Model 2500

Electric Powered 25 GPM
Double Diaphragm Plastic Pump

Installation and Operations Manual

Page 2	Specifications
Page 4	Operation
Page 6	Electrical
Page 9	Parts Lists
Page 10	Maintenance

The Pump Is Factory Wired For

120V/15A/1ph/60hz Electric Power

See Lenze SM Vector-Frequency Inverter Operating Instructions
Page 9 Ratings 120/240VAC Single Phase 60/50Hz ESV751

DANGER! Hazard of Electrical Shock. Capacitors retain charge for approximately 180 seconds after power is removed. Allow at least 3 minutes for discharge of residual charge before touching the drive.

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PLUMBING A DIAPHRAGM PUMP

Warning! DO NOT SHUT OFF DISCHARGE WHEN THE PUMP IS RUNNING.
BECAUSE the Edson Model 2500 pump is a positive displacement pump, it will continue to try to pump liquid through a closed line. The pressure created will cause damage to the pump.

FOR THE SAME REASON.

DO NOT PLACE THE PUMP IN A SITUATION WERE THE DISCHARGE LINE WILL BE CLOSED WHILE THE PUMP IS RUNNING UNLESS AN AUTOMATIC HIGH AMP OR HIGH PRESSURE OFF SWITCH IS USED.

- USE ONLY NON COLLAPSING HOSE AND/OR PIPE ON THE SUCTION AND THE DISCHARGE OF THE PUMP.

- WHEN PUMPING LIQUIDS WITH SUSPENDED SOLIDS, THE DISCHARGE PLUMBING CAN BE THE SAME SIZE OR LARGER BUT NEVER SMALLER THAN THE SUCTION.
  BECAUSE a smaller discharge line increases the possibility of clogging.

- WHENEVER POSSIBLE INSTALL THE PUMP AND DISCHARGE PLUMBING SO AIR CANNOT BE TRAPPED IN THE DISCHARGE PLUMBING.
  BECAUSE trapped air will severly restrict flow and 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.

- TAKE APPROPRIATE PRECAUTIONS WHEN INSTALLING THE PUMP BELOW THE LIQUID BEING TRANSFERED.
  BECAUSE installing the pump on a positive suction head, the force of gravity will cause the liquid to flow right through a diaphragm pump even when it is not running. There is no internal shut off in a check valved diaphragm pump to stop the siphone effect of a positive suction head.

- DRY START SELF PRIMING IS REQUIRED FOR A PUMP OUT APPLICATION.
  The Edson Model 2500 will develop a dry start vacuum equal to 10.5 hg. After the pump chambers are full (primed) the suction lift will increase to 23 hg. You can maintain a primed pump chamber and the 23 hg by installing optional high suction lift plumbing. This plumbing keeps the pump chambers primed even when the suction line runs dry. The result is dry line suction lifts to depths greater than 20ft.
  The self priming feature depends on:
  1. An airtight suction line.
  2. The flapper check valves sealing properly. Solids trapped under the check valves will prevent self priming. This can occur when the pump is used in sewage or sump pump out applications. Flushing with water will generally clear out the solid matter.

ELECTRICAL INSTALLATION GUIDELINES

DANGER! HAZARD OF ELECTRICAL SHOCK.

THE CAPACITORS IN THE INVERTER RETAINA CHARGE FOR APPROXIMATELY 180 SECONDS AFTER POWER IS REMOVED OR THE INVERTER IS UNPLUGGED. ALLOW AT LEAST 3 MINUTES FOR DISCHARGE OF RESIDUAL CHARGE BEFORE OPENING THE DRIVE.

READ THE ENCLOSED INVERTER MANUAL SAFTEY SECTION BEFORE CONNECTING ELECTRICAL POWER TO THE PUMP.

Caution

All Electrical Connections Must Be Installed By a Licensed Electrician In Accordance With Local Codes

- The Model 2500 drive is a combination of a Lenza Frequency Drive wired for **110V/ 1** Phase input rated at FL A Draw of **13.5 amps** and inverter grade 3/4 hp, 3 ph, 208-230/460v, tefc motor.

