

LIQUIDYNAMICS

Bulk Transfer Carts

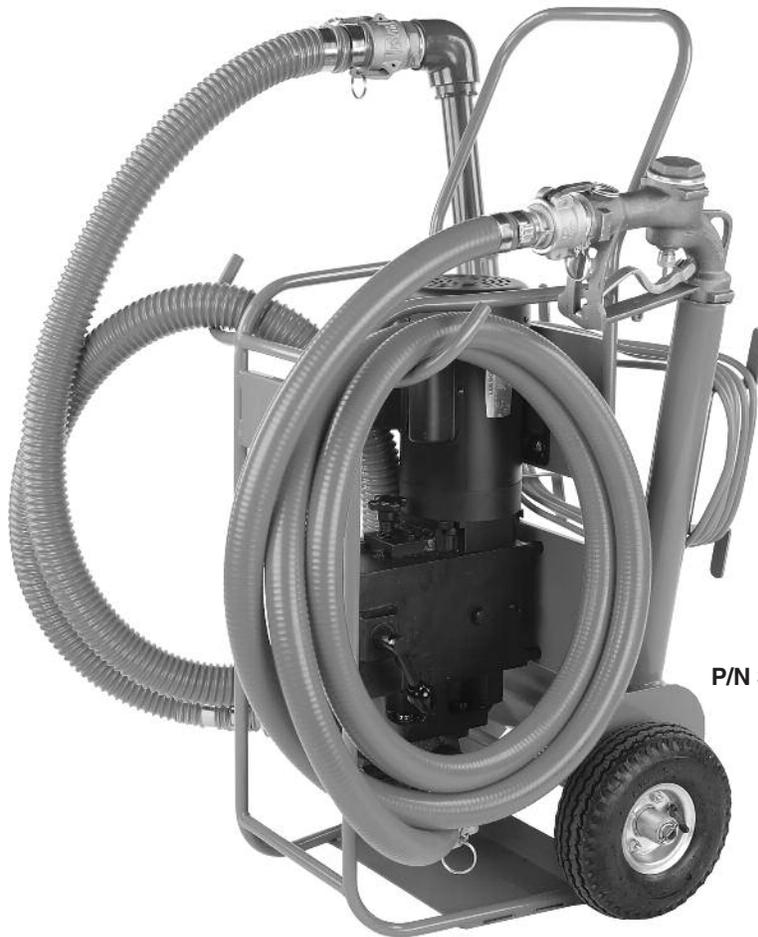
Instruction & Parts Manual

This Manual Covers the Following Model Pumps

P/N 33280 and 33280-P Three Speed Transfer Cart

P/N 33267 and 3267-P High Volume Transfer Cart for Light Viscosities

P/N 33267-20CG and 33267-20CG-P Single Speed Cart
for Medium Viscosities



P/N 33280 shown



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This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

READ THIS MANUAL CAREFULLY BEFORE OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.



DO NOT USE THIS CART SYSTEM TO PUMP FLAMMABLE, EXPLOSIVE OR CORROSIVE PRODUCTS SUCH AS GASOLINE, DIESEL FUEL OR CHEMICALS.



Before each use inspect the power cord to ensure it is not cut, nicked, has any exposed wires and ground lug on plug is intact and functional.

UNCRATING & ASSEMBLY:

1. When removing carton exercise caution not to cut hose or power cord that may have shifted during transport.
2. Remove straps securing pump assembly from shipping pallet.
3. Inspect for damage. If damage is found please report damage to freight carrier.

Part Number # _____

Voltage: _____

Motor Serial # _____

Tested by: _____

Gearbox Serial # _____

Date: _____

Pump Serial # _____



This symbol indicates a potentially hazardous situation which, if not avoided, may result in injury or damage to equipment.

All pumps have been assembled and tested at the factory and are ready for use. In cases where hoses are not provided, a few general guidelines should be followed.

Suction Hose:

- Use hard wall non-collapsible hose rated for 25" Hg Vacuum.
- Should be the same size as pump inlet or larger
- Short as practical, no greater than 15' in length.
- If handling heavy lubes or operating in colder temperatures, consider using next larger hose diameter.

Discharge Hose:

- Should be the same size as pump discharge or larger.
- Short as practical. Maximum hose length will vary according to viscosity of product handled. Consult factory.

INTRODUCTION:

This heavy-duty transfer pump system is designed for the bulk transfer of a wide variety of lubricants using either 115 VAC. or 208-230 VAC. All pumps systems are tested and shipped to operate with 115 VAC unless otherwise specified.

