



BASIC GASOLINE POWERED DIAPHRAGM PUMP OUT

Installation and Operations Manual

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The Pump Out System

A Model 278GB is made up of the Edson 120GLB-200 Pump and the Edson Pump Out Hose Assembly 260-25-150. The combined pump and hose can be purchased with several options. Check the packing list for any options ordered with the system. The more common option include 279WHA Waste Hose Assembly kit that is used to connect the pump to a collection tank. The use and installation of this kit are covered in this manual.

- Make sure all the components listed on the packing slip are present
- Make sure the parts list attached to this manual includes all options listed.
- Fill in the important pump information below



ENTER YOUR SYSTEM DATA HERE

SYSTEM SERIAL #

From Edson Serial # Sticker On Pump Frame

PUMP DRIVES: Engine

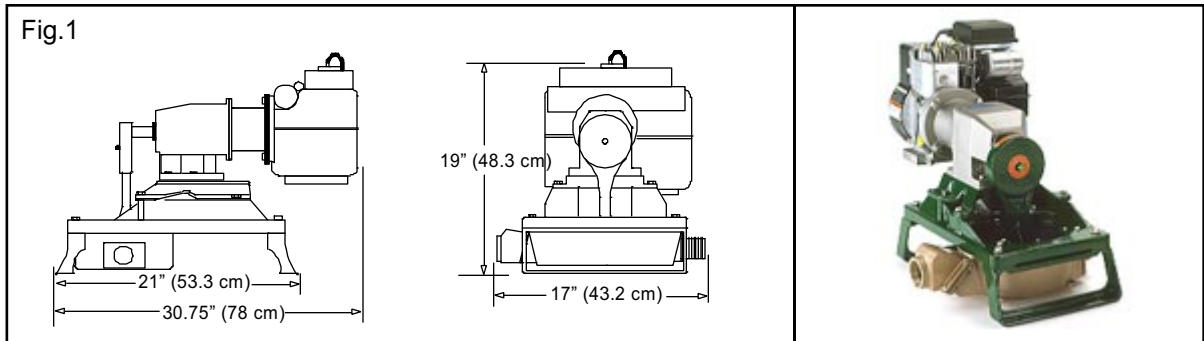
Reducer

From Plates On Engine and Reducer.

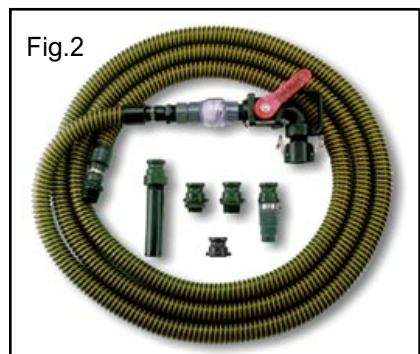


Description & Dimensions

Pump: 120GLB-200 is the Edson gasoline powered, skid mounted, nominal 40 gallon per minute, 2" NPT, diaphragm pump with the wetted parts made of marine bronze. A 3.5 gasoline engine coupled to a 57 to 1 ratio gear reducer is used to drive diaphragm pump. For this application the inlet of the pump is a 1 1/2" MNPT thread. **Fig.3** (See Pump Installation Pg.3)



Pump Out Hose Assembly: 25' X 1 1/2" Polyflex Hose, 90° Ball Valve, Sight Glass/Check Valve, Quick Clamp Adapter, Complete Set of Deck Adapters. **Fig.2** (See Pump Out Hose Installation Pg.4) (An optional 50 ft. assembly may have been ordered.)



Quick Clamp Adapter: A 1 1/2" Female Quick Clamp X 1 1/2" Female NPT is provided to make connecting the pump out hose to the pump easy. **Fig.3** (See Pump Out Hose Installation Pg.4)



Waste Hose Assembly 2" : (Optional - Must be ordered separately) This plumbing kit includes all the hose, fittings and adapters needed to install an Edson Diaphragm Pump to any size collection tank. The configuration shown on page three allows a collection to be filled by the pump. It also provides the plumbing that allows the collection tank to be emptied by the same pump out system. The offered designed virtually eliminates operator error inherent in gravity drain tanks or using costly ball valves or three way valves to control discharge from the pump unit. **Fig.4** (See Waste Hose Installation Drawing Pg. 5)
Order No. 279WHA-200



PVC Pump Out Hydrant 2" : (Optional - Must be ordered separately)
This plumbing hydrant is made up of a female quick clamp 2", a ball valve 2" and a clear sight glass/check valve 2". If appropriate for a waste collection application, the hydrant is installed directly to a 2" or larger gravity feed sewer drain line. It is installed in a location and at a height that allows an operator to easily connect the pump discharge line when using the pump out to empty the collection tank. To reduce drips when connecting a wet hose to the hydrant, the top of the hydrant should be above the top of the tank. **Fig.5** (See Emptying The Collection Tank, Pg. 6)
Order No. 270PC-200



IMPORTANT

Factory Engines Do Not Come With Oil.