- The Lenza Vector-Frequency Inverter is a programable AC Speed Control. The standard unit is factory wired for 1**10V/1 Phase Input**. The **Output from the VFD is 230V/ 3 Phase**. Other VFDs can be used to meet any power input requirement but this section of the manual only applies to 120V/1 Phase Input. Contact Edson Customer Service if there is any question regarding the unit shipped.

- The inverter has been programed and wired so that when the green start switch on the front of the control is pressed the pump will run and stop when the red stop button is pushed.

- When the Up button is pressed the pump will speed up and when the down button is pushed the pump will slow. The LED displays the curren speed. The display has been programed to show the actual cycle rate of the pump. Example: When the display shows 30 when the pump is running, this means that the pump piston is moving the double diaphragms in and out at a cycle rate of 30 times per minute.

161-A-1613
Remote Start Stop

- The Lenze VFD, Model ESV751 NO 1SXC can be programed to use external inputs to control the operation of the 2500 Pump. You can read the Lenza Operation Instructions, contact Lenza customer service direct or call Edson Customer Service to find a solution to how you would like the pump to function in relation to external inputs. The basic programing for the factory settings and a couple of simple examples are detailed on the next page.

- If any remote start stop stations are used with this pump station and if they are installed more than 30 ft away from the VFD, an auxilary relay in a nema 4X box must be installed on the pump unit. The remote start/stop are wired to the relay and the relay is wired to the VFD.

Lenza VFD

- **Basic VFD Settings** - Following are the parameter settings that Edson made to the VFD to program the LED to display the motor speed as the actual pump cycle rate. See Commissioning 4.3,4.5 on Pages 25 and 26 of the Lenza Manual VFD Operating Instructions. Be advised these VFDs are no onger preprogramed with password 225 to get into the program.

Parameter	Description	Setting	Explanation
P108	Motor Overload	65%	Setting calc. by motor FLA/SMV output current
P161	Speed At Max Signal	100%	Hz Setting
P178	Display Frequency Multiplier	1.06	Scales Frequency Display

- **Examples External Input** - Considering the versatility of the Lenze VFD, Model ESV751 NO 1SXC there are a number of options for using external inputs to control the operation of the 2500 Pump. You can read the Lenza Operation Instructions, contact Lenza customer service direct or call Edson Customer Service to find a solution to how you would like the pump to function in relation to external inputs. Two simple examples are detailed below.

Special Note: When using external inputs such as float switches and momentary start/stop switches connected directly to the VFD Control Terminal Switch. The switch must be within 30 ft of the VFD.

Example One: Turning the pump on based on high liquid level. **Application**: Keeping a sump dewatered automatically.

Option 1:

a. Attach a normally open float switch or sensing devise to terminals 1 and 4 on the control terminal strip behind the cover of the VFD. (See Installation 3.2.3 Control Terminals Page 20 of the Lenza Manual.
b. Reset Code P100 to 1 (Terminal Strip Operation). (See Commissioning 4.3, 4.5 on Pages 25 and 26 of the Lenza Manual VFD Operating Instructions. Be advised these VFDs are no longer programed with password 225 to get into the program.
c. The pump will turn on when the NO switch closes due to high liquid and turn off when the switch opens. Note - If the pump is stopped by pushing the stop button while it is running, it will not restart until the circuit between 1 and 4 is opened and closed. Use an external NC momentary switch in series with the NO primary level sensor to reset the 1 to 4 circuit.

Option 2:

a. A normally open float switch or sensing device can be connected to the main 110V power source. Make sure it is rated for 15 amps as the full load amp draw for the Model 2500 is 13.5 amps.
b. Code 100 is set on the default selection of 0 and Code P110 must be reset to 1 (Start on Powerup).

Example Two: Turning the pump off based on high liquid level. **Application:** Filling a tank you want the pump to shut off when liquid reaches a certain level.

