



Installation, Operation and Maintenance Manual
10-25 Hp Medical Dynamic Vacuum System

This unit purchased from: _____

Date purchased: _____

Model number: _____

Serial number: _____

Option(s) included: _____

Any information, service or spare parts requests should include the machine serial number and be directed to:

BeaconMedæS

13325-A Carowinds Blvd.
Charlotte, NC 28273

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Safety Precautions

The operator should carefully read the entire contents of this manual before installing, wiring, starting, operating, adjusting and maintaining the system.

The operator is expected to use common-sense safety precautions, good workmanship practices' and follow any related local safety precautions.

In addition:

- **Before starting any installation or maintenance procedures, disconnect all power to the package.**
- All electrical procedures must be in compliance with all national, state and local codes and requirements.
- A certified electrician should connect all wiring.
- Refer to the electrical wiring diagram provided with the unit before starting any installation or maintenance work.
- Release all vacuum from the package before removing, loosening, or servicing any covers, guards, fittings, connections, or other devices.
- Notify appropriate hospital personnel if repairs or maintenance will affect available vacuum levels.
- Prior to using the **LifeLine** Medical Vacuum System, the medical facility must have a Certifier perform all installation tests as specified in NFPA 99. The medical facility is also responsible for ensuring that the medical vacuum system meets the minimum requirements for medical vacuum as specified in NFPA 99.
- This is a high speed, rotating piece of machinery. Do not attempt to service any part while the machine is in operation.
- To prevent automatic starting, disconnect all electrical power before performing any maintenance functions.
- Do not operate unit without guards, shields or screens in place.
- Make sure that all loose articles, packing material, and tools are clear of the package.
- Check all safety devices periodically for proper operation.
- **Do not add lubricating oil** of any kind to the vacuum pump. Absolutely no oil is required for proper operation.
- Electrical service must be the same as specified on the control panel nameplate or damage to the equipment may occur.
- Vibration during shipment can loosen electrical terminals, fuse inserts, and mechanical connections. Tighten as necessary.

1. INSTALLATION

1.1 Uncrating

Upon delivery, the condition of the **LifeLine** Medical Dynamic Vacuum System should be carefully inspected. Any indication of damage by the carrier should be noted on the delivery receipt, especially if the system will not be immediately uncrated and installed. **BeaconMedaes** ships all systems F.O.B. factory; therefore, damage is the responsibility of the carrier, and all claims must be made with them. **LifeLine** modules may remain in their shipping containers until ready to be installed. If any of the modules are to be stored prior to installation, they must be protected from the elements to prevent rust and deterioration.

DO NOT REMOVE the protective covers from the inlet and discharge connection ports of the modules until they are ready for connection to the hospital's pipeline distribution system.

1.2 Location

The **LifeLine** Medical Dynamic Vacuum System should be installed indoors in a clean, well-ventilated environment. Areas of excessive dust, dirt, or other air-borne particulate should be avoided.

Certain considerations should be given to the placement of the system. The package may be installed in any location that is flat, level and will support its weight. Clearance between the unit and adjacent walls should be no less than 24" to ensure sufficient airflow for cooling. There should be a minimum of three feet of clearance in front of the control panel for safe operation and maintenance. A vertical distance of 24" is required above the modules for ventilation and maintenance.

No special foundation is required. However, all units must be securely bolted using all mounting holes provided. If a raised concrete pad is used, the module bases must not overhang the concrete base.

Adequate ventilation is required. The pumps are air-cooled. Therefore, it is very important that the ambient temperature should be between 40°F and 105°F (If the maximum ambient exceeds 105°F, contact factory for special instructions). The system should be located as close as possible to the point of usage to prevent excessive loss of operating vacuum due to pressure drop.

When selecting the location for the system, remember to keep in mind the requirements for service.

2. START-UP

2.1 General Information

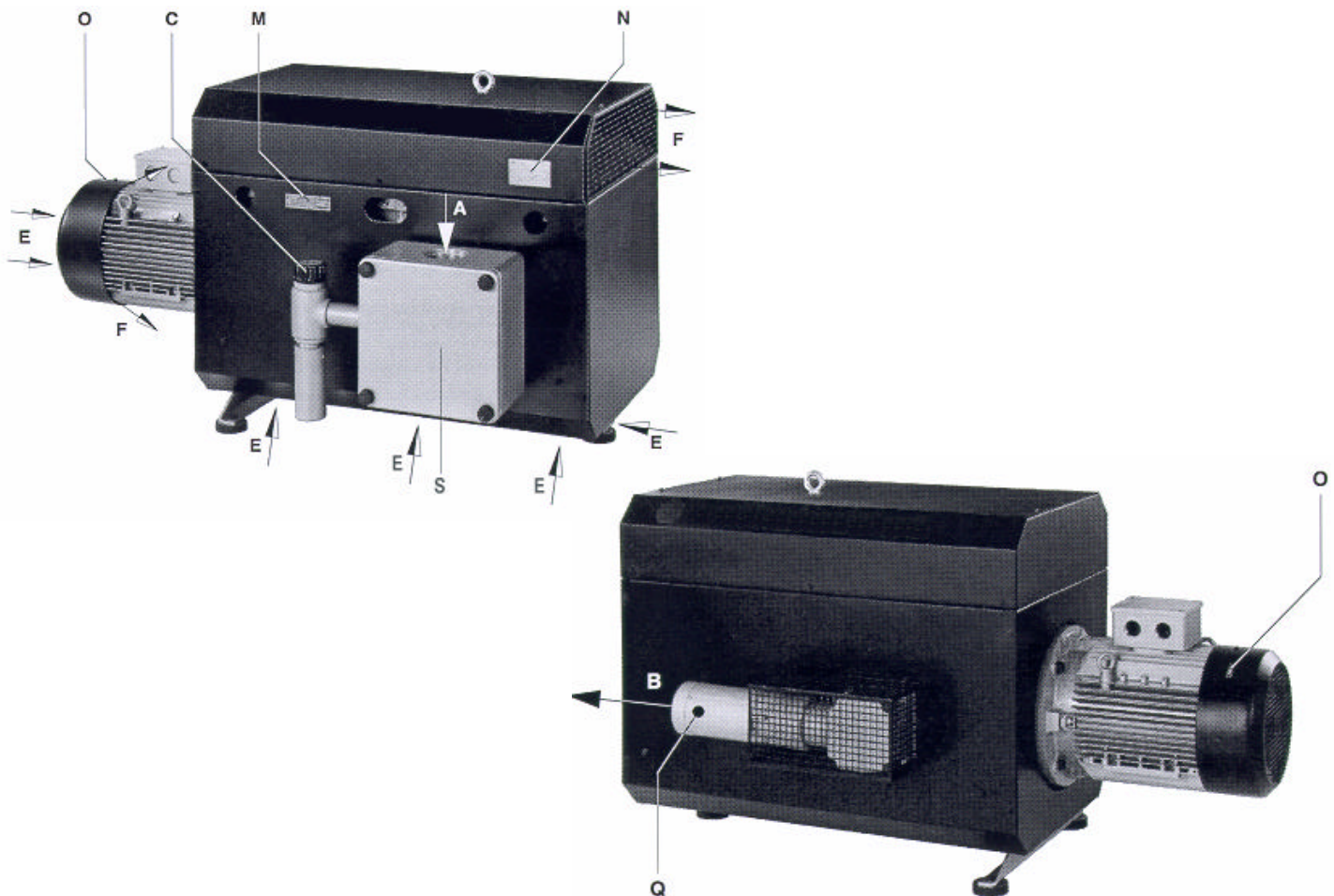
All LifeLine Medical Dynamic Vacuum Systems work according to the dynamic compression principle utilizing non-contact rotating impellers. A built in micro fine filter filters all vacuum air. The vacuum pump is enclosed in a sound box. The cooling of the vacuum pump takes place over the coupling fan. The fresh cool air (E) is sucked in from underneath the unit and the warm air is exhausted through the vents (F). The pumps are driven by a direct flanged three phase, standard TEFC motor via a pin and bush coupling.