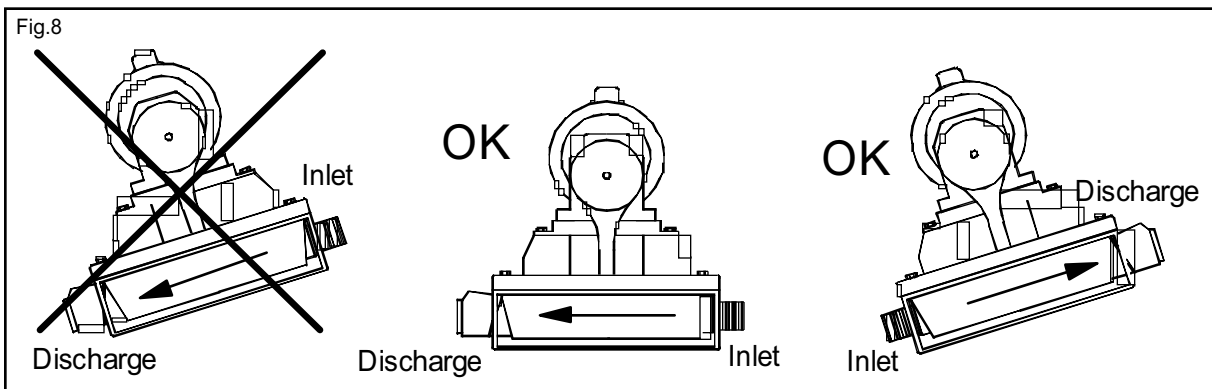
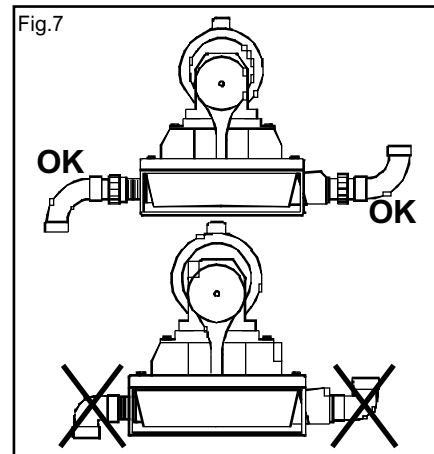
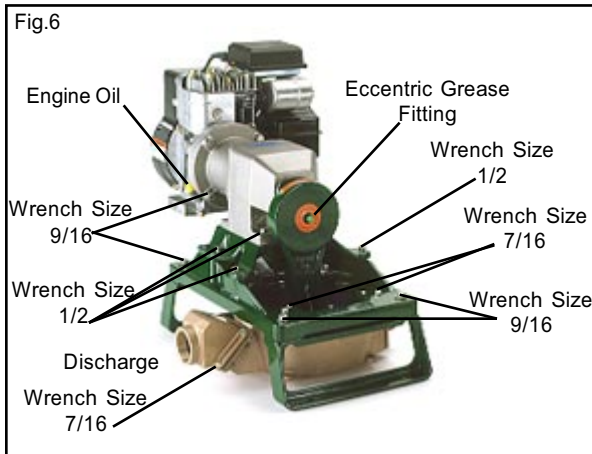
It is the responsibility of the purchaser to add oil to the engine crank case per the engine manufacturers specifications detailed in the enclosed engine manual.

Failure to add oil to the engine prior to running the engine will destroy the engine

The Pump:

First Things First.

- Check All Bolts - Make sure that all bolts on the pump are tight. Tools: 2 ea. 9/16, 1/2 and 7/16 Box Wrenches. See Fig.6
- Install in accordance with performance specifications and plumbing guidelines. See page 4 & 5
- Check Eccentric for Grease - See instruction labels on pump. See Fig. 6 & Eccentric pg.6
- Plumbing Fittings - Use only large radius elbows and remember No aluminum fittings on a bronze pump and No bronze fittings on an aluminum pump. See Fig. 7
- Install for Maintenance - Install the pump in a manner that allows easy access for inspection & maintenance. Connect plumbing to the pump using unions or easily removed couplings.
- Keep The Pump Horizontal - The pump is designed to be installed on a relatively horizontal surface. If the mounting surface is not horizontal, the discharge should always be higher than the inlet. If not installed accordingly the check valves will not work. The pump base can be rotated 180°. See Fig 8