Option 1:

a. Attach a Normally Closed float switch or sensing devise to terminals 1 and 4 on the control terminal strip (See Installation 3.2.3 Control Terminals, Page 20 of the Lenza Manual).
b. Reset Code P100 to 1 (Terminal Strip Operation). (See Commissioning 4.3, 4.5 on Pages 25 and 26 of the Lenza Manual VFD Operating Instructions. Be advised these VFDs are no longer programed with password 225 to get into the program.
c. When the NC switch opens the pump will turn off and it will turn on again when the switch closes. Note - If the tank filling operation requires the pump to be shut off from the stop button on the VFD keypad or if the main power is shut off, the pump will not start again until the normally closed switch is reset by opening the NC circuit between 1 and 4. This can be done by wiring an external, manual, momentary ,NC switch in series with the level sensing switch.

Option 2:

a. A normally closed float switch or level sensing device is connected to the main 110V power source. Make sure it is rated for 15 amps as the full load amp draw for the Model 2500 is 13.5 amps.
b. Code 100 is set on the default selection of 0 and Code P110 must be reset to 1 (Start on Powerup)

Example Three: Edson uses the Model 2500 for an pplication that requires the following of the pump:

1. Start the pump from a remote location using a momentary start switch.
2. Once started the pump must run for a specific period of time and then shut off automatically.
3. The pump must be able to repeat this every time the remote start switch is pressed.
4. The pump run cycle must be able to be stopped by pressing a remote momentary stop.

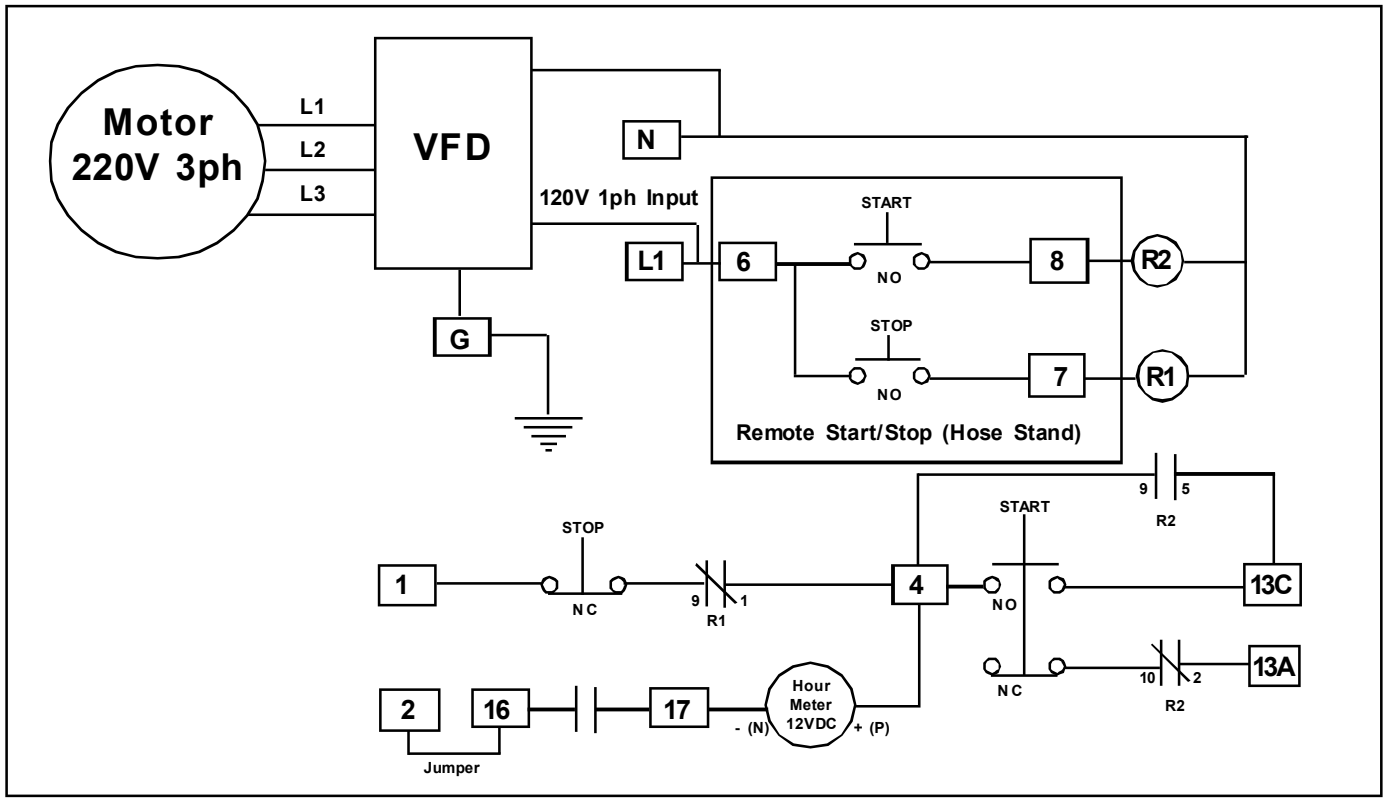
The following are parameter setting and the wiring diagram to make this happen with the Lenze VFD.

VFD Program:

Parameter	Description	Setting	Explanation
P100	Start Control Source	4	Allows Start w/ momentary NO Switch btw. Term. 4-13A
P108	Motor Overload	65%	Setting calc. by motor FLA/SMV output current
P111	Stop Method	2	Drive Ramps to Zero Speed not Coast
P121	TB13A Input Function	24	Activate Sequencer Segment 1
P122	TB13B Input Function	8	Control Select-Allows Switch btw. Keypad/Term. Start/Stop
P123	TB13C Input Function	11	Start Forward Allows NO momentary Switch Start
P140	Relay Output Run	1	Hour Meter Energized
P700	Sequencer Mode	1	Enable Timer Transition mode
P706	Sequencer Action	1	Sequencer Action After Start/Stop-Restarts @ Seg. Begin.
P707	Sequencer # Cycles	1	Single Cycle Scan
P708	Sequencer Scaling	2	Sequencer Timer Set in Minutes
P710	Sequencer Freq Setpt	60	Sets Sequencer Speed = 60 Hz (1725 RPM)
P711	Seq. Accel/Decel	2	Sets Sequencer Accel/ Decel = 2 Seconds
P712	Time in Current Seg.	10	Set the time executing the segment = 10 Minutes
P795	End Segment	1	SMV Stops after execution of segment

Wiring Diagram:

Wiring 1 - Stop Switch - Red Momentary Switch With NC Contact wired between TB 1&4.
Wiring 2 - Start Switch - Green Momentary Switch With 2 sets of Contacts, 1 NO Contact wired between TB 13C&4, and 1 NC Contact wired between TB 13A&46
Wiring 3 - Hour Meter - Jumper wired between TB 2&16. TB17 wired to the Negative (-) terminal of the 12 VDC hour meter and TB 4 wired to the Positive (+) terminal of the hour meter.



PARTS LIST

Model 2500 Pump

Pump Drive Components

1	161-A-2808	3/4 HP - 3 Phase Gearmotor Qty 1
2	160-A-2816	14/3 Power Supply Cord, 8 ft long Qty 1 (Not Shown. Supplied Only With Inverter Set Up for 110 Volt, 1 Phase Input)
3	161-A-2810	Inverter Qty 1
4	161-C-810	Motor Mount Qty 1
5	161-G-2814	Eccentric Qty 1
6	161-C-805	Piston Qty 1

Pump Head Components

7	160-B-1278	V-Clamp for Pump Base Qty 2
8	113V-2500	Diaphragm, Viton Qty 2
9	161-A-2813	Lower Standard Qty 2
10	161-A-2815	Standard Bolt Qty 2
11	161-D-361	Pump Base, Poly Qty 2
12	160-A-1475-150V	Gasket 1 1/2" Viton Qty 4
13	266-150	Nipple Close X 1 1/2", Sch 80 PVC Qty 4
14	160-A-1653V	Check Valve, Swing, Clear 1 1/2", Viton Qty 4
15	160-G-297	Flange Adapter With Elbow Qty 4
16	161-A-2245	O-Ring 2" X 1.75" X .125" Viton Qty 2
17	161-A-2245	Pump Base Plug Qty 2