Vacuum can be adjusted with the regulating valve (C) to the required levels.

Optional extras: As required, non-return valve, dust inlet filter, vacuum tight suction filter and motor starter.

WARNING!
Pumps that have reached operating temperature may have a surface temperature at position (Q) of more than 158° F (70°C).
Do Not Touch.

Vacuum regulating valve (C), greasing points (L) and filter housing (S) should be easily accessible. The cool air entry (E) and the cool air exit (F) must have a minimum distance of 2 foot from any obstruction. The discharged cooling air must not be re-circulated. For maintenance purposes we recommend a space of 2 feet in front of the filter housing (S) and greasing points (L).



2. START-UP (continued)

2.2 Lubrication

The pumps are 100% oil-less. **DO NOT ADD OIL.**

2.3 Pump Rotation

Prior to actual operation, the pumps must be checked for correct rotation.

Using the Hand-Off-Auto switch on the door of the control panel, jog the motor of the specific pump that is to be checked by momentarily turning the switch to "Hand" and back to "Off". By observing the cooling fan on the end of the motor, you can determine the rotation of the pump. Pump rotation should be clockwise as viewed from the motor end of the pump. Directional arrows are located on each pump.

If the pumps are rotating in the wrong direction, rotation can be reversed by switching any two main power leads at the bottom of the starter in the main control panel. Correct rotation should be confirmed in the previous manner.

1.3 Locations Above Sea Level

The safety relief valves and vacuum control switches on the **Lifeline** Vacuum systems are factory set for an altitude less than or equal to 2000 ft. However, if the altitude is greater than 2000 ft, certain adjustments may be necessary to compensate for a lower barometric pressure.

1.3.1 Compensation for Altitude

All vacuum pumps above sea level have reduced flow and should be de-rated. After determining the correct flow needed for the medical vacuum system, multiple this number by the adjustment factor in the following chart. After determining the new flow required, use this number to size the medical vacuum system.

Altitude Adjustment Factor		
Altitude (ft)	Normal Barometric Pressure (inches HG)	Multiplier used for Required SCFM
0	29.92	1.00
500	29.39	1.02
1000	28.86	1.04
1500	28.33	1.06
2000	27.82	1.08
2500	27.32	1.10
3000	26.82	1.12
3500	26.33	1.14
4000	25.84	1.16
>4000	Contact Factory. Do NOT use Oil-less Vacuum Pumps.	

1.4 Component Assembly

Modular systems are shipped as separate units to facilitate a variety of installations. All modular and tank mount units are designed to fit through a standard 36" doorway, though some receiver modules may need to be tipped slightly. Some interconnecting piping and wiring between modules may be necessary on modular systems only.

1.5 Electrical Requirements

WARNING!
**BE SURE THAT ALL POWER IS TURNED OFF PRIOR TO
PERFORMING ANY WORK ON THE ELECTRICAL PANEL!**

Refer to the electrical diagram provided with the unit before starting any installation or maintenance work.

Do not operate vacuum pump on a voltage other than the voltage specified on the control panel nameplate.

All customer wiring should be in compliance with the National Electrical Code and any other applicable state or local codes.

Refer to the wiring diagram(s) that came with the vacuum pump system for pertinent wiring connections.

Electrical power for the medical system must be supplied from the emergency life support circuit.

Check the control voltage, phase, and amp ratings before starting the electrical installation, and make sure the voltage supplied by the hospital is the same. The wire size should be able to handle peak motor amp load of all operating units. Refer to the vacuum pump system full load amperes on the wiring diagram.

Check all electrical connections within the vacuum system that may have loosened during shipment.

Only certified electricians should make power connections to the control panel and any interconnecting wiring.

Ensure that the emergency generation system electrical supply is consistent with the vacuum system's requirements.

Three-phase power supplied from emergency generator(s) must match that of the normal supply to allow for correct direction of the motor rotation at all times.

The electrical controls for the system were wired at the factory and were fully tested.

NOTE: It may be necessary to switch two of the leads when performing start-up, if the pump rotation is in the wrong direction.

1.6 Intake Piping

Before connecting any piping, the plastic thread protector installed in the connection port must be removed. It is recommended that the main vacuum line to the receiver should not be reduced below that provided on the receiver. Long piping runs may need to be increased in size to minimize pressure drop. Improper line sizing may result in a loss of capacity. Ideally, piping should be constructed using long radius elbows and a minimum number of turns.

All secondary lines should be taken from the top or side of the main line to prevent any accumulated moisture from draining towards the pumps. All lines should slope away from the pumps. Any low points in the piping should be equipped with pipe drains to remove accumulated moisture.

All intake vacuum lines must be piped to in accordance with NFPA 99. All pipe must be either seamless copper tubing or other corrosion-resistant metallic tubing, such as galvanized steel or stainless steel, as detailed in NFPA 99.

1.7 Exhaust Piping

The exhaust line must be piped outside of the building in accordance with NFPA 99. To ensure that no restriction of airflow will occur, size the piping accordingly. All pipes must be either seamless copper tubing or other corrosion-resistant metallic tubing, such as galvanized steel or stainless steel, as detailed in NFPA 99. A flexible connector (shipped loose) must be installed on each exhaust port of the vacuum pump before connecting to the main exhaust line leading outdoors. Additionally, a drip leg must be installed at each exhaust port connection to allow for the draining of any accumulated moisture. The outside pipe must be turned down and screened to prevent contamination.

WARNING:
The vacuum exhaust vent must be located away from medical air intakes, doors and openings in the buildings to minimize possible contamination to the facility, in accordance with NFPA 99.