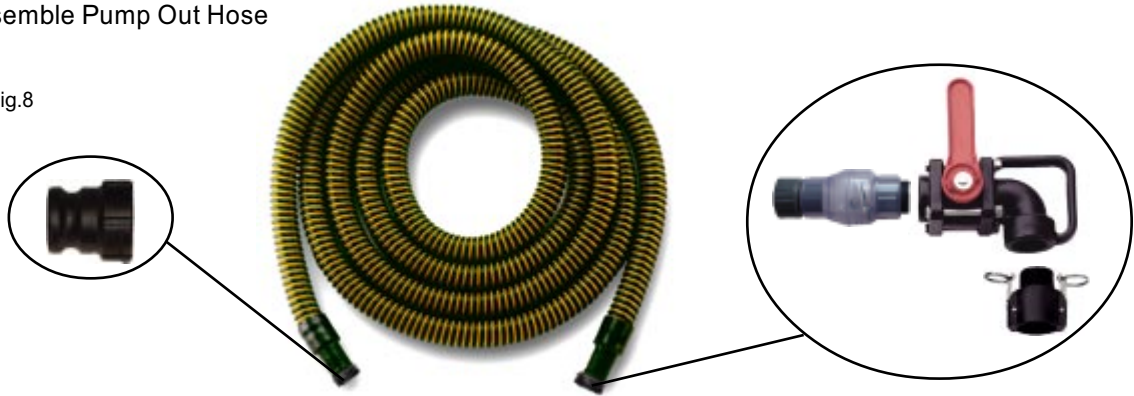


The Pump Out Hose Assembly

**ALL THREADS ON ALL FITTINGS ON THE SUCTION LINE
MUST BE SEALED WITH PASTE OR TAPE**

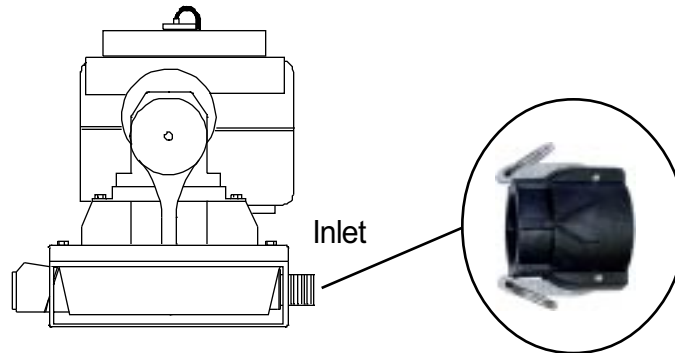
1. Assemble Pump Out Hose

Fig.8



2. Install Female Quick Clamp Adapter On Pump Inlet

Fig.9



3. Clamp Hose Onto Pump Inlet

Portable Systems With A Collection Tank Using The Edson Waste Hose Assembly Kit:



Fig.10

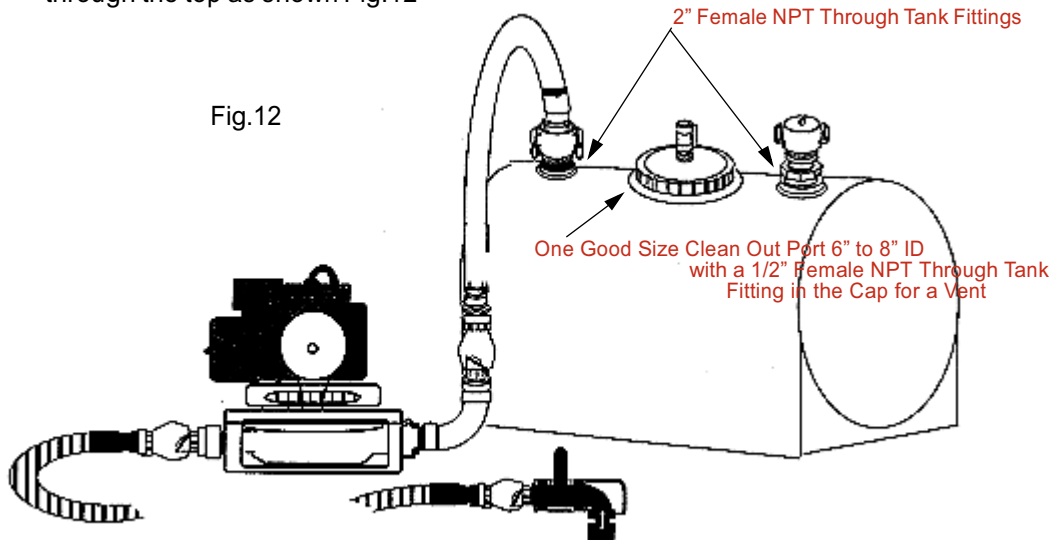


Fig.11

Example Of Trailer Mounted

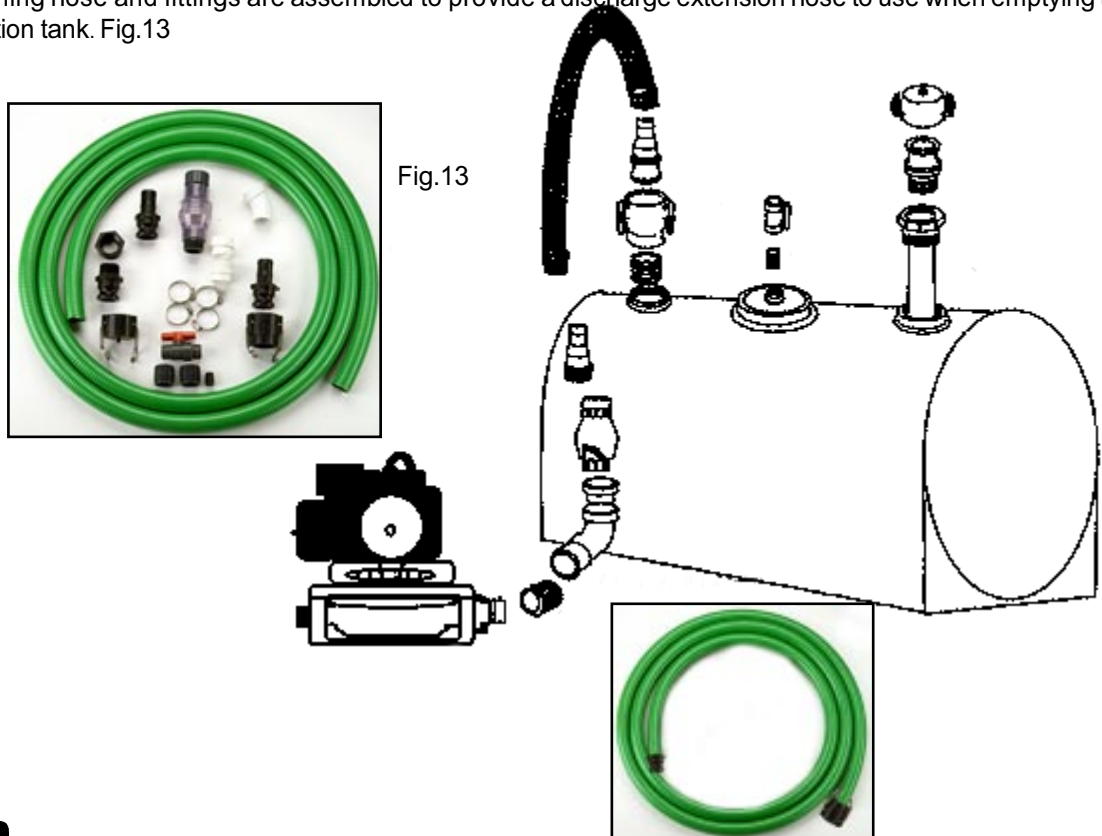
Tank Set UP

1. Recommended Tank Setup - Any Size or shape tank can be used with bulkhead tank fittings through the top as shown Fig.12



Kit Installation

2. Kit Hose and Fittings Installed - Install the fittings and a section of the hose as shown, then the remaining hose and fittings are assembled to provide a discharge extension hose to use when emptying the collection tank. Fig.13



Test 1 Start Up: Run Pump First Without Pumping Any Liquid, Just Air.

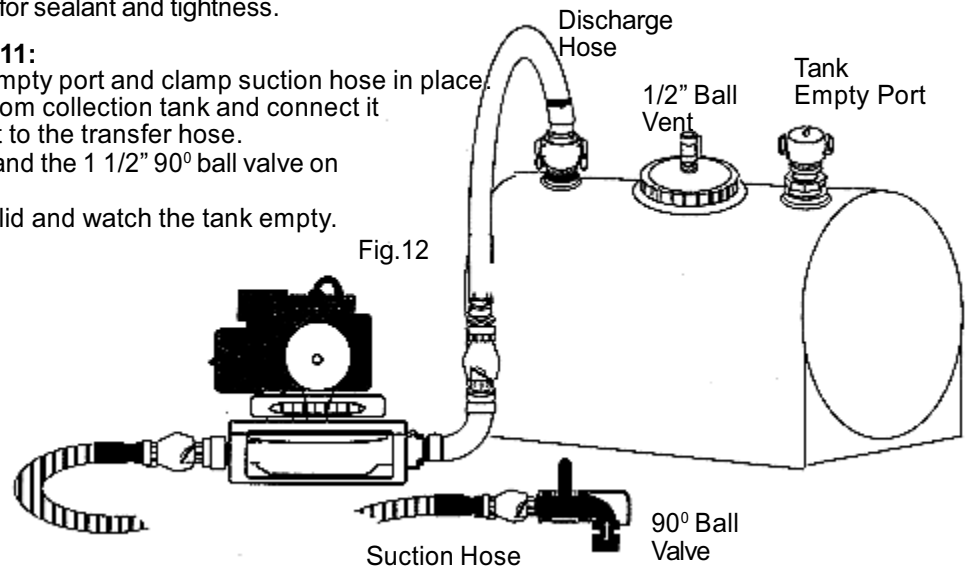
1. Open 1 1/2" 90° ball valve on suction hose.
2. Open 1/2" ball valve vent on tank.
3. Start the pump engine. (Engine Manual Enclosed)
With pump running, a vacuum should be felt at end of pump out hose and air should be felt coming out of the 1/2" ball valve on tank.
4. Stop the pump.

Test 2 Start Up With Water: Same as test 1 only use clean water to fill the tank.

1. Check for leaks on all fittings.
2. Turn pump off when tank is 1/2 full.
3. Repair any leaks by checking for sealant and tightness.

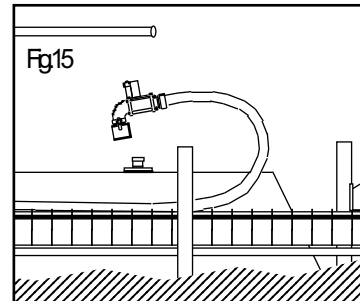
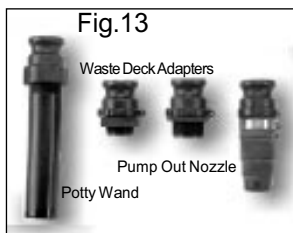
Test 3 Empty The Tank fig. 10&11:

1. Remove cap from the tank, empty port and clamp suction hose in place.
2. Disconnect discharge hose from collection tank and connect it to waste hydrant or connect it to the transfer hose.
3. Open the 1/2" vent ball valve and the 1 1/2" 90° ball valve on suction hose.
4. Start the pump and open the lid and watch the tank empty.
5. Look for leaks.



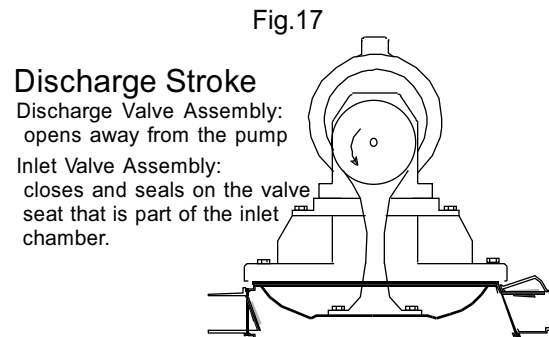
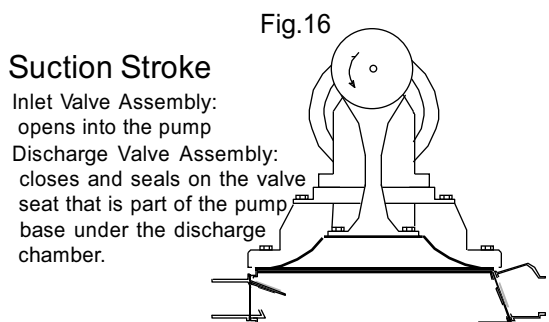
Pumping Out A Boat:

1. Remove the waste deck cap on the boat.
2. If the thread on the cap is the same size as one of the two waste deck adapters, screw the adapter that fits into the deck fitting. If neither one fit, attach the pump out nozzle to the end of the pump out hose. Fig. 13
3. Unwind the pump out hose all the way. Fig. 14
4. Turn on the pump.
5. Clamp the pump out hose to the deck adapter or press the nozzle into the deck fitting. Fig. 15
6. Open 1 1/2" 90° ball valve slowly.
7. When pump out is complete, flush boat toilet with fresh water into holding tank and pump out again.
8. Disconnect and rewind hose.
9. Turn off pump and now close the pump out hose 90° ball valve.
10. Wash up.



