAVE NO LIABILITY TO BUYER OR OTHERWISE ARISING FROM, OR IN ANY WAY CONNECTED TO, THE PRODUCT, INCLUDING ITS SALE, USE OR OPERATION, EXCEPT AS EXPRESSLY SET OUT HEREIN. IN NO EVENT SHALL FRUITLAND MANUFACTURING BE LIABLE FOR LOST PROFITS OR FOR SPECIAL, CONSEQUENTIAL, EXEMPLARY OR INCIDENTAL DAMAGES OF ANY KIND WHETHER ARISING IN, CONTRACT, TORT, PRODUCT LIABILITY, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, EVEN IF FRUITLAND MANUFACTURING WAS ADVISED OF THE POSSIBILITY OF SUCH LOST PROFITS OR DAMAGES. IN NO EVENT SHALL FRUITLAND MANUFACTURING BE LIABLE TO BUYER FOR ANY DAMAGES WHATSOEVER IN EXCESS OF THE TOTAL PRICE PAID BY BUYER FOR THE PRODUCT. BUYER HEREBY WAIVES ANY CLAIM THAT THE EXCLUSIONS OR LIMITATIONS IDENTIFIED HEREIN DEPRIVE IT OF AN ADEQUATE REMEDY OR CAUSE THIS OR ANY OTHER AGREEMENT WITH FRUITLAND MANUFACTURING TO FAIL OF ITS ESSENTIAL PURPOSE.

## NOTICE - WARRANTY CLAIM



In the event of pump failure while the pump is still under warranty, pumps are to be returned to factory without dismantling or other alterations for warranty assessment. Violation of this condition will void warranty. All shipping costs are the customer's responsibility.

Thank you for purchasing a Fruitland Manufacturing Pump. Our Quality Control program has been developed to ensure this vacuum pump and its components are free from defects in materials and workmanship. With proper maintenance and operation your Fruitland pump should give many years of trouble free use.

**Please read the owner's manual completely before operating your new Fruitland pump.**

## SERVICE NOTE USE GENUINE FRUITLAND PARTS ONLY!

If you have any questions, or require further information on installing, operating and or the maintenance of your vacuum pump contact:

**1-800-663-9003 or email: [sales@fruitland-mfg.com](mailto:sales@fruitland-mfg.com)**

\*If you require these components, please contact your supplier or Fruitland Manufacturing (They may not be included in the pump or package you acquired)



324 Leaside Ave, Stoney Creek Ontario, Canada L8E 2N7  
905-662-6552 • Toll Free: 1-800-663-9003  
[www.fruitlandmanufacturing.com](http://www.fruitlandmanufacturing.com)

**ATTENTION:**

**Read owner's manual fully before operating pump.  
Failure to do so can result in personal injury, severe  
pump damage and may void warranty.**