Bulk transfer pumps are positive displacement internal gear design, which are exceptionally well suited for handling refined oils. Pump and motor connections are achieved using a rigid double NEMA "C" face connection protecting drive shaft connection from misalignment due to rough handling.

Pumps may be operated in a vertical or horizontal orientation. All pumps include an internal bypass valve set at the factory for optimum performance.

Specific pump models are designed to handle a specific viscosity range. “Recommended Gear Settings Chart” (Fig. 1) depicts approximate viscosity operating range for fixed and 3 speed pumps.

PUMP VISCOSITY CHART			
Fixed Gear Pumps	3 Speed pump setting	Typical operating range	** Pump should be empty to start
2 HP 40 GPM	3rd Gear 40 GPM	Up to 230 Centipoise	180 Centipoise and above
2 HP 20 GPM	2nd Gear 20 GPM	Up to 600 Centipoise	500 Centipoise and above
2 HP 10 GPM	1st Gear 10 GPM	Up to 4900 Centipoise	3500 Centipoise and above
NOT RECOMMENDED		5000 Centipoise and above	
** “Pump should be empty to start” column indicates the viscosity at which pump needs to be empty in order to “start” when pumping the higher viscosities noted in the “Typical operating range” column.			

Fig. 1

“Lubricant Viscosity Table” (Fig. 2) provides approximate viscosity of oils at various operating temperatures.

Note: Chart depicts average viscosity and should only be used as a general reference.

LUBRICANT VISCOSITY TABLE												
Temperature		100 F	90 F	80 F	70 F	60 F	50 F	40 F	30 F	20 F	10 F	0 F
FLUID	ISO No.	38 C	32 C	27 C	21 C	15 C	10 C	4 C	-1 C	-7 C	-12 C	-18 C
A.T.F		35	44	56	72	95	127	176	250	366	544	872
5w-20		46	59	76	101	136	188	268	394	598	944	1557
10w	32	37	49	64	87	122	176	263	407	659	1120	2012
5w-30		61	78	101	134	182	252	359	528	801	1262	2070
Hydraulic	46	46	61	82	114	163	241	370	592	995	1763	3319
10w-30		70	91	121	165	230	331	491	755	1205	2010	3517
20w	68	68	92	127	181	266	405	640	1059	1843	3392	6651
30w	100	100	135	187	267	392	596	940	1547	2670	4854	9364
10w-40		97	126	168	228	317	454	669	1017	1605	2635	4523
15w-40		123	164	223	311	445	656	998	1575	2585	4437	7999
40w	150	128	178	253	370	562	887	1457	2510	4555	8765	18015
20w-50		164	222	308	440	645	976	1530	2494	4243	7575	14266
80W-90		143	198	282	412	622	975	1591	2717	4880	9275	18770
50w	220	226	321	470	709	1110	1807	3074	5491	10358	20769	44595
80W-140		263	359	502	720	1062	1615	2542	4152	7068	12596	23621
90w gear	320	331	479	713	1099	1757	2926	5099	9346	18121	37417	82894
140w gear	460	479	702	1060	1658	2693	4557	8077	15065	29745	62574	141305
Readings are in centipoise (formula used is centistoke X .9 = centipoise).												

Fig. 2

WARNING

Before each use, inspect the power cord to ensure it is not cut, nicked, has any exposed wires and ground lug on plug is intact and functional.

SINGLE SPEED PUMP OPERATION:

1. Ensure power switch located on motor is in the off position.
2. Insert power cord plug into 110 VAC receptacle.
3. Insert suction stub into container to be emptied.
4. Place nozzle into container to be filled (Ensure nozzle is not inadvertently latched open).
5. Turn power switch to the "ON" position.
6. Open discharge nozzle, allowing air to escape and pump to pick up prime.
7. Once flow is established, monitor filling process to prevent over filling container.
8. Close nozzle once desired amount is dispensed.
9. Turn power switch to the off position.

If transfer is complete, it is considered a good practice to disconnect the hose from the suction stub. While pump is running, holding suction hose up allowing product to gravity flow to pump. Open discharge nozzle to allow majority of product to be purged from the system. This practice reduces the amount of cross contamination when handling different grades of product.

Stow discharge nozzle & suction stub into storage tubes to ensure residual product will be contained in the residual fluid tank.