How The Pump Works

- The engine and gear reducer rotate the eccentric disk inside the eccentric housing.
- The eccentric housing raises and lowers the diaphragm.
- Raising the diaphragm creates a vacuum. See Fig. 16
- The vacuum pulls the discharge valve assembly closed.
- Atmospheric pressure pushes liquid and/or air up the inlet plumbing to fill the vacuum.
- When the diaphragm is driven down the air and liquid under the diaphragm is compressed closing the inlet check valve and forcing the air and liquid out the discharge. Fig. 17
- The closing of the inlet valve assembly also prevents the liquid and air trapped in the inlet line from dropping back down (to atmosphere).



Pump Performance Is Dependent On Cycle Rate & Installation Head:

- Volume is expressed in GPM (gallons per minute) and LPM (liters per minute)
- Gasoline powered pumps can be run at different speeds based on engine throttle setting.
- Head conditions are determined by the height, length and size of the installation plumbing to and from the pump and the viscosity of the liquid.

General Specifications:

- Static Head: Suction 15 ft / 4.57m Discharge 15 ft / 4.57m (2" Hose or Pipe)
- Dry Suction Head: 12 ft / 3.65m (2" ID Pipe or Hose)
- Continuous Duty Discharge Heads: Should be Limited to 10 ft. / 3m
- Performance: 38 GPM / 144 LPM at 4 ft Suction Lift and 0 Discharge at 56 Cycles per Min. w/ 2" Pipe

Volume Charts:

- Use these as a guide to determine the performance to expect from the pump you are installing. Volumes are based on the suction height, discharge height and speed while pumping water through 2" pipe. Actual performance will vary based on length of the plumbing and the viscosity of the liquid being pumped.

Volume Charts:

56 Cycles Per Min.	DISCHARGE HEIGHT			
	0	5 ft 1.5 m	10 ft 3 m	
S U C T I O N H E I G H T	1 ft .3 m	38/144	32/121	24/91
	5 ft 1.5 m	30/114	30/114	23/87
	10 ft 3 m	28/106	26/98	16/61
	12 ft 3.7 m	28/106	26/98	14/53

gpm / lpm

40 Cycles Per Min.	DISCHARGE HEIGHT			
	0	5 ft 1.5 m	10 ft 3 m	
S U C T I O N H E I G H T	1 ft .3 m	27/102	23/87	17/64
	5 ft 1.5 m	21/81	21/81	16/62
	10 ft 3 m	20/76	19/70	11/43
	12 ft 3.7 m	20/78	19/70	10/38

gpm / lpm

36 Cycles Per Min.	DISCHARGE HEIGHT			
	0	5 ft 1.5 m	10 ft 3 m	
S U C T I O N H E I G H T	1 ft .3 m	24/92	21/78	15/58
	5 ft 1.5 m	19/73	19/73	15/56
	10 ft 3 m	18/68	17/63	10/39
	12 ft 3.7 m	18/68	17/63	8/30

30 Cycles Per Min.	DISCHARGE HEIGHT			
	0	5 ft 1.5 m	10 ft 3 m	
S U C T I O N H E I G H T	1 ft .3 m	20/77	19/72	17/64
	5 ft 1.5 m	17.5/66	17/64	16/61
	10 ft 3 m	17/64	16/61	15/57
	12 ft 3.7 m	13/49	12/47	10/38

gpm / lpm

20 Cycles Per Min.	DISCHARGE HEIGHT			
	0	5 ft 1.5 m	10 ft 3 m	
S U C T I O N H E I G H T	1 ft .3 m	14/52	11/42	9/34
	5 ft 1.5 m	11/42	11/42	8/31
	10 ft 3 m	10/38	9/34	6/22
	12 ft 3.7 m	10/38	9/34	5/19

gpm / lpm

13 Cycles Per Min.	DISCHARGE HEIGHT			
	0	5 ft 1.5 m	10 ft 3 m	
S U C T I O N H E I G H T	1 ft .3 m	9/34	7/26	5/20
	5 ft 1.5 m	7/26	7/26	5/20
	10 ft 3 m	7/26	6/23	4/14
	12 ft 3.7 m	7/26	6/23	3/12

Diaphragm: Edson 120 Pumps use Elastomer Diaphragm and Flapper Valves. Over time these parts wear and need to be replaced. The ability to easily and quickly replace these inexpensive parts is one of the major advantages of an Edson diaphragm pump. Edson has packaged these parts as Spares Kits. See the parts list for the order #s.

- Change the diaphragm as required. See Fig. 18
- Inspection and testing on a regular basis is recommended. For continuous duty application, inspect the pump daily until a life pattern is established.
- Look for leaks, cracks or splits on the surface of the diaphragm.
- Life expectancy is directly related to head conditions, run time and diaphragm material. The higher the suction and discharge pressures the shorter the life.

Step 1. Unbolt Pump Base from Pump Frame with 7/16" wrench.





Fig.18

Step 2. Unbolt the Diaphragm from the Eccentric Housing and Lower Standard (STAINLESS STEEL BACKING PLATE) with 9/16" socket.