Suction & Discharge Port Components

18	160-A-2836	Flange Tee 2" Qty 2
19	160-A-1475-150V	Gasket 1 1/2" Viton Qty 6
20	160-A-2450	V-Clamp for Flange Fittings Qty 6
21	160-A-2835	Flange Adapter 2" Flange x 1-1/2" MNPT Qty 2

Mounting Frame Assembly

22	160-C-804	Pump Frame PVC Schedule 120 Qty 1
23	160-A-2897	Stainless Clamp 8.61 - 9.19 Clamping Range Qty 2
24	161-D-390-R	Pump Leg - RIGHT Qty 1
25	161-A-2902	Leg Connecting Rod Qty 1
26	161-D-390-L	Pump Leg - LEFT Qty 1
27	161-A-166	Wheel Qty 2

PUMP MAINTENANCE

Overview:

Except for general cleaning and the as needed replacement of the diapragms, check valves and O rings, there is no scheduled maintenance program for this pump.

The replacement of the diaphragms, valve assemblies and O rings are going to be determined based on the demands of the particular installation.

Determining those demands and the pumps performance can be evaluated by inspection and testing on a regular basis.

- Life expectancy is directly related to head conditions, run time and diaphragm material. The higher the suction and discharge pressures the shorter the life.

- The 2500 diaphragm is made of Viton. Dynamic testing shows that life expectancy for the Viton diaphragm should be between 650 hrs under extreme head conditions and 1200 hrs under low to moderate head conditions.

Testing:

- **Vacuum/Pressure Gauge Test - Tests the performance of the pump using an Edson Vacuum/Pressure Test Gauge. Order No. 276-150**
  1. By holding or clamping the gauge into the suction and discharge plumbing you can read the actual vacuum and pressure forces created by the installation.

- **Volume Test - Testing overall performance of the pump installation.**
  1. Use a container with a known capacity of at least 2 gallons.
  2. Empty the container using the suction side of the pump or fill it from the discharge. When using the fill test make sure the pump is fully primed before filling the container.
  3. Use a watch to record the time it takes. Repeat the test at least twice.
  4. Establish GPM rate. Example: It took 10 seconds to empty a 2 gallon container. The GPM rate is 12 Gallons Per Minute.(60 seconds divided by 10 seconds times 2 gal.)
  5. Record the cycle speed of the pump. Know the head conditions of your test and compare the results of your test with the volume of the appropriate Volume Chart on the pump specification sheet. Every installation is different so use the charts as a guideline.

- **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. 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 clamps or worn diaphragm. Tighten and replace as required.
     If you hear no air movement, inspect the valve assembly. Clean or replace the valve assembly.
  4. Press your hand over the discharge. If the inlet valve is sealing properly, the pressure of the pump should push your hand away. If it does not and the air is forced out the inlet chamber, inspect the valve assembly. Clean or replace the valve

Edson Diaphragm and Check Valves:

Over time these parts wear and need to be replaced. The ability to easily and quickly replace these parts is one of the major advantages of an Edson pump. These parts are available as individual items.

Order No.	Description	Qty Per Pump
113V-2500	Viton Diaphragm	2
160-A-1653V	Check Valve, Swing, Clear 1 1/2", Viton	4

See the next pages for guidelines in changing these parts.

Changing The Diaphragms Of The Model 2500

Rule 1. Change only one side at a time.

Step 1. Remove the 2" Flange V Clamps and Gaskets on the suction and discharge Tee only on the side of the diaphragm being changed.

Step 2. Remove the Pump Base V Clamp by unscrewing the Tee Handle all the way

Step 3. Remove the Pump Base and Valves Assemby. Lay out all these parts for reassembly.

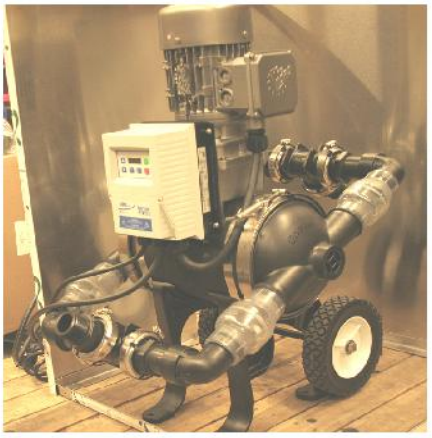
Step 4. Use a 1/2" drive or a crescent wrench to unscrew the diaphragm retaining nut, lower standard and diaphragm from the piston.