Note: When operating at the upper end of the viscosity range or due to colder temperature, it will be necessary to "walk-the-hose" (Disconnecting suction hose from the suction stub while pump is running, allowing oil to purge from hose and pump cavity). This procedure will protect the motor from attempting to start under an excessive load. Failing to adhere this procedure will cause motor to overheat, trip the circuit breaker and adversely affect the useful life of the motor.

3-SPEED PUMP SYSTEM OPERATION:

3 Speed pump operation is essentially the same as single speed systems except operator has the ability to select 3 different flow rates i.e.; 10, 20 and 40 GPM.

Gear Position	Flow Flow	Recommended Application
1	10 GPM	High viscosity lubricants or cold temperatures, viscosity up to 4900 cps.
2	20 GPM	Midrange lubricants in mild to warm temperatures, viscosity up to 600 cps.
3	40 GPM	Light products or midrange lubricants at higher temperatures, viscosity up to 230 cps.

Procedure to determine appropriate pump gear setting:

Use viscosity table, FIG.2 as general reference for approximating viscosity of a lubricant at required temperature, then reference Fig. 1 to determine the optimum speed setting.

Example:

1. Handling 10W/40 at a temperature of 60 degrees. Referencing "Lubricant Viscosity Table" FIG. 2 locate 10W/40 line, find the approximate temperature across the top of the chart, determine where the two lines intersect in the table. This is the approximate viscosity.i.e.; 317 centipoise.
2. Next locate "Recommended Gear Settings" chart, FIG.1, find the "Typical Operating Range" column and determine gear setting by locating the highest GPM that the viscosity of lubricant being handled does not exceed the value found in the "Typical Operating Range" column. In this example, 600 centipoise. Therefore use 2nd gear/20GPM setting.

WARNING

Any attempt to change gears while pump is running will severely damage the gear box and possibly cause injury to the operator.

Procedure for changing gear settings:

In order to change pump gears, power must be OFF.

1. Ensure power is turned off.
2. Grasp pump speed selector knob with one hand, move the selector knob towards the desired setting. (Fig.3)

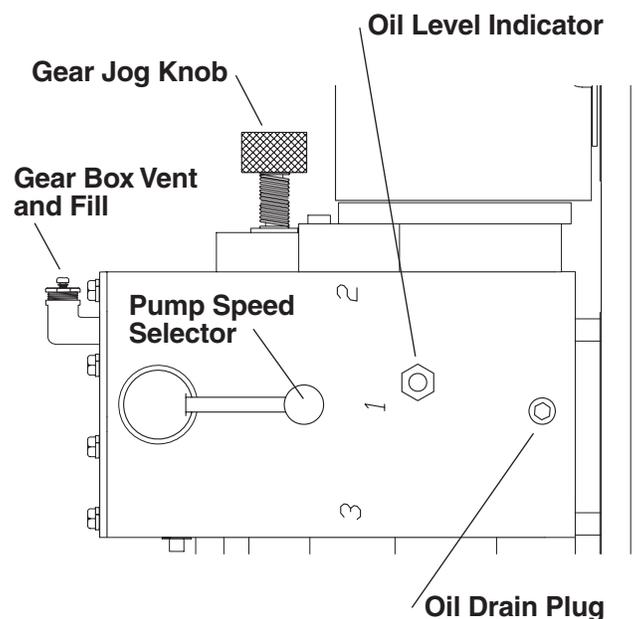


Fig. 3 – Three Speed Gear Box

3. When the selector knob stops; with the other hand grasp and push down the “Gear Jog knob” against the spring tension. Rotate the knob clockwise or counter clockwise while simultaneously applying light pressure to the speed selector knob. This allows the selector knob to move into proper position when gears become synchronized. The procedure may have to be repeated twice when passing through 1st gear.
4. After the speed selector knob is in place, release “Gear Jog Knob”.

WARNING

Do not depress the “Gear Jog Knob” when pump is turned on or while pump is running this could result in personal injury to the operator and damage to the gear box.

5. When power is applied to the pump be prepared to turn off power immediately in the event gears were not properly synchronized.

CAUTION

Do not attempt to force the gears in place while motor is running this will cause serious damage to the gearbox.