Step 3. Reverse steps 1 & 2 to reassemble pump with new diaphragm and the 2 sealing washers on the 3/8" bolts.

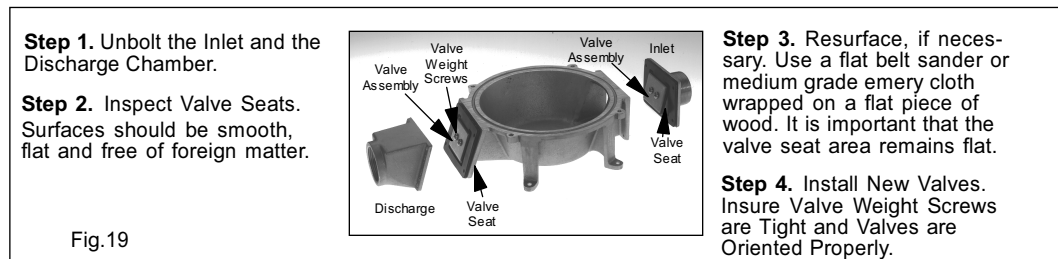
Important:
Eccentric stays connected to the reducer. Lower Standard must be installed with its sharp edge away from the bottom of the diaphragm

Tools Required:
9/16" Socket Wrench with a 6" Extension
(2) 7/16" Box Wrench

Eccentric: A disk called an eccentric is pressed onto the output shaft of the gear reducer. As it rotates inside the bronze eccentric housing the diaphragm is raised and lowered. This assembly needs to be greased with any good gear grease. Edson applies **Mobil Grease HP Multipurpose Premium Grease** during the assembly of the pump. Failure to grease this part will result in early wear.

Valve Assemblies & The Valve Seats: The sealing of the flapper valves are what makes the diaphragm pump work. If the valves are not sealing properly, the pump will not be performing to full potential or may not be pumping at all. The valves tend to last longer than the diaphragm. When you change the diaphragm inspect the valves for cracks and delamination and the valve seats for pitting and any build up that will prevent the valve rubber from sealing effectively. Testing the pump is the best way to evaluate performance.

- Change the valve assemblies as required. See Fig. 19
- Inspection and testing on a regular bases is recommended. For continuous duty application, inspect the pump daily until a life pattern is established.
- See Pump Performance Tests.

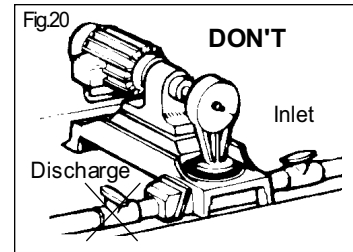


Pump Performance Tests:

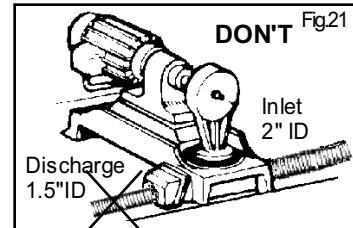
- **Vacuum Gauge Test - Tests the performance of the discharge valve and valve seat.**
 1. Attach a 5' length of non-collapsing hose or pipe with a vacuum gauge installed to the inlet of the pump. Make sure the line is completely sealed and air tight.
 2. Turn on the pump and let it run till the gauge stabilizes. Record the reading.
 3. Turn off the pump and watch the gauge.
 4. If the discharge is working properly the gauge should build and hold at 10" to 12"hg. Do not be concerned if the vacuum pressure slowly returns to 0 within a minute or so.
 5. If you do not get any vacuum reading or if the gauge does not get to 10" hg and drops off to 0 as soon as the pump stops, do the same thing again. Listen for air being sucked in around the diaphragm. If you hear air movement, inspect for loose bolts or worn diaphragm. If you hear no air movement, remove the discharge chamber and inspect the valve assembly and valve seat. Clean or replace the valve and clean or resurface the valve seat as appropriate. See Maintenance/Valve Assemblies Fig. 19
- **Pressure Gauge Test - Tests the performance of the suction valve and valve seat.**
 1. Attach a 5' length of non-collapsing hose or pipe with a 0 to 15 psi gauge installed to the outlet of the pump. Make sure the line is completely sealed and air tight.
 2. Turn on the pump and let it run till the gauge stabilizes. Record the reading.
 3. If the suction valve is working properly the gauge should build and pulse at 6 to 7 psi. and when the pump is stopped the pressure may hold or slowly returns to 0.
 4. If you do not get any pressure reading or if the gauge does not get to 4 psi and drops off to 0 as soon as the pump stops, clean or replace the suction valve and clean or resurface the valve seat as appropriate. See Maintenance/Valve Assemblies Fig. 19
- **Manual Test - Testing the pump valves and valve seats without the use of a gauge.**
 1. Remove all fittings from the inlet and discharge of the pump.
 2. Turn on the pump.
 3. Put your hand over the inlet. If the discharge valve is working properly, you should feel a very strong pulsing suction. The pulsing coincides with the raising and lowering of the diaphragm. If you do not feel any suction, do the same thing again and listen for air being sucked in around the diaphragm. If you hear air movement, inspect for loose bolts or worn diaphragm. If you hear no air movement, remove the discharge chamber and inspect the valve assembly and valve seat. Clean or replace the valve and clean or resurface the valve seat as appropriate.
 4. Press your hand over the discharge. If the inlet valve is sealing properly, the pressure of the pump down stroke should push your hand away. If it does not and the air is forced out the inlet remove the inlet chamber and inspect the valve assembly and valve seat. Clean or replace the valve and clean or resurface the valve seat as appropriate. See Maintenance/Valve Assemblies Fig. 19

Important Plumbing Do & Don'ts

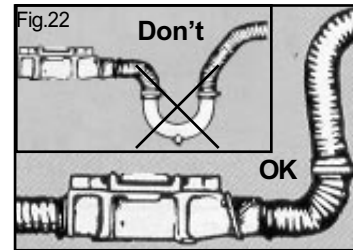
- DO NOT SHUT OFF DISCHARGE WHEN THE PUMP IS RUNNING. See Fig 20 - Do not place the pump in a situation where the discharge line will be closed while the pump is running. BECAUSE the Edson pump is a positive displacement pump and it will continue to try to pump liquid through a closed line. The pressure created will cause damage to the pump.