Rule 2. Before installing the new diaphragm, run the pump drive until the piston is fully withdrawn back into the pump frame.

Step 5. Use a little teflon grease to hold the gaskets in place while you align the Pump Base & Valves Assembly. Hold the Pump Base tight to the diaphragm with your body while you fit and tighten the large pump base V Clamp. Make sure the Pump base, the diaphragm and the pump frame are aligned before tightening the V Clamp. Re-install the 2" Flange V Clamps on the suction and discharge Tee before starting to change the other diaphragm.

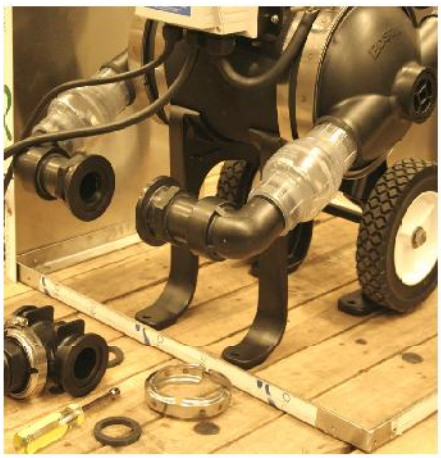
Changing A Check Valve

Rule 1. **If changing both suction and discharge check valve(s), complete the suction side before beginning the discharge side.**



Step 1. Loosen both pump base v-clamps (do not remove) and rotate the suction, discharge and base assembly until the suction port is clear of the front support legs. Tighten the v-clamps.

Step 2. Remove the suction flange tee and washers by removing the 2" flange v-clamps. You may have to spread the tee and elbow flanges on one side of the tee and then the other while working the flange tee and washers free.

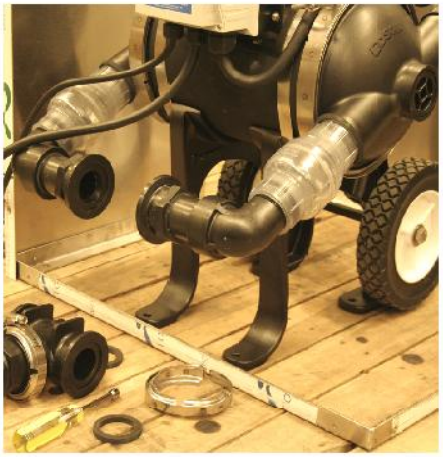


Step 3. Unscrew the check valve-flange elbow assembly(ies) from the pump base(s). If the sealing washer and 1 1/2" close nipple remains in the pump base, leave it. If it comes off with the check valve, it and the flange elbow must be removed from the check valve being replaced. They will be used with the new check valve.

Changing A Check Valve

Rule 2. **Orient the check valve so the suction flapper opens towards the pump base. When installed on the discharge side, it must be oriented so the flapper opens away from the pump base.**

Step 4. Screw the check valve, sealing washer and 1 1/2" close nipple into the pump base after coating the close nipple threads with a light coating of a non-petroleum based, teflon grease. By hand, tighten the valve to the pump base until the sealing washer is pressed tight between the two surfaces. Using a pipe wrench if necessary, continue to screw in the new valve until the flapper hinge is at the top.



Step 5. Using sealing paste on the threads of the flange elbow, screw it into the check valve. Screw it in until it is aligned with the opposing assembly. Use the flange tee to check the alignment and then go ahead and change the opposing check valve if necessary following the same procedures

Step 6. Install the flange tee and sealing washers, then install and tighten the flange tee v-clamps.
If required follow the same procedures to change the discharge check valves.
When completed loosen the pump base v-clamps and rotate the suction and discharge and base assemblies to their original position and make sure all v-clamps are tight.