LifeLine Units	System Exhaust Pipe Length (ft) - See Notes											
	25	50	75	100	150	200	250	300	350	400	450	500
Simplex 10 Hp	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Simplex 15 Hp	3.00	3.00	3.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00
Simplex 25 Hp	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00
Duplex 10 Hp	3.00	3.00	3.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00
Duplex 15 Hp	4.00	4.00	4.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00
Duplex 25 Hp	5.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00	6.00	8.00	8.00	8.00
Triplex 10 Hp	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Triplex 15 Hp	5.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00	6.00	8.00	8.00	8.00
Triplex 25 Hp	5.00	5.00	6.00	6.00	6.00	6.00	8.00	8.00	8.00	8.00	8.00	8.00
Quad 10 Hp	4.00	4.00	4.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00
Quad 15 Hp	5.00	5.00	6.00	6.00	6.00	6.00	8.00	8.00	8.00	8.00	8.00	8.00
Quad 25 Hp	5.00	5.00	6.00	6.00	6.00	6.00	8.00	8.00	8.00	8.00	8.00	8.00

- Notes:**
1. All pipe sizes are based on the following: copper pipe (Type L), 14.7 psia, 70° F.
 2. The minimum pipe size must be maintained for the total length of the exhaust pipe. Use next larger size pipe in the event the minimum size is not available.
 3. When determining the total pipe length, add all the straight lengths of pipe together in addition to the number of elbows times the effective pipe length for that pipe size. (See the table and example below.)

Effective Pipe Length Equivalent to each 90 degree Elbow									
Pipe Size (in.)	1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00	8.00
Eff. Pipe Length (ft)	3.6	4.9	6.4	7.9	9.4	10.0	11.9	13.2	14.5

See example next page

Example:

Select the pipe size for a Duplex 10 HP with 130 feet of straight pipe and six elbows:

- A) Select the pipe size of 3" diameter for 130 feet of straight pipe.
- B) Determine the eff. Pipe length for an elbow of 3" dia. (EPL= 7.9 ft / elbow).
- C) Calculate the SYSTEM PIPE LENGTH {SPL (3.0" D) = 130 + (6 x 7.9) = 177.4 ft}
- D) Check this SYSTEM PIPE LENGTH to see if it exceeds the minimum pipe size. In this case it does, select the next larger pipe size from the table (D = 4").
- E) To double-check the pipe size, recalculate the SPL with the new diameter.
SPL (D = 4") = 130 + (6 x 10.0) = 190 ft. This is in the allowable range.

1.8 Ventilating Piping (Optional)

The (optional) ventilation duct is provided when the cooling exhaust air is to be ducted out of the equipment room. When using ventilation ductwork precautions must be taken to assure proper cooling ventilation of the vacuum system to eliminate overheating of the pump.

WARNING:

Ventilating exhaust ductwork must contain a booster fan sized to provide the required ventilating airflow as shown in the table below. This additional ventilating ductwork, including the booster fan, must be designed so it does not create any restriction to the vacuum pump ventilating airflow.

VENTILATING AIR FLOW REQUIREMENTS PER PUMP AT DUCT EXIT	
Vacuum Pump Horsepower	Minimum Air Flow - CFM
10	1300
15	1300
25	2100

3. GENERAL OPERATION

WARNING!
NEVER ADD OIL TO THE INLET OF OIL-LESS PUMPS!

3.1 Electrical Control Panel

The **LifeLine simplex** control system provides a circuit breaker disconnect for the vacuum pump with an external operator, full voltage motor starter with overload protection, a 120V control circuit transformer with fuses, vacuum control switch, hand-off-auto lighted selector switch and a runtime hourmeter. The control system includes a manually adjustable minimum run timer and a 0-30"Hg vacuum gauge in the control panel. All components are enclosed in a NEMA 12 enclosure.

The **LifeLine multiplex** control panel includes redundant 120V control transformers with fuses, visual and audible lag pump alarm, 0-30"Hg vacuum gauge, and the following for each pump: hourmeter, vacuum control switch, illuminated Hand-Off-Auto switch, and motor starter with circuit breaker and external disconnect. All components are enclosed in a NEMA 12 enclosure.

During normal operation, all H-O-A switches should be turned to the "Auto" position so that the PLC can effectively control the system. The PLC monitors the system vacuum switch condition, starts and stops the pumps depending on changing vacuum switch conditions and minimum run time values, and automatically alternates the lead position between units.

In a typical **duplex** system, one pump will be able to handle the system load. The PLC will signal the lead pump to start when the lead vacuum switch (VS-1) closes with falling vacuum level. If the one pump can carry the load, then the vacuum level will rise and VS-1 will open. At this point, if the minimum run timer for that pump has been satisfied, the PLC will turn off the lead pump. If the minimum run timer for that pump has not been satisfied, the lead pump will continue to run against the vacuum relief valve until the timer expires. When the system vacuum drops again and VS-1 closes, the PLC will automatically sequence the lead role to the other pump and will start it. This is also known as "first on/first off" instead of the more traditional "last on/first off". With the "first on/first off" sequencing technique, starts and stops on the pump are minimized. If the lead pump runs continuously in lead for more than 5 hours (this is the minimum run time value), the PLC will automatically sequence the pump attempting to evenly distribute the run time among all available pumps. If during operation, the second pump is required to come on in addition to the lead pump, the PLC will turn on the "Lag Alarm" (see section 3.4).

In a **triplex** or **quadruplex** system, the operation is very similar to the duplex operation described above with the following differences. For each additional pump, there is an additional vacuum switch. (Refer to the wiring diagram that came with the unit for actual vacuum switch setpoints.) With a triplex or a quadruplex system, the lag unit running alarm may not necessarily correspond to the third or fourth pump coming on. To determine when the PLC turns on the lag alarm, it counts the number of units in the "Auto" position and makes a decision based on the vacuum switch conditions. For instance, in a quadruplex system with only 2 H-O-A switches in the "Auto" position, the lag alarm will turn on when the second unit is turned on (or the lag vacuum switch VS-2 closes).

On the **initial** system start-up, when the system vacuum level is below the setpoints of the vacuum control switches, pumps 1 and 4 will start, after a 7-second delay pump 2 will start, and after another 7-second delay pump 3 will start. The time delay is to prevent high inrush current after a power failure or emergency power switch over. During this initial system start-up, the lag alarm will come on at this point and is normal. It can be reset once the vacuum level is high enough to open the lag vacuum switch.

3.1.1 Minimum Run Timer(s)

All **LifeLine** vacuum systems incorporate minimum run timers to minimize the starts and stops on the vacuum pumps.

For **simplex** systems, there is one manually adjustable minimum run timer that is factory set at 1 hour. During operation, the minimum run timer starts when the vacuum switch opens. If the vacuum switch stays open long enough for the timer to expire, then the pump will turn off.

For **multiplex** systems, the minimum run timers are built into the PLC. Once a pump is turned on by the PLC it will not turn it off until its minimum run timer has expired. If the vacuum switch remains closed after the minimum run timer has expired the PLC will force alternation to the next available pump. The PLC automatically adjusts the minimum run time value depending on “lead or lag condition”. See the chart below for minimum run time values.

Minimum Run Timer Values				
System	Minimum Run Time Value (hours)			
	Lead (VS-1)	Lag 1 (VS-2)	Lag 2 (VS-3)	Lag 3 (VS-4)
Simplex	1	N/A	N/A	N/A
Duplex	5	1	N/A	N/A
Triplex	5	2.5	2.5	N/A
Quadruplex	5	2.5	2.5	1

3.2 Relief Valve

Every **LifeLine** pump is built with an integral vacuum relief valve. The purpose of this relief valve is to prevent the pump from operating at a vacuum level that is too high. The maximum operating point varies by model and is factory set before shipping. All relief valves are factory set at 23 inches Hg. Relief valve settings may be different for higher altitudes (see Section 1.3).