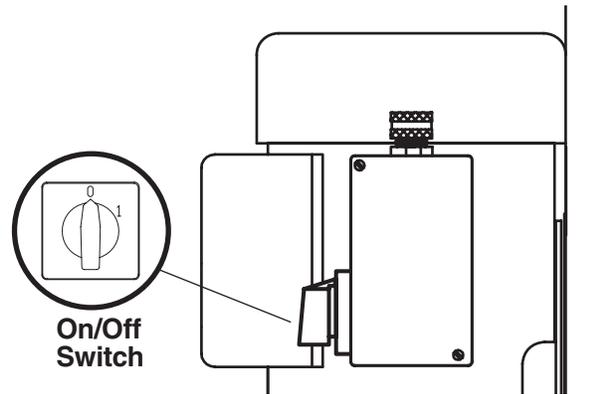
ON/OFF SWITCH:

A heavy duty rotary on/off switch is located on the motor electrical box. It is positioned for maximum protection from accidental breakage. The switch is activated by lightly rotating the knob 25 degrees right or left. “0” (the 12:00 o’clock position) is “OFF” and “1” (the 2:00 o’clock position) is “ON”. (Fig. 4)

Normal operating range is between 8 - 20 Amps, it is not uncommon for current draw to momentarily exceed 20 amps when starting the pump. If the pump current draw is greater than 20 Amps, the operator should turn off the pump and select a lower gear (slower pump speed). If allowed to continuously run in excess of 20 Amps, motor life will be adversely affected and/or cause the electrical circuit breaker to trip.

Note: It is not uncommon for old circuit breakers to become weak and require replacement.

If the breaker continuously trips, this could be an indication the circuit breaker is weak and needs to be replaced. Alternatively, if an extension cord is being used, the cord may not be of sufficient size to handle the load. Or, possibly there are other items operating on this circuit breaker, therefore not providing sufficient amperage capability for the additional load of this transfer cart.

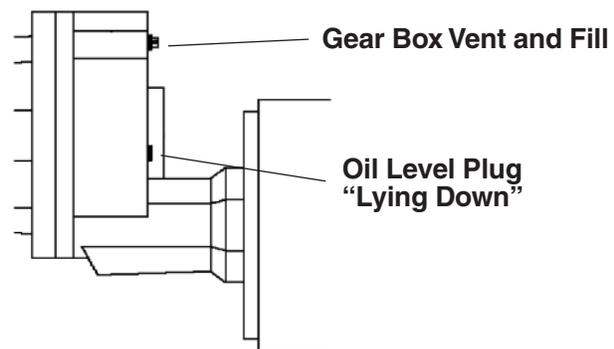


(Fig. 4) – Motor Electrical Connection Box

SINGLE SPEED GEAR BOX

The single speed gear box uses two sets of pillow block style couplings. One couples the motor shaft to gear box and the second couples gear box to pump. Both sets of couplings are securely mounted between two “C” flanges preventing misalignment due to rough handling. Both couplings are covered with OSHA approved shrouds.

Check gearbox lubricant level with the cart lying down; remove the 3/8” hex oil level plug located at the motor side of gear box (Fig.5). When plug is removed, a small amount of oil should run out. If necessary to add oil, remove vent plug at top of gear box (Fig. 5), pour lube into fill/vent port. Proper level is achieved when oil flows from the oil level hole when cart is in the horizontal position.



(Fig. 5) – Single Speed Gear Box

Change oil only when performing maintenance that requires gear box disassembly, or as outlined in “Lubrication” section below.

Use Mobil SHC-634 Lubricant, a synthetic hydrocarbon formulated for long life and wide temperature range (-25 degrees F to +220 degrees F) or equal.

3 SPEED GEAR BOX

The 3 speed gear box uses no couplings. Motor shaft to gear box and gear box to pump are directly connected with keyed shafts. Both connections are covered, preventing person contact.

The 3 speed gear box is equipped with two visual oil level indicators. One is for use when the pump/gear box is standing upright, the other for use when the pump is lying down. (Fig. 3) Observing the appropriate indicator, proper lubricant level is half way up the level indicator.

If necessary to add oil, remove vent plug located on the top of gear box, pour lube into fill/vent port while observing the oil level indicator

Maintenance

Because of the rugged construction of the transmission, no unusual maintenance procedures are necessary for the life of the transmission. A periodic check of the oil level and an occasional check for tightness of bearing cap bolts, cover bolts and all mounting hardware is advisable to avoid excessive wear and noise. These inspections are best scheduled to coincide with the oil changes described under "Lubrication" below.

Lubrication

All transmissions are shipped from the factory with the proper grade of oil installed. Initial oil supplied with the transmission should be changed after 500 hours of operation, and flushed out with a proper flushing oil. After initial oil change, further changes should be scheduled every 2500 hours or every 6 months, whichever comes first. In extremely dirty or dusty areas where the transmission is exposed to high humidity, or reactive chemicals in the air, changes should be more frequent.

Oil level of the 3 speed transmission should be checked weekly.

The following steps should be followed when changing oil:

1. Operate transmission for at least 1/2 hour to warm oil.
2. Stop transmission and disconnect power supply from motor. Remove drain, fill and level plugs.
3. Allow transmission to drain completely (if removed oil appears unusually dirty, flush with suitable flushing oil).
4. Clean and install drain plug securely using a thread sealant. Refill transmission until oil reaches level hole. **DO NOT OVERFILL.**
5. Clean and re-install filler plug and level plug using a thread sealant.
6. Clean oil breather (vent plug).

Storage

If the transfer cart is going to be put in storage for a period of time greater than two months, the 3 speed transmission should be either filled completely with oil, or run for short periods once a week with normal oil levels. Failure to ensure proper lubrication of internal parts during storage may result in internal oxidation.

At the end of the storage period, change oil in the 3 speed transmission and refill to operating levels.

The following oils are acceptable for use in this transmission:

Mobile	Gear Oil 630
Texaco	Meropa 220
Phillips	Philgear 220
Shell	Omala 220

Use Mobil SHC-634 Lubricant, a synthetic hydrocarbon formulated for long life and wide temperature range (-25 degrees F to +220 degrees F) or equal.

PUMP

The Liquidynamics transfer pump is an internal gear, positive displacement pump with internal bypass valve that is factory set and should not require any maintenance. Periodically, inspect for leaks and loose bolts.



Not approved for Class I Div 2 explosion proof environment. **DO NOT USE THIS CART SYSTEM TO PUMP FLAMMABLE, EXPLOSIVE OR CORROSIVE PRODUCTS SUCH AS GASOLINE, DIESEL FUEL OR CHEMICALS.**

MOTOR

2 HP 115/230V TEFC Totally enclosed fan cooled motor. No preventive maintenance is required on motor assembly. Visually inspect to ensure shroud, mounting bolts and electrical cords are secure. Sealed bearings require no lubrication.

CART

Constructed of thick wall steel tubing with powder coat finish for durability. Tires may be inflated up to 50 PSI.

TRANSFER OPERATION

1. Ensure power switch located on motor is in the off position.
2. Insert power cord plug into 110VAC receptacle.
3. Insert suction stub into container to be emptied.
4. Place nozzle into container to be filled (Ensure nozzle is not inadvertently open).
5. On PowerMaster select load setting 20 or 15 Amp and set % Speed to 100%.
6. Set the Start/Stop Switch to the "Start" position.
7. Open discharge nozzle, allow air to escape and pump to prime.
8. Once flow is established, adjust % Speed to the desired flow rate, monitor transfer process to prevent over filling container.
9. Close nozzle once desired amount is dispensed.
10. Turn power switch to the off position.

If transfer is complete it is considered a good practice to disconnect the hose from the suction stub. While pump is running, holding suction hose up allowing product to gravity flow to pump. Open discharge nozzle to allow majority of product to be purged from the system. This practice reduces the amount of cross contamination when handling different grades of product.

11. Stow discharge nozzle & suction stub.

Note: When operating at the upper end of the viscosity range or colder temperatures, it may be necessary to "walk-the-hose" (Disconnecting suction hose from the suction stub while pump is running, allowing oil to purge from hose and pump cavity). This procedure will protect the motor from attempting to start under an excessive load. Failing to adhere to this procedure will cause motor to overheat, trip the circuit breaker and adversely shorten the useful life of the motor.



Dry running leads to immediate damage to pump components. Due to tight running clearances, liquids containing solids and abrasives will accelerate pump wear and/or cause pump damage.

POWERMASTER OPERATION

The useable current available from an electrical outlet is dictated by age of the circuit breaker and other equipment that may be sharing the same circuit. The PowerMaster is designed to sense available current and automatically reduce motor load by decreasing flow rate to prevent overloading. Additionally, on the enclosure cover of the PowerMaster there is a 15/20 Amp switch allowing the operator to select the desired load range.

It is reasonable, when initially connecting to an unfamiliar electrical outlet to attempt using the 20 Amp setting in order to obtain maximum performance. Because the PowerMaster provides a soft motor start, therefore reducing the current spike during start up. It is possible to run in the 20 Amp mode when on a 15 Amp circuit without overload. However, if the circuit is known to be a 15 Amp circuit with additional equipment running on it the PowerMaster will be more sensitive to current fluctuations while in the 15 Amp setting.

The operation of a pumping system that has the "PowerMaster" option is essentially the same except an operator selects:

- A. Either 15 or 20 Amp load setting.
- B. The flow rate using the "% Speed" Potentiometer.