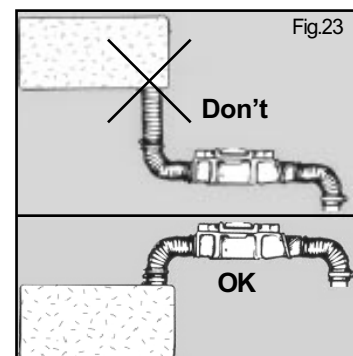
- DISCHARGE FITTINGS, PIPE AND HOSE SHOULD ALL BE THE SAME SIZE AND NEVER BE SMALLER THAN THE INLET. See Fig. 21 BECAUSE a smaller discharge line increases work for the pump and increases the possibility of clogging.



- DO NOT INSTALL THE PUMP AND PLUMBING SO AIR WILL BE TRAPPED. See Fig. 22 BECAUSE trapped air can completely restrict the flow or at the least require more work from the pump resulting in early diaphragm failure. Install pump and plumbing so any air introduced into the plumbing will not be trapped but flow naturally through liquid and out of the system.



- SHOULD NOT INSTALL PUMP WITH POSITIVE HEAD ON THE INLET See Fig. 23 - Under standard operating guidelines the pump should be above the liquid it is being used to transfer. BECAUSE of the flow through check valves, stopping the pump will not stop the liquid from flowing. Under the force of gravity liquid will pass right through a diaphragm pump. Also consider a diaphragm pump can not control a siphon condition. They are used many times to start one.



Running The Pump Dry:

The Edson Diaphragm Pump will run dry indefinitely without damage.

**Use Only Non Collapsing Hose and Pipe
On the Inlet and Discharge of the Pump**

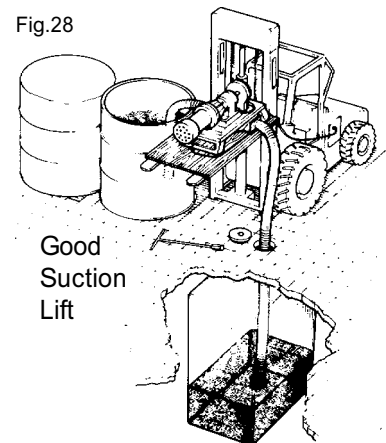
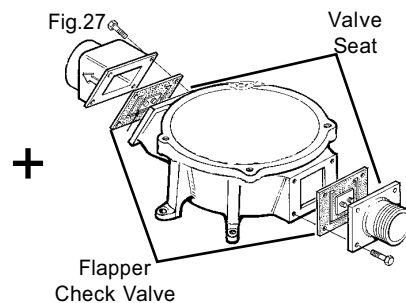
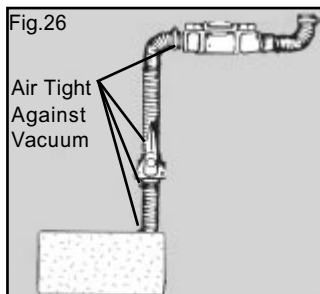
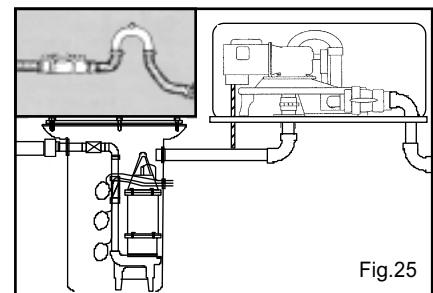
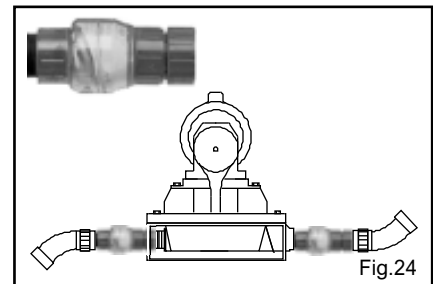
Self Priming:

The 120G Pump will develop a dry start vacuum of 10 to 12 inches of mercury, equal to a height of approximately 12'. After the pump is primed the vacuum pressure will increase to 15" hg or more. The self priming feature depends on:

- An air tight suction line. All threads on all fittings on the suction line must be sealed with paste or tape

- The flapper check valves sealing properly. Solids trapped under the check valves will prevent self priming. This is likely to occur when the pump is used in sewage or sump pump out applications . Flushing with water will generally clear out the solid matter. Installing secondary clear flapper check valves right at the inlet and discharge will improve the dry suction start performance of the pump and make clearing the valves easy. Order Edson Clear Check Valves 269CL-200 (2") or 269CL-150 (1.5"). See Fig.24

- USING A DISCHARGE LOOP - For sewage and sump applications when the discharge line drains down and away from the pump, installing an 8" to 10" positive loop right on the discharge port will improve the self priming feature. When you stop pumping the loop traps some liquid against the discharge valve improving the seal. See Fig.25



The Edson Diaphragm Pump is very simple and problems are isolated to only the following components:

- **The Motor & Gear Reducer**
- **The Gear Reducer and Eccentric**
- **The Diaphragm and Valves**
- **Suction and Discharge Plumbing**

Problem	Possible Causes	Action
1. Problem Pump is running, liquid is not moving.	a. Suction line is blocked. b. Suction line has air leak between liquid and inlet of the pump. c. Discharge and/or suction valves are not working. d. Diaphragm has a leak. e. Discharge or suction line is too high.	If the cause is not obvious, isolate the source. Disconnect the inlet and discharge plumbing from the pump and perform the Manual Test page 8. If the cause is not in the pump check for a block or an air leak in the suction line. Suction air leaks can be cumulative and can be as simple as one or two fittings not being sealed properly. Review Plumbing
2. Problem Starting Engine	a. Gas or Spark Plug	Review Engine Manual
3. Problem Engine is running but reducer is not moving	a. Reducer Coupling has come loose on the motor shaft.	Remove the engine and reposition and secure the coupling to the drive shaft. See parts diagram for positioning instructions.
4. Problem Diaphragm is wearing out much earlier than expected.	a. Liquid being pumped is not compatible with the diaphragm material. b. Discharge and/or suction back pressure too high.	Consult a chemical resistance chart, review the Installation Guidelines . Call Edson Customer Service.
5. Problem Pump base and/or lines keep filling with solids	a. Line velocity is too slow to keep the solids in suspension. b. The percent of solids is too high.	Speeding up the pump will help increase the velocity. Using a strainer can reduce the size and percent of solids. Diluting the slurry by increasing the amount of liquid or by increasing the agitation of the mix may solve the problem. Review Pumping Liquids with Suspended Solids

Parts List 278GB-40

Key #	Edson Order #	Description (nsn number if there is one)	Qty
Pump	120ELB-200	Edson Gasoline Powered Diaphragm Pump, Side Mounted, Bronze 2"	1
1	161-A-1385	3.5 HP Briggs & Stratton Gasoline Engine Model Manufacturers Manuals and Operating Instructions Included.	1
2	161-A-1811-2	Motor Coupling for A-1743 Reducer (included with Reducer key #3)	1
3	161-A-1744	57 to 1 C-Face Gear reducer and coupling (includes Motor Coupling & Eccentric Disk key #s 2 & 4)	1
4	161-A-168	Eccentric Disk (included with Reducer key # 3)	1
5	161-A-1161	Snap Ring (included with Eccentric Housing key #6)	1
6	161-A-1213	Eccentric Housing With Snap Ring (includes Zerk Fitting & Snap Ring key #s 6, 7, 8)	1
7	161-A-150	Zerk Grease Fitting (included with Eccentric Housing key #6)	1
8	161-A-399	Zerk Fitting Dust Cap (included with Eccentric Housing key #6)	1
9	3/8-16X1.25" HHCS	Stainless Hex Head Cap Screws	2
10	160-A-1200	Sealing Washers (5310013938514) Not Shown	2
11	113N-0	Diaphragm	1
12	160-A-906	Lower Standard (4320013331830)	1
13	3/8"-16X1" HHCS	Stainless Hex Head Cap Screws	8
14	5/16"-18X1.25"HHCS	Stainless Hex Head Cap Screws	4
15	161-C-583	Reducer Mounting Adapter Plate	1
16	3/8"-16X2.5" HHCS	Stainless Hex Head Cap Screws	4
17	161-D-69	Pump Frame	
18	161-C-389	Pump Leg	2
19	1/4"-20X1.5 HHCS	Stainless Hex Head Cap Screws with Washers	4
20	161-A-1299	Motor Guard (Optional part installed only when ordered)	0
21	161-A-164	Axle Hanger	0
22	161-A-166	Wheel	0
23	161-A-143	Pal Nut	0
24	161-A-165	Stainless Axle	0
25	3/8"-16X4" HHCS	Stainless Hex Head Cap Screws with Nuts and Washers	0
26	3/8"-16X3" HHCS	Stainless Hex Head Cap Screws with Nuts and Washers	0
27	161-A-147	Pump Handle	0
28	1/4"-20X1 HHCS	Stainless Hex Head Cap Screws with Nuts and Washers	8
29	160-B-50B-200	Bronze Discharge Chamber 2"	1
30	160-G-107	Inlet/Discharge Valve Assembly (4320013235967)	2
31	160-C-298	Bronze Side Inlet Pump Base	1
32	160-B-68B	Bronze Suction Chamber 2"	1
33	114N-117-120	Replacement diaphragm and valve spares kits are available Includes: Qty 1 - 113N-0 DIAPHRAGM (key # 3) Qty 2 - 160-G-107 (key #27) Qty 2 - 160-A-1200 (key # 32)	0
Hose	261-25-150		
34	262-25-150	Hose Assembly 25' X 1 1/2" ID polyflex hose with 1 1/2" MNPT end fittings	1
35	269CL-150	Clear Swing Check Valve 1 1/2"	1
36	264-90-150	90° Ball Valve 1 1/2" FNPT	1
37	152FM-150NY	Quick Clamp Adapter 1 1/2" FQC X MNPT	1
38	158MF-150NY	Quick Clamp Adapter 1 1/2" MQC X FNPT	1
39	273-150	1 1/2" Deck Adapter	1
40	273-125	1 1/4" Deck Adapter	1
41	272QC-150	QC Pump Out Nozzle	1
42	274-150	Potty Wand	1
Inlet Quick Clamp Adapter			
43	151FF-150NY	QC Adapter 1 1/2" QC X 1 1/2" FNPT	1