The function of the relief is very important to the successful long-term operation of the vacuum system. Since these pumps have no oil or water to carry away the heat of compression, an adequate flow of air *through* the pump, as well as air circulation *around* the pump, is vital.

NEVER SET THE VACUUM RELIEF VALVE AT A POINT THAT EXCEEDS THE FACTORY RECOMMENDED LEVELS!

3.3 Tank Drain

The standard tank drain consists of a manually operated ball valve.

To drain the liquid from the tank, open the tank bypass valve and close the tank isolation valves. Then open the vent and drain valves. When draining is complete, close the vent and drain valves first, then open the tank isolation valves and close the tank bypass valve.

3.4 Emergency Shutdown / Alarms

The following conditions may arise during operation.

Motor Overload Shutdown - This will shut down the pump in question and will not re-start until the reset button on the starter inside the main control cabinet is reset. See Section 4 for troubleshooting information.

Lag Unit Running Alarm - This alarm will activate if the last available vacuum pump comes on. In the case of a duplex system, it will activate when the second pump turns on or the lag vacuum switch (VS-2) closes. In the case of a multiplex system, the lag alarm will activate when the last available unit is required to come on. For example, in a quadruplex system, if all four (4) H-O-A switches are set to "Auto", then the lag alarm will trigger when the fourth unit comes on. If on the same system, three (3) of the four (4) H-O-A switches are set to "Auto" and the other to "Off" or "Hand", then the lag alarm will activate when the third unit comes on. To silence the alarm, press the amber push button. In the event the lag alarm is persistent, check to see if any leaks or valves are open downstream or reduce the system load.

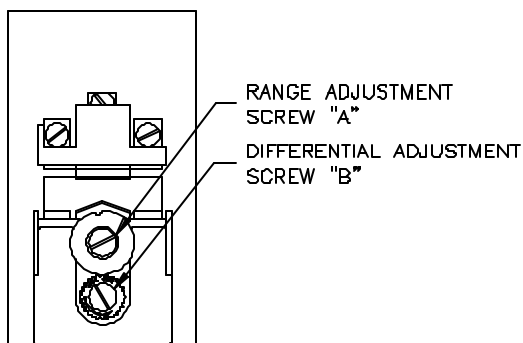
Please note that the lag alarm may be reset even if the lag pump is still running. This can happen due to the minimum run timer not having expired, but the lag vacuum switch itself may be open.

High Air Temperature Shutdown - This will shut down the pump in question and will not re-start until the appropriate red push button is pressed on the main control panel. Before allowing the unit to re-start, the condition should be checked (see "pump runs hot" in the Troubleshooting Section 4). Even after pushing the button, the unit may not re-start, depending on system sequencing and system pressure.

High Vacuum Alarm - This alarm will activate if any pump pulls more than 23.5"hg. Once this condition occurs, a "High Vacuum Alarm Light" will illuminate and the high vacuum solenoid valve will open. After condition is corrected press appropriate red push button on the main control panel. (See "high vacuum alarm" in the Troubleshooting Section 4).

3.5 Vacuum Switch Set Point Adjustments

The vacuum switch is set at the factory to the operating point(s) as stated on the wiring diagram supplied with the unit. It is good practice to cycle the switch to determine actual operating points before proceeding with readjustment. Refer to the illustration below for location of adjustment.



Adjusting Instructions

FIRST - Adjust the range (screw "A") to the required cut-in vacuum setting. Turning the screw clockwise lowers the cut-in and cut-out vacuum settings equally.

SECOND - Adjust the differential (screw "B") to the required cut-out vacuum setting. Turning the screw counter-clockwise will increase the cut-out vacuum setting only. Differential is the difference between cut-in and cut-out settings.

4. TROUBLE SHOOTING

Problem	Possible Cause	Solution
Unit lacks sufficient vacuum	Unloader vacuum switches limiting vacuum level	Check and reset unloader switches as necessary
	Clogged Filters	Clean or change filters
	Vacuum relief valves need adjusting	Re-calibrate valves
	Leaks or restrictions in piping	Open pipe connections and examine for internal contamination or buildup Tighten all piping connections Replace rubber hoses
	Insufficient pump speed (RPM)	Check voltage and amperage to motor Inspect motor and coupling halves Check that the pump shaft turns freely
	Clogged ports	Clean and open all ports
	Defective inlet filter box gaskets	Inspect gaskets for breakage or disintegration. Replace if necessary.
	Line losses too high	Piping diameter too small- replace with larger diameter Check for clogged filter elements- replace if necessary.
	Unit is operating at an elevated altitude	Contact the factory for assistance. Performance may be reduced when operating above sea level
Motor breakers trip constantly	Defective motor	Test motor and replace if necessary
	Heaters incorrectly adjusted or too small	Adjust or replace with correctly sized heaters
	Low motor voltage	Check at motor terminals. Contact electric service provider.
	Ambient temperature too high	Reduce ambient temperature.
Unit runs rough and cannot be rotated manually	Worn coupling disc	Remove motor and inspect coupling disc and pins. Replace, if necessary, and realign.
	Worn bearings	Replace module
Pump overheats	Cooling ducts blocked	Clean cooling ducts
	Cooling fan broken	Replace fan
	High ambient temperature	Ventilate or cool room
	Vacuum too high	Adjust switches or relief valve
	Inlet restricted	Remove restriction
	Exhaust restricted	Remove restriction
High vacuum level	Vacuum relief valves need adjusting	Re-calibrate valves
	Vacuum switch out of adjustment	Adjust vacuum switch

5. MAINTENANCE

5.1 General Maintenance for all Sizes

WARNING:
ISOLATE POWER BEFORE STARTING ANY MAINTENANCE PROCEDURES, TO PREVENT ELECTRICAL SHOCK OR ACCIDENTAL STARTING OF EQUIPMENT.

WARNING!
Pumps that have reached normal operating temperature may have a surface temperature of more than 158° F (70°C).
Do not perform any maintenance until after a sufficient cool down period.

Never perform any maintenance functions while the unit is in operation.

Item	Frequency	Action
Exhaust drip leg	Daily/Adjust as needed	Check for accumulated moisture
Inlet filters	Annually	Replace the inlet filter elements Refer to service manual for procedures
Grills	Annually	Clean air grills if dirt has accumulated
Motor bearings* 10 HP motors 15 – 25 HP motors	Annually or 5,500 hours Annually or 3,600 hours	8 grams of grease per fitting 17 grams of grease per fitting
Pump bearings*	Every 6 months	30 grams of grease per fitting
Coupling	Annually	Inspect coupling rubbers for wear. Replace as needed

*Refer to the service manual for grease specifications.

5.1.1 Pumps

Maintain the pump regularly to achieve the best operating results. Maintenance intervals will depend on the pump's use and ambient conditions. Each pump in the **LifeLine** system is an oil-less dynamic vacuum pump.

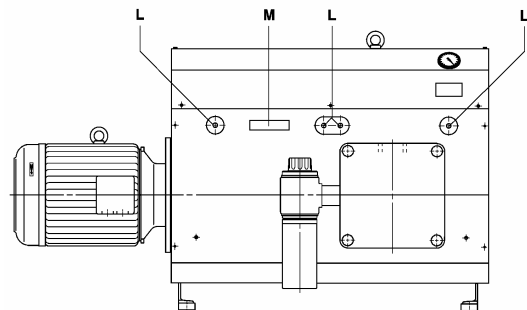
Do not add oil at any time to the **intake** of the vacuum pumps.

5.1.2 Exhaust Drip Leg Valve

Each pump should have a drip leg installed by others at the exhaust port on the pump. This valve should be checked daily at first, then depending on the moisture accumulated could be checked less frequently.

5.1.3 Pump Lubrication

The bearings of the blower units need to be greased every **6 months** with 30 g grease per bearing (approximately 10 pumps on a standard grease gun) (see 4 greasing points (L) with Petamo GY 193 (GRS 01 005).



5.1.4 Motor Lubrication

If greasing the motor becomes necessary, wipe the fittings completely clean and use clean equipment. More bearing failures are caused by dirt introduced by greasing than from insufficient grease. Be careful not to over-grease the motor. Use a good quality rust inhibited polyurea-based grease such as Chevron SRI. Grease 10 hp motors with 8 g of grease per fitting annually or every 5500 hours. Grease 15 & 25 hp motors with 17g of grease per fitting annually or every 3600 hrs.

5. MAINTENANCE

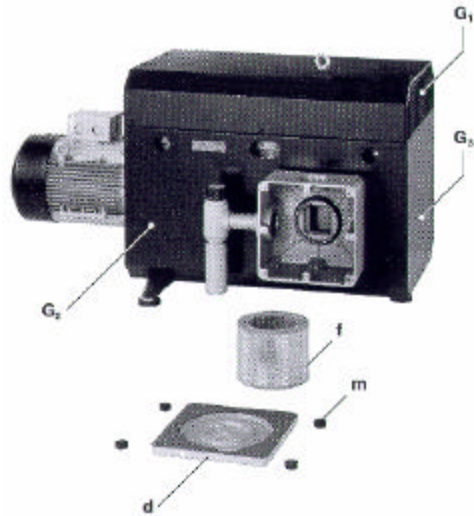
5.1 Maintenance (continued)

5.1.5 Inlet Filters

The capacity of the vacuum pump can be reduced if the air inlet filters are not maintained correctly.

The inlet filter cartridges (f) should be cleaned monthly and changed yearly depending on the degree of contamination.

Inlet cartridge cleaning: Remove thumb screws (m). Remove filter cover (d) complete with gasket. Pull filter cartridges (f) off and clean either by knocking out by hand or by using compressed air. Reassemble in reverse order.



5.1.6 Cooling

The air slots for the cooling air exits (F) in the grill (G.) or the space between the cooling fins (E') may become clogged by dust. They can be cleaned, by blowing out with compressed air, after removing the cover plates (G2) and (G3).

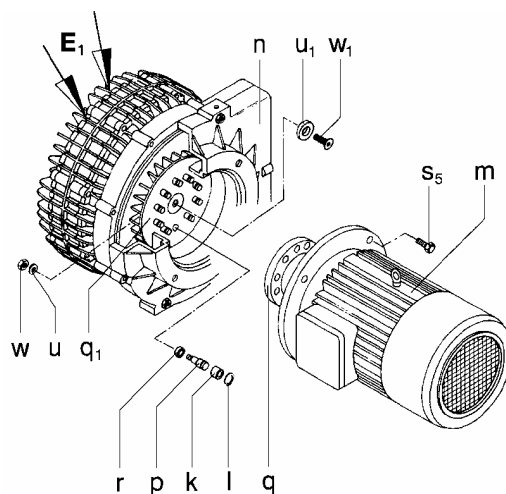
5.1.7 Coupling

The coupling rubbers (k) are wearing parts and should be checked annually. When the coupling rubbers are worn this can be detected by a knocking sound when the blower is started.

Defective coupling rubbers can cause extensive damage and even in some extreme cases break the blower shaft.

To check the coupling, stop the motor (m) and isolate. Remove the screws (S₅). Pull off the motor together with the motor side coupling half (q). If the coupling rubbers (k) are damaged remove the circlips (l) from the coupling bolt (r) and exchange the coupling rubbers (k). Leave the spacer (p) in place, check the coupling bolts (r) for any wear and replace if necessary.

To replace, screw off motor flange cover (n); remove the shaft nut (w₁) with spring shim (u₁), and pull off the coupling (q₁) from the blower. Remove the nut (w) with washer (u) and exchange the coupling bolts. Re-assemble in reverse order.



6. REPLACEMENT PARTS

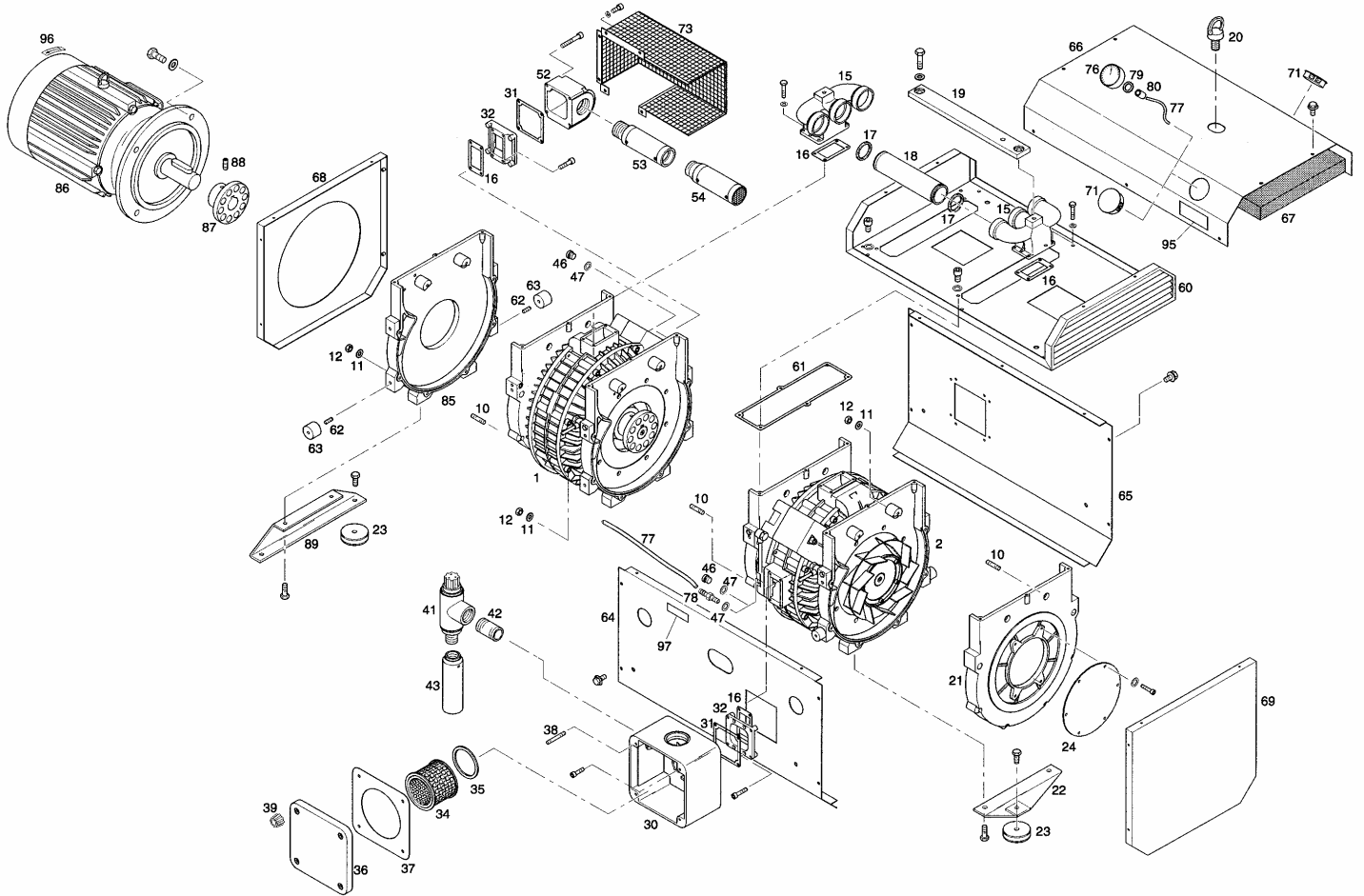
Any information, service or spare parts requests should include the system serial number, which is located inside the control panel door, and be directed to:

**BeaconMedæS
13325-A Carowinds Blvd.
Charlotte, NC 28241**

Telephone: (704) 588-0854

Fax: (704) 588-4949

6.1 Replacement Parts - 10 & 15 hp



6.1 Replacement Parts – 10 & 15 hp

General Assembly:

1. 10 horsepower model & 15 horsepower model.
2. Connection position with 90°
10. Threaded Pin
11. Disc
12. Hexhead Screw
15. Manifold
16. Gasket (Seals)
17. O-Ring (Seals)
18. Connection pipe
19. Connection piece
20. Lifting eye
21. End Cap
22. Foot
23. Rubber foot
24. Cover

Connection Pieces on the Vacuum side:

30. Filter housing
31. Gasket (Seals)
32. Intermediate plate
34. Filter cartridge (Wearing parts)
35. Gasket (Seals)
36. Filter cover
37. Gasket (Seals)
38. Threaded pin
39. Filter knob
41. Vacuum regulating valve coupling
42. Barrel nipple
43. Silencer
46. Lock plug
47. Sealing ring (Seals)

Connection Pieces on the Pressure side:

52. Connection housing
53. Silencer
54. Silencer

Cover cap:

60. Conduit bottom
61. Gasket (Seals)
62. Rubber foot
63. Threaded pin
64. Side part left
65. Side part right
66. Conduit cap
67. Acoustic plate
68. Front part (A side)
69. Front part (B side)
71. Cover cap
73. Touch protection

Vacuum Gauge:

76. Vacuum gauge
77. Flexible pipe
78. Fitting
79. Passage
80. Hose socket

Drive:

85. Motor flange cover
86. Motor
87. Coupling half driving
88. Threaded pin
89. Foot
23. Rubber foot

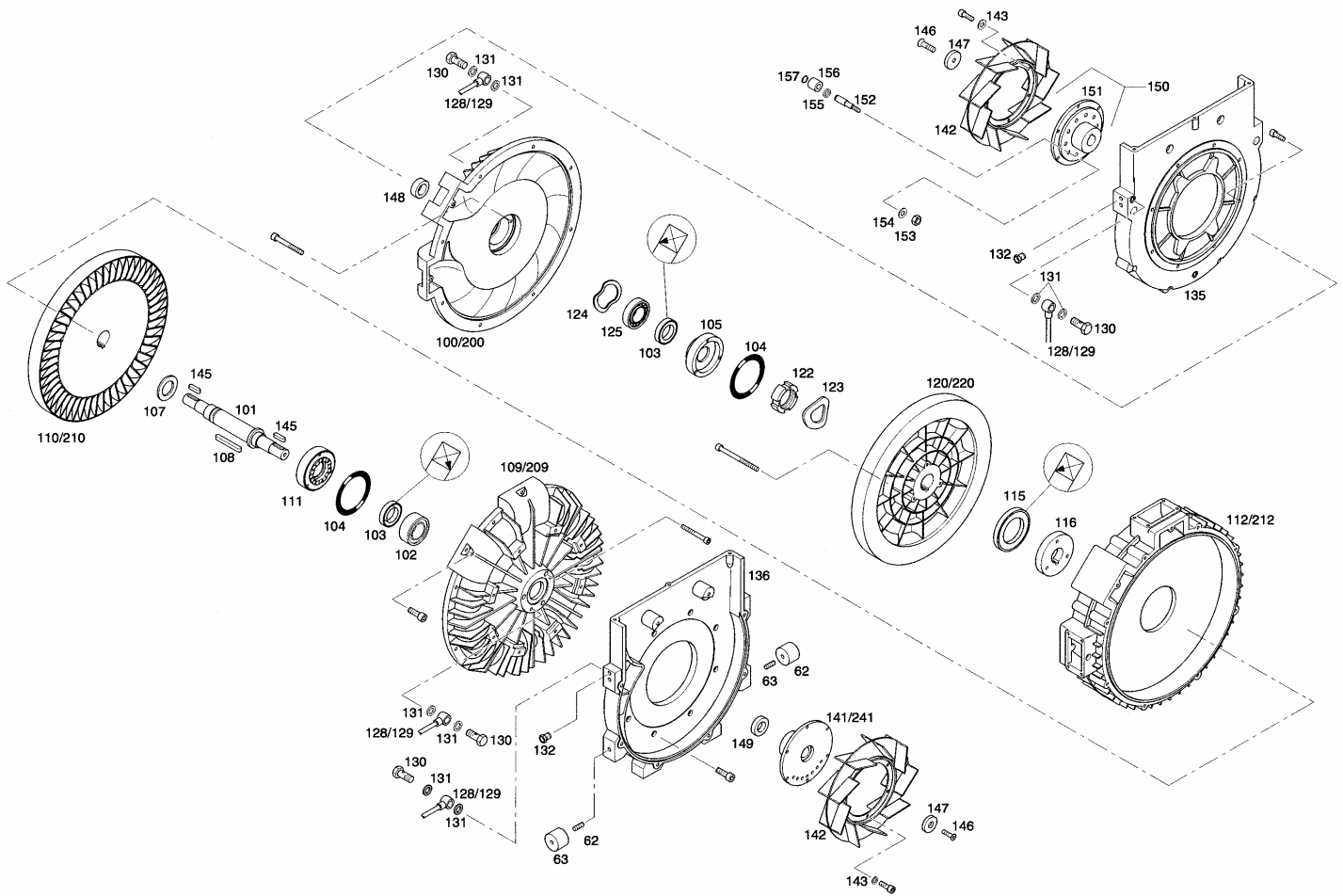
Labels:

95. Data Plate
96. Directional arrow
97. Greasing Label

Medical Dynamic Vacuum



6.1 Replacement Parts - 10 & 15 hp



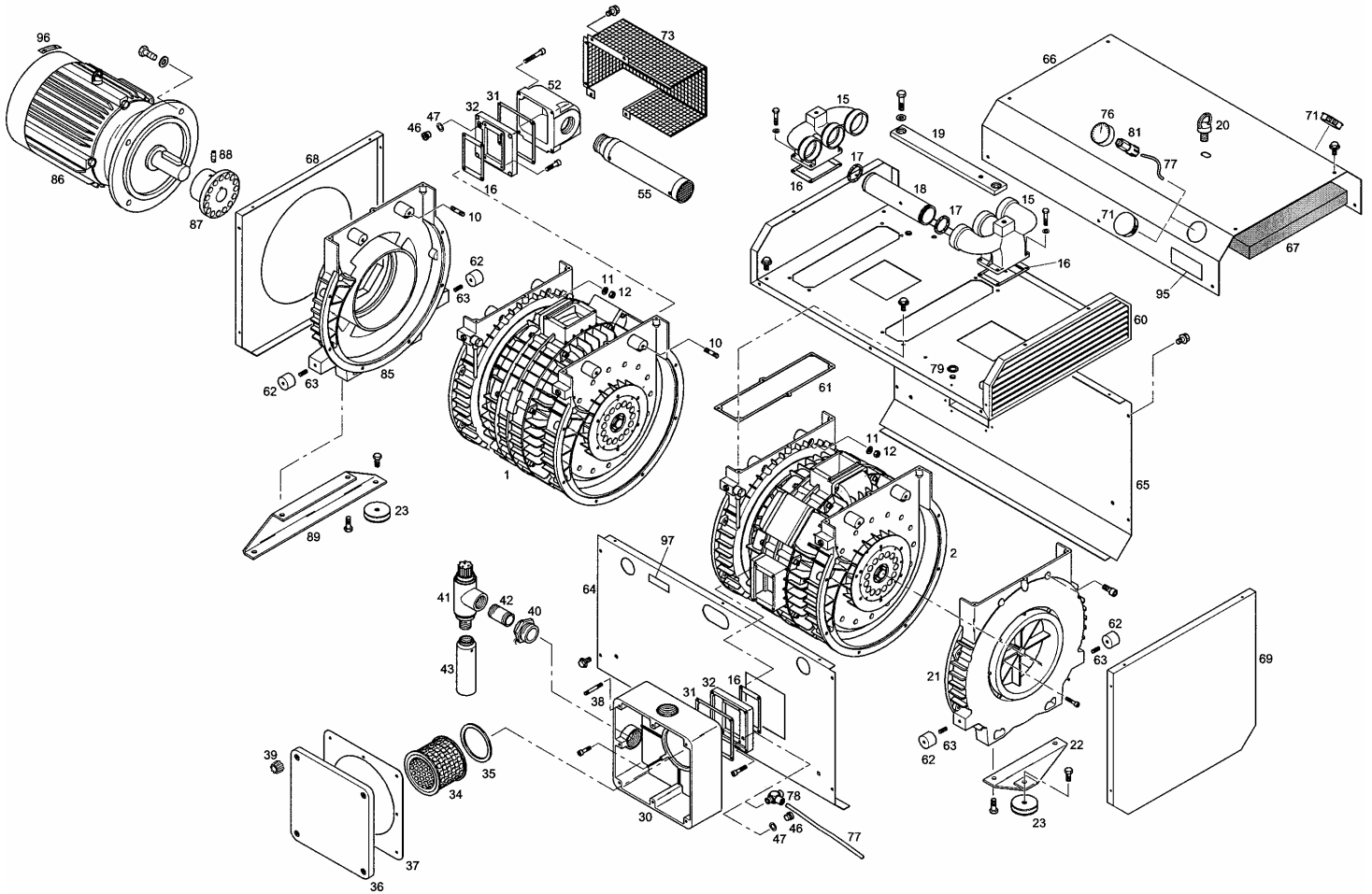
6.1 Replacement Parts - 10 & 15 hp

General Assembly:

- 100. Housing cover A
- 101. Blower shaft
- 102. Angular ball bearing (Wearing parts)
- 103. Shaft seal (Seals)
- 104. O-Ring (Seals)
- 105. Bearing cover A
- 107. Spacer shim
- 108. Key
- 109. Housing cover B
- 110. Impeller B
- 111. Bearing B
- 112. Blower housing
- 115. Shaft seal (15Hp model) (Seals)
- 116. Spacer ring
- 120. Impeller A
- 122. Shaft nut
- 123. Spring shim
- 124. Ball bearing shim (Wearing parts)
- 125. Deep groove ball bearing (Wearing parts)
- 128. Lubrication pipe A
- 129. Lubrication pipe B
- 130. Banjo bolt
- 131. Sealing ring (Seals)
- 132. Grease nipple
- 135. Connection cover A
- 136. Connection cover B
- 141. Coupling half driving
- 142. Cooling fan
- 143. Spring ring
- 145. Key
- 146. Countersunk screw
- 147. Disc
- 148. Spacer ring
- 149. Spacer ring
- 150. Coupling driven coupling (151-157)
- 151. Coupling half driven
- 152. Coupling bolt (Wearing parts)
- 153. Hex head screw (Wearing parts)
- 154. Disc (Wearing parts)
- 155. Spacer ring (Wearing parts)
- 156. Coupling rubber (Wearing parts)
- 157. Lock ring (Wearing parts)
- 200. Housing cover A
- 209. Housing cover B
- 210. Impeller B
- 212. Blower housing
- 241. Fan hub

Medical Dynamic Vacuum

6.2 Replacement Parts – 25 hp



6.2 Replacement Parts – 25 hp

General Assembly:

1. 25 horsepower model
2. Connection position with 90°
10. Threaded Pin
11. Disc
12. Hexhead Screw
15. Manifold
16. Gasket (Seals)
17. O-Ring (Seals)
18. Connection pipe
19. Connection piece
20. Lifting eye
21. End Cap
22. Foot
23. Rubber foot

Connection Pieces on the Vacuum side:

30. Filter housing
31. Gasket (Seals)
32. Intermediate plate
34. Filter cartridge (Wearing parts)
35. Gasket (Seals)
36. Filter cover
37. Gasket (Seals)
38. Threaded pin
39. Filter knob
40. Reducer
41. Vacuum regulating valve coupling
42. Barrel nipple
43. Silencer

Connection Pieces on the Pressure side:

46. Lock plug
47. Sealing ring (Seals)
52. Connection housing
55. Silencer

Cover cap:

60. Conduit bottom
61. Gasket (Seals)
62. Rubber foot
63. Threaded pin
64. Side part left
65. Side part right
66. Conduit cap
67. Acoustic plate
68. Front part (A side)
69. Front part (B side)
71. Cover cap
73. Touch protection

Vacuum Gauge:

76. Vacuum gauge
77. Flexible pipe
78. Fitting
79. Passage
81. Fitting

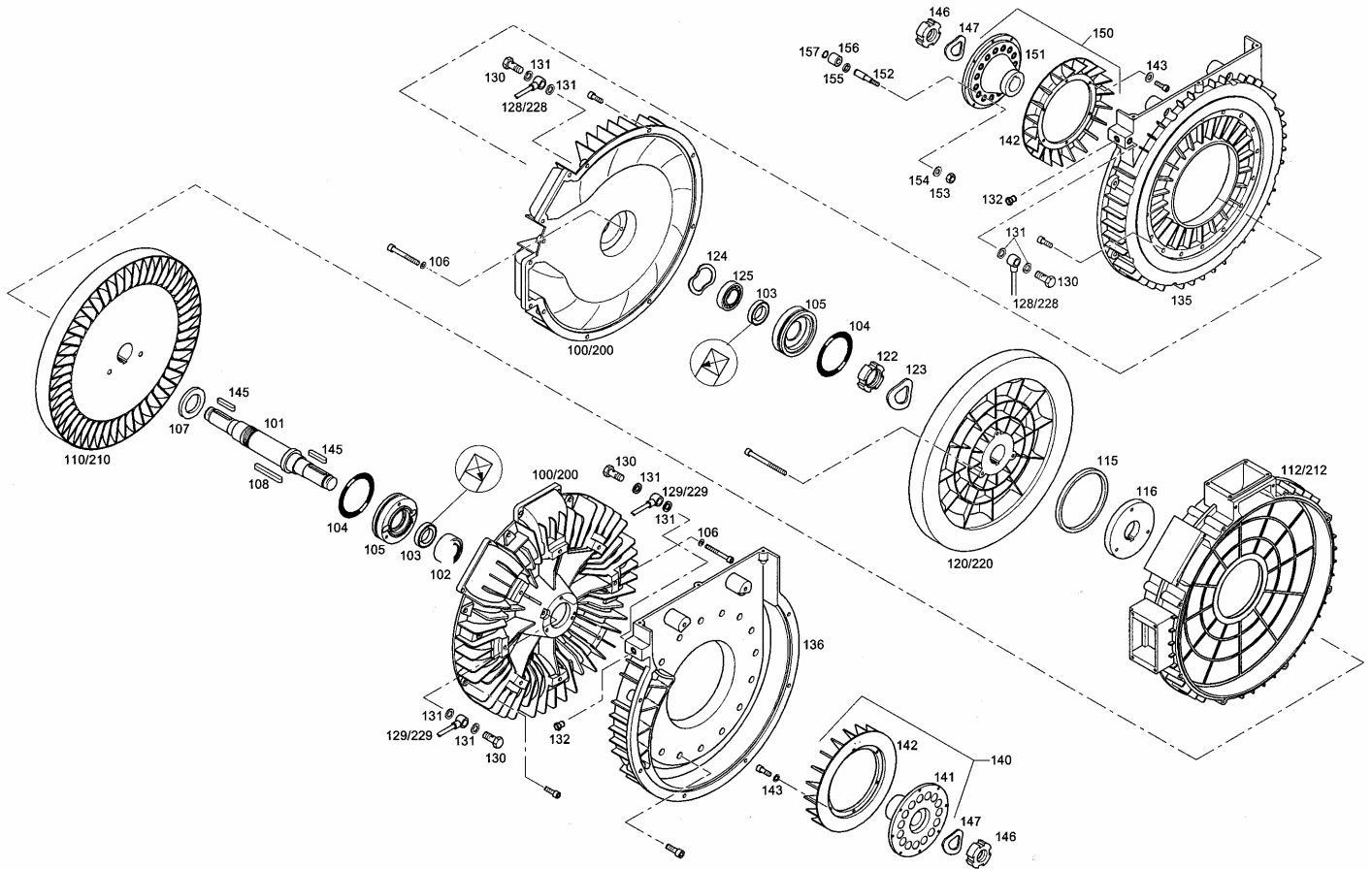
Drive:

85. Motor flange cover
86. Motor
87. Coupling half driving
88. Threaded pin
89. Foot
23. Rubber foot

Labels:

95. Data Plate
96. Directional arrow
97. Greasing Label

6.2 Replacement Parts – 25 hp



6.2 Replacement Parts - 25 hp

General Assembly:

- 100. Housing cover A
- 101. Blower shaft
- 102. Angular ball bearing (Wearing parts)
- 103. Shaft seal (Seals)
- 104. O-Ring (Seals)
- 105. Bearing cover
- 106. Sealing ring
- 107. Spacer shim
- 108. Key
- 110. Impeller B
- 112. Blower housing
- 115. Sealing ring
- 116. Spacer ring
- 120. Impeller A
- 122. Shaft nut
- 123. Spring shim
- 124. Ball bearing shim (Wearing parts)
- 125. Deep groove ball bearing (Wearing parts)
- 128. Lubrication pipe A
- 129. Lubrication pipe B
- 130. Banjo bolt
- 131. Sealing ring (Seals)
- 132. Grease nipple
- 135. Connection cover A
- 136. Connection cover B
- 140. Coupling hub driving complete (141-143)
- 141. Coupling hub
- 142. Cooling fan
- 143. Spring ring
- 145. Key
- 146. Shaft nut
- 147. Spring shim
- 150. Coupling hub driven coupling (142, 143, 151-157)
- 151. Coupling hub
- 152. Coupling bolt (Wearing parts)
- 153. Hex head screw (Wearing parts)
- 154. Disc (Wearing parts)
- 155. Spacer ring (Wearing parts)
- 156. Coupling rubber (Wearing parts)
- 157. Lock ring (Wearing parts)

APPENDIX A - ENGINEERING DIAGRAMS

Lifeline Medical Vacuum Unit	General Assembly Appendix A.1	Installation Appendix A.2
Duplex Module 10 - 15 hp	DIA 04 516	DIA 07 233
Triplex Modular System 10 - 15 hp	DIA 04 517	DIA 07 234
Quad Modular System 10 - 15	DIA 04 518	DIA 07 235
Duplex SPC/Common Base System 10 - 15 hp	DIA 04 522	DIA 07 236
Duplex SPC/Common Base System 25 hp	DIA 04 513	DIA 07 230
Triplex SPC/Common Base System 10 - 15 hp	DIA 04 523	DIA 07 237
Triplex SPC/Common Base 25 hp	DIA 04 514	DIA 07 231
Quad SPC/Common Base 10 - 15 hp	DIA 04 524	DIA 07 238
Quad SPC/Common Base 25 hp	DIA 04 515	DIA 07 232

APPENDIX A.1 - GENERAL ASSEMBLY

APPENDIX A.2 - INSTALLATION