The PowerMaster contains two diagnostic LEDs mounted on the enclosure cover displaying the operational status.

POWER ON LED "Power" will illuminate green when AC power is applied.



Do not depend on the Power LED as a guaranteed power off condition. Be sure the power cord is unplugged before servicing this device.

STATUS LED "Status" LED is a tricolor LED which provides indication of a fault or abnormal condition. The information provided can be used to diagnose overload condition and provides an indication to inform the operator that the PowerMaster operating parameters are normal Table below summarizes the Status functions.

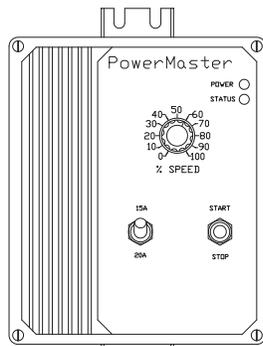
POWERMASTER OPERATING CONDITION AND STATUS LIGHT INDICATOR

PowerMaster Operating Condition	Flash Rate (1) and LED Color
Normal Operation	Slow Flash Green
Overload (120% - 160% Full Load)	Steady Red (2)
Power Master Timed Out	Quick Flash Red (2)
Under Voltage	Quick Flash Red / Yellow (3)
Over Voltage	Slow Flash Red / Yellow (3)
Stop	Steady Yellow

Notes: (1) Slow Flash = 1 second on and 1 second off. (2) When the overload is removed, before times out and trips the drive, the Status LED will flash green. (3) When the under voltage or over voltage condition is corrected, Status LED will flash Red / Yellow / Green.

START-UP PROCEDURE.

If AC power is applied the “Power” LED will illuminate green. The “Status LED will indicated PowerMaster Status, as described in Table above.



(Fig. 6)

To start the PowerMaster, momentarily set the Start/Stop Switch to the “Start” position. (Fig.6) The motor will begin to accelerate to speed set on %Speed Potentiometer located on the front cover.

STARTING THE POWERMASTER AFTER A FAULT HAS BEEN CLEARED – The PowerMaster monitors four faults (Undervoltage, Overvoltage, Short Circuit and Overload) See Table for the Status LED indication.

To start the drive after a fault has been cleared, momentarily set the Start/Stop Switch to the “Stop” position.

ON/OFF SWITCH

A heavy duty rotary on/off switch is located on the motor electrical box. It is positioned for maximum protection from accidental breakage.

The switch is activated by lightly rotating the knob 25 degrees right or left. “0” (the 12:00 O’clock position) is “OFF” and “1” (the 2:00 O’ clock position) is “ON”.

MAINTENANCE

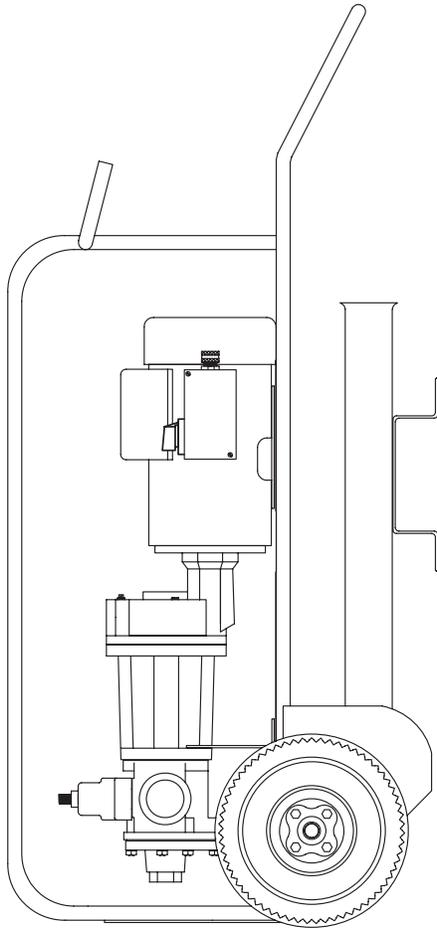
Frequency

Since usage varies for different users, the frequency and extent of pump maintenance is best established based upon past performance. Keeping detailed maintenance records of past performance aids in determining future preventive maintenance intervals. During routine operating inspections, pay particular attention to seal, bypass, bearing areas of the pump and abnormal vibration or noise.

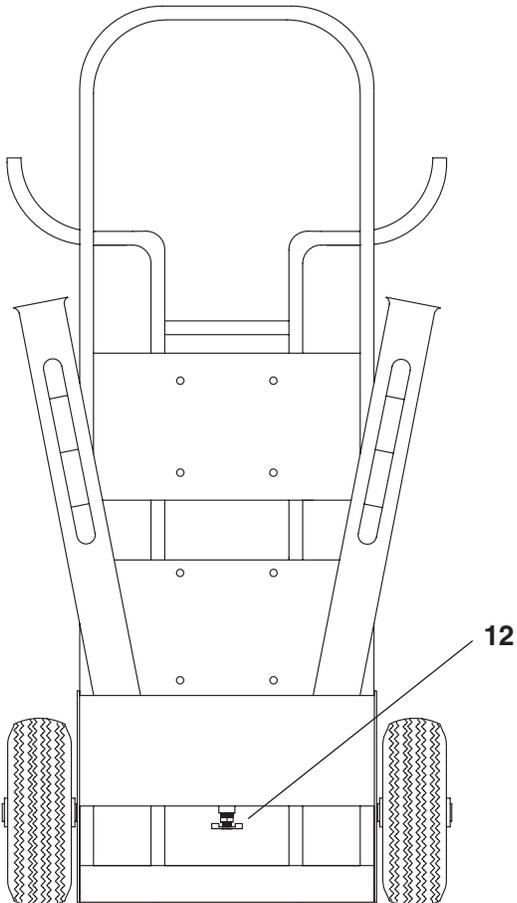
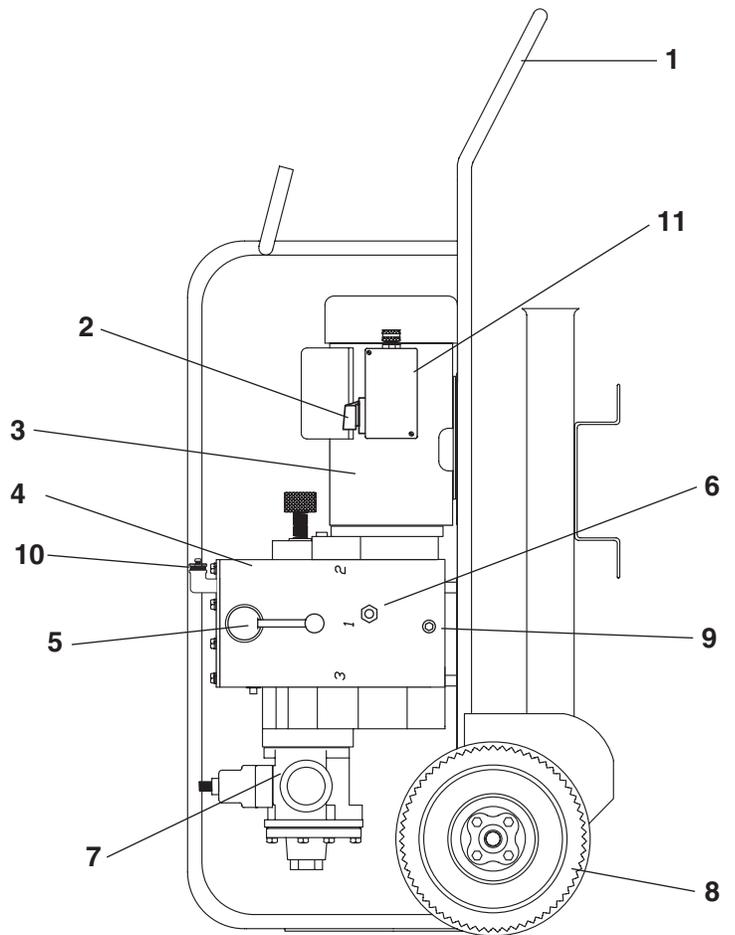


Before attempting to service the pump disconnect motor power and release all pressure within the system. Wear appropriate personal protection equipment and handle equipment with care.

SINGLE SPEED PUMP WITH CART

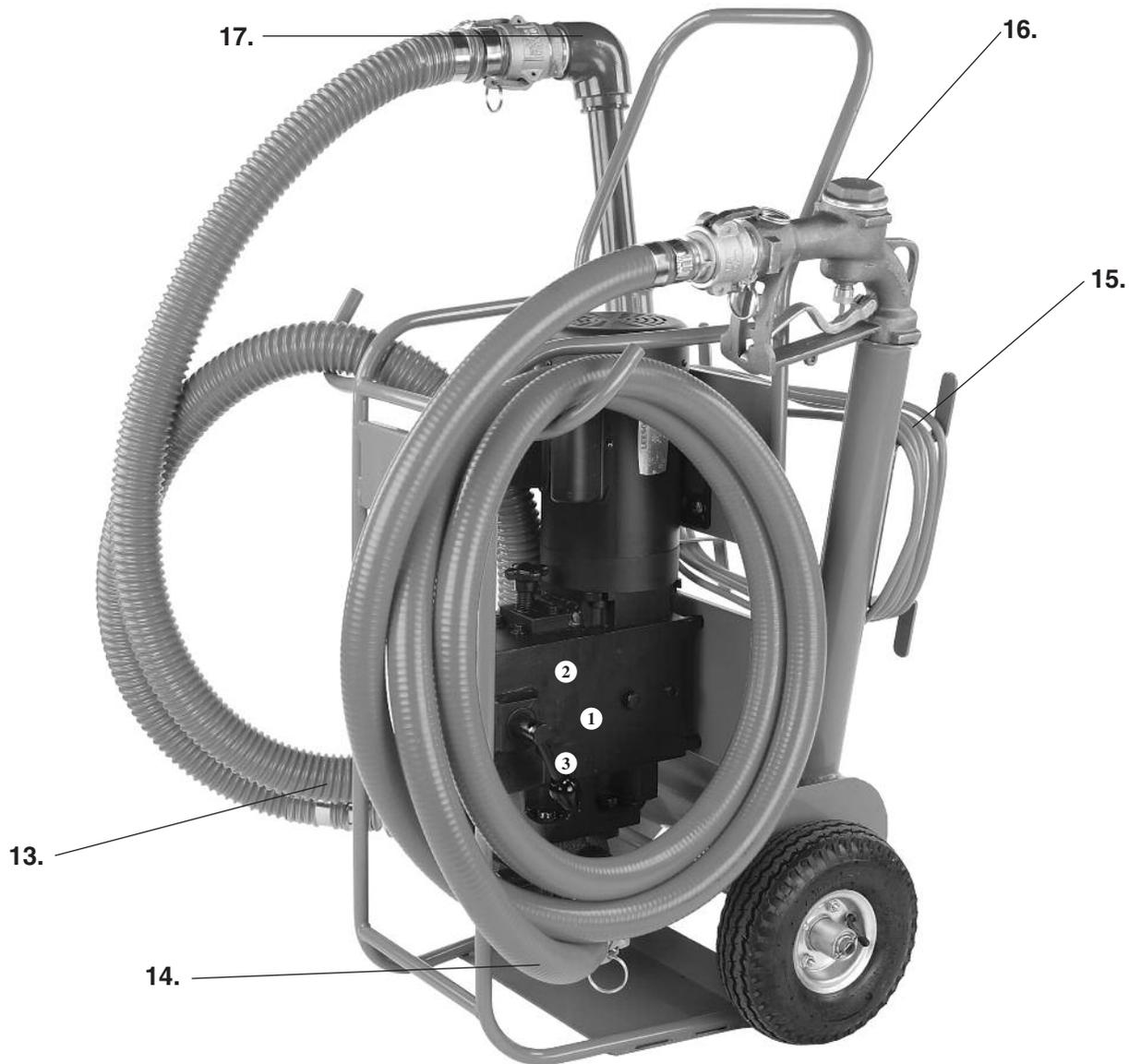


THREE SPEED PUMP WITH CART



Spare Parts Items

1. P/N 901103	Cart Frame, Powder Coated
2. P/N 905002	Rotary On/Off Switch
3. P/N 905001	2 HP, Dual Voltage TEFC Motor
4. P/N 901133	3 Speed Gear Box
5. P/N 901133-01	Gear Shift Lever
6. P/N 901133-02	Oil Level Indicator
7. P/N 901122	40 GPM Internal Gear Pump
8. P/N 901007	Pneumatic Wheel, 10"
9. P/N 901133-03	Oil Drain Plug
10. P/N 901133-05	Gear Box Vent
11. P/N 905012	Motor Load Indicator/Amp Gauge
12. P/N 900188	3/8" Drain Fitting



Spare Parts Items

13. P/N 81291-10	2" x 10' Suction Hose w/cam lock fittings
14. P/N 81281-15	1½" x 15' Discharge Hose w/cam lock fittings
15. P/N 905006-25	12 ga. X 25' Power Cord, 3 wire
16. P/N 32108	1½" Manual Shutoff Nozzle
17. P/N 950084	1½" x 37" Suction Stinger



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