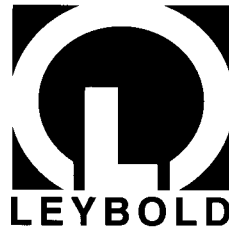


Vacuum Solutions

Application Support

Service



LEYBOLD
VACUUM PRODUCTS INC.

GA01.415/2.02



DRYVAC® B

25B, 50B, 100B

Catalog Numbers:
138 00/30/60/62

Operating Instructions

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Note:

References to illustrations consist of (figure number/item number). For example, (1/2) refers to Figure 1, Item 2.

Safety Information

Hazard analyses per European standard EN 1012 were conducted for the DRYVAC₂® 25, 50 and 100 B pumps. Every person involved with connecting, operating or maintaining these pumps shall have read and understood this DRYVAC₂ operating instruction manual in order to avoid hazards and operating malfunctions.

DRYVAC₂ B pumps are designed to pump down vacuum chambers to pressure values in the rough and fine vacuum ranges, and are intended for industrial use.

Precautionary notes in these instructions:

Warning – This indicates procedures and operations which must be strictly observed to prevent hazards to persons.

Caution – This indicates procedures and operations which must be strictly observed to prevent damage or destruction of the pump.

Media compatibility

The DRYVAC₂ B models are authorized for clean particle-free applications.

Warning



The DRYVAC₂ B models do not have a purge system to dilute process gases; thus, they are not suitable for pumping hazardous gases or vapors including the following:

- ignitable and explosive gases or vapors,
- oxidants, or
- pyrophoric gases.

Electrical Safety

Warning



Disconnect the pump from the main power supply before beginning any assembly or disassembly work. Take measures to ensure that the pump cannot be started. The electrical connections shall be made only by a qualified and licensed electrician, in accordance with local codes.

Mechanical Safety

Warning



Do not expose any parts of the body to the vacuum. In particular do not operate the pump with flanges open, or loosen any flange, oil filling or drain screws when a vacuum is present, even if the pump is switched off.

Remove the cover panels only when the pump is switched off.

Do not remove the pump or perform any maintenance work before it has been vented and has come to a complete stop.

Returning Equipment

Complete the form at the back of this manual before returning equipment to Leybold for service. This form notifies us of any toxic or other harmful products (as defined by the applicable regulations such as the Common Market Guideline L360, 1976/1979 or VBG 16) that may exist in or near the equipment. Attach the form to the pump or enclose it with the pump. This statement detailing the contamination is required to satisfy legal requirement and to protect our employees.

1 Description

1.1 Design and Function

The DRYVAC₂ B models are dry-compression vacuum pumps for pumping clean gases. They are not suitable for pumping gases containing dust or aggressive or corrosive media. Refer to Section 1.4 for technical data.

Pump operating principle

DRYVAC₂s are four-stage hook-and-claw vacuum pumps. Figure 1 illustrates the DRYVAC₂'s operating principle.

The two rotors (1/1) turn in opposite directions inside the pumping chamber. As they rotate, they open and close the intake (1/5) and outlet (1/4) slots with each cycle.

The pumping chamber is divided by the rotors. Gas is drawn in on the one side of the rotors and compressed on the other side.

The top sketch shows the beginning of the suction and compression cycle. As the rotors rotate, the sealed space above the rotors (1/2) is reduced in size and the gas is compressed. At the same time, the right rotor begins opening the inlet slot and gas is drawn into the pumping chamber below the rotors.

In the center sketch, the left rotor is starting to open the outlet slot, and compressed gas is being discharged from the pumping chamber.

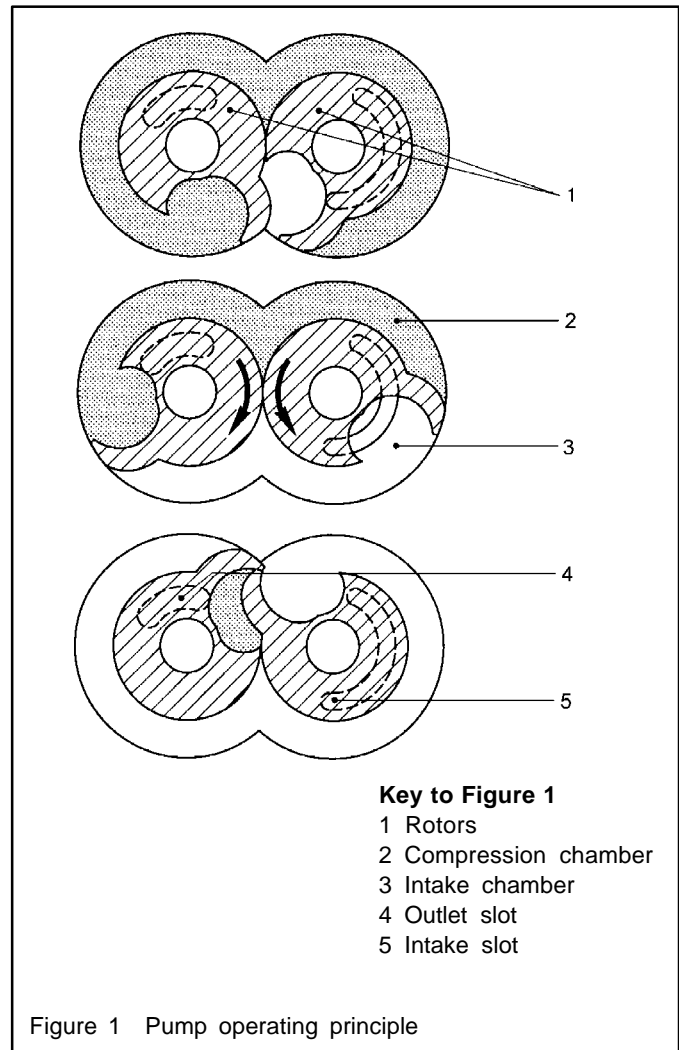
In the bottom sketch, the cycle has been completed and the inlet and outlet slots are closed. Once the rotors have passed through the neutral position, the cycle starts again.

Design

There are four pumping stages (2/2) located one above the other. The stages are pinned together.

The gas enters the pump through the intake port, is pumped through four pump stages, flows through an exhaust silencer (2/1) into the exhaust.

The rotors are driven by two vertical shafts connected to the motor (2/3) and synchronized by gears.

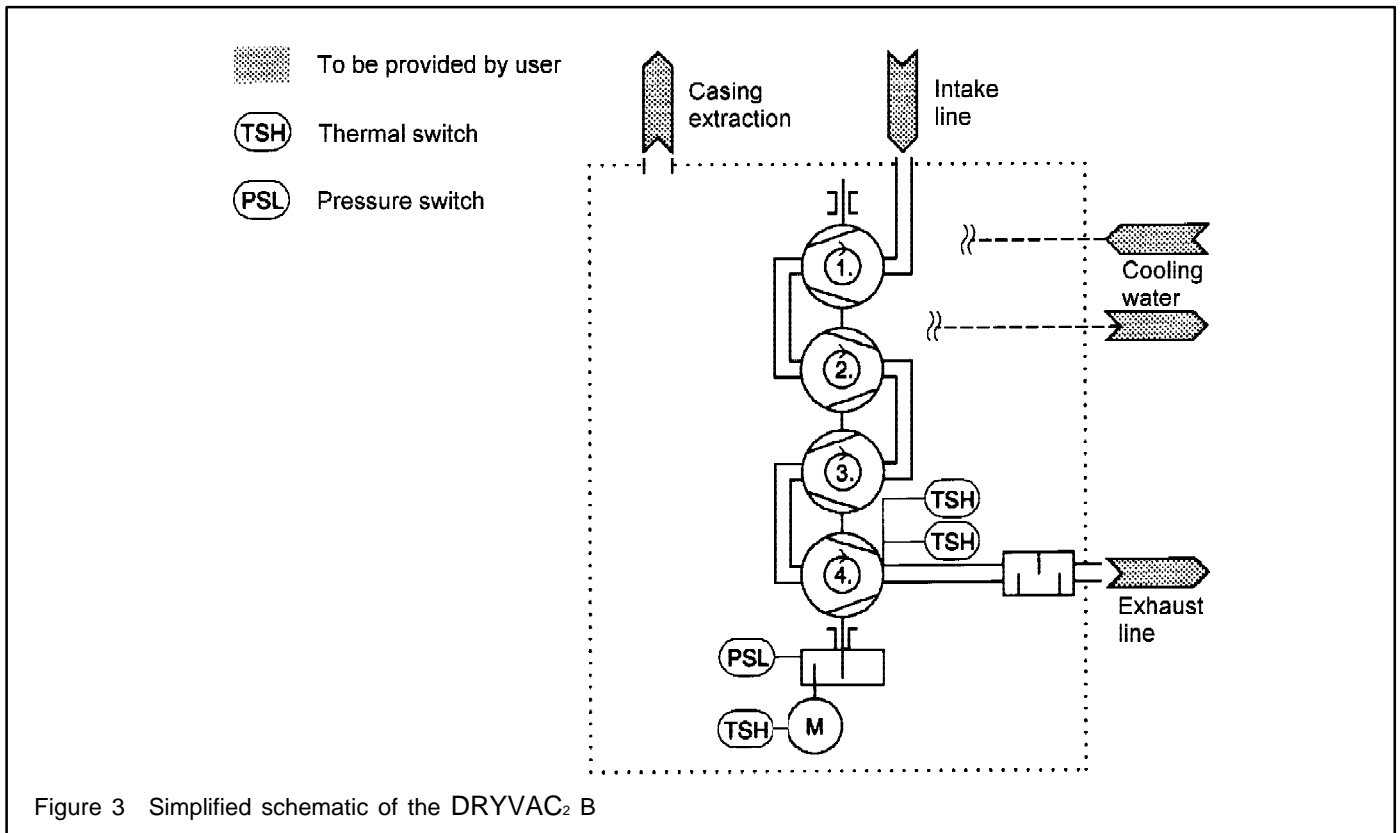
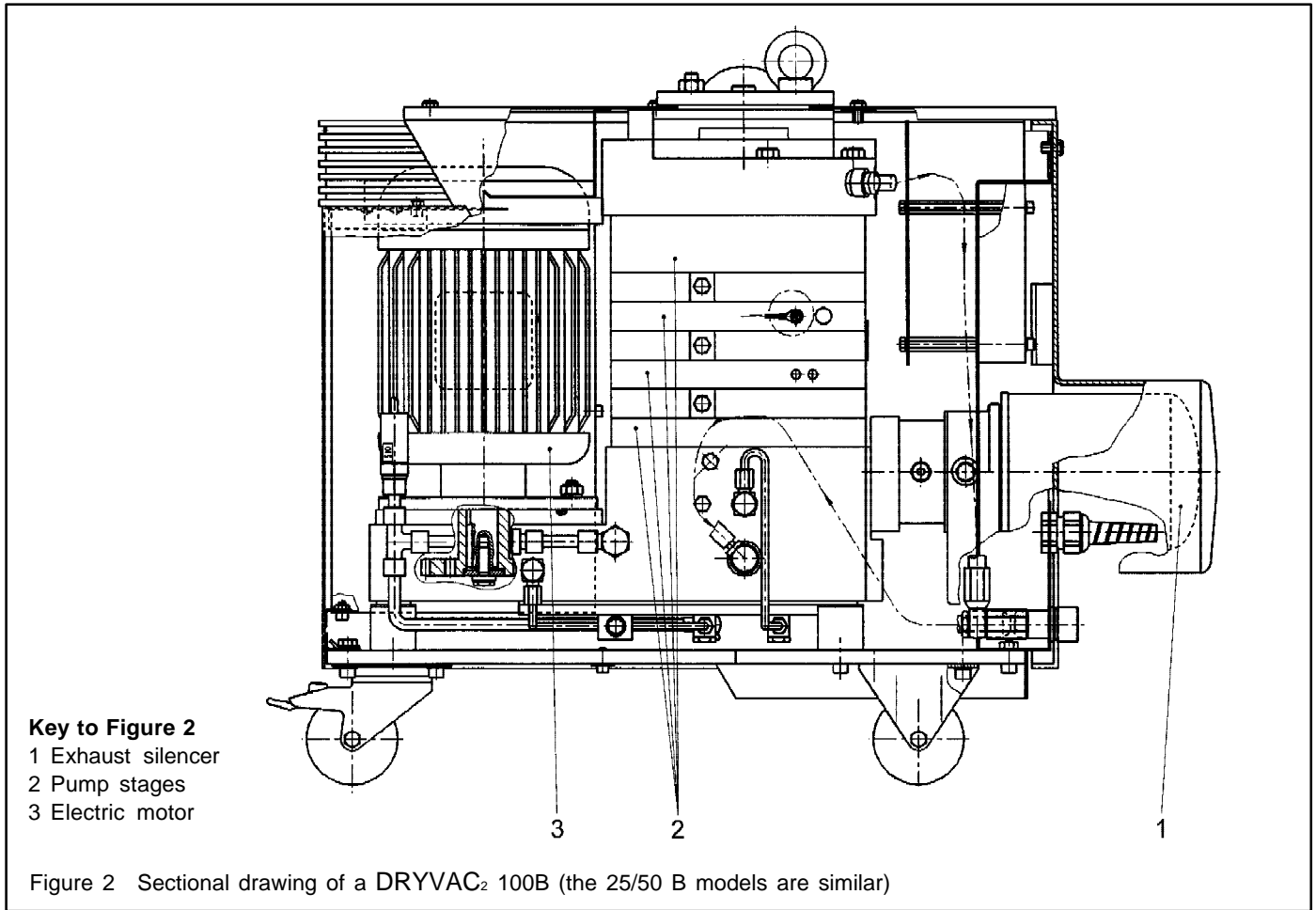


The pumping chamber is free of sealants and lubricants; however, PFPE (perfluoropolyether) is used to lubricate the gearing and the lower bearings. The upper bearings are PFPE-grease lubricated.

Piston rings are used to seal each shaft where it passes through the stages. The gear box is isolated from the pumping chamber by piston rings and radial shaft seals. The upper bearings are isolated by shaft seals.

The bearings and seals are mounted in the water-cooled upper and lower end plates. The supply of cooling water is limited by an orifice in the water-in port. The pump stages are air cooled.

The pump is fully enclosed by panels, which can easily be removed for maintenance purposes. An air outlet for cabinet ventilation is on the top of the DRYVAC₂.



Electrical Equipment

The electrical equipment of the DRYVAC₂ B includes an oil-pressure switch, and three thermal switches. These devices are normally connected to the plant's control equipment for the purpose of controlling the pump.

The DRYVAC₂ B is equipped with two thermal switches that monitor pump temperature. The first switch warns of an abnormally high temperature, while the second switch signals that the temperature is too high for continued pump operation.

A third thermal switch monitors the pump's motor temperature, and opens if the motor temperature exceeds 160 °C (320 °F).

A switch in the gear box monitors the oil pressure. The signal from this switch can be processed in your plant control to indicate whether or not the pump is running. The oil-pressure switch opens when the oil pressure in the gear box is <1.5 bar (7 psig).

The switch connections are brought together on sub-D connector X18 on the back of the housing. Sub-D connector X19 is not wired.

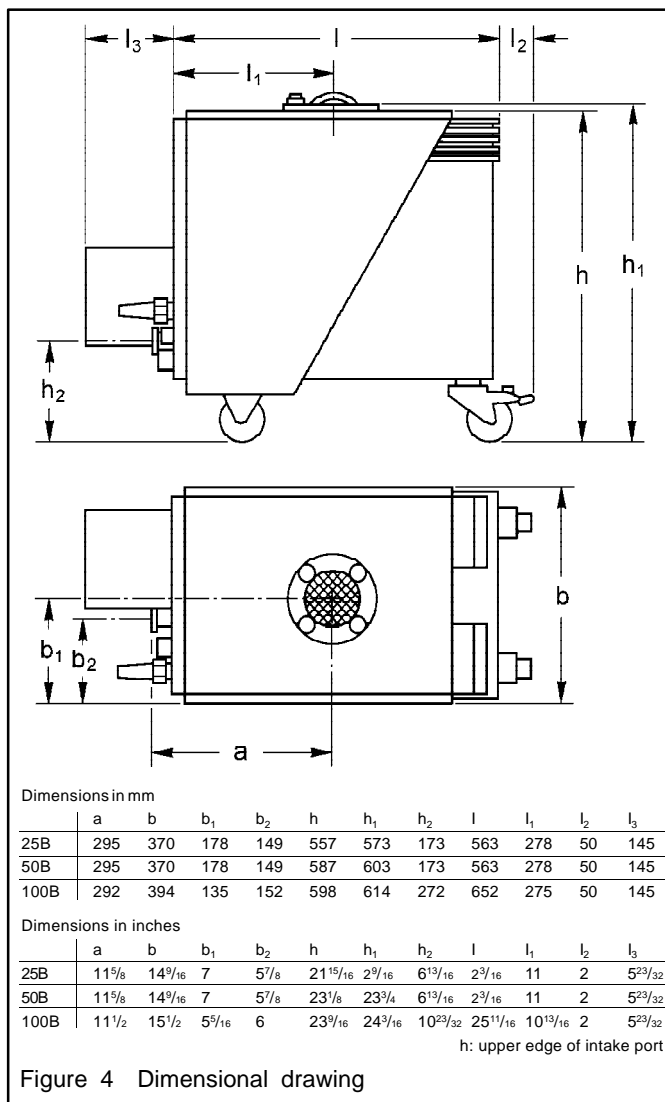


Figure 4 Dimensional drawing

1.2 Standard Equipment

The DRYVAC₂ B is delivered ready for operation with its gear box filled with PFPE (perfluoropolyether) lubricant.

A sealing disk with dirt trap and a union flange are attached to the intake port.

The intake and exhaust ports, and the water inlet and outlet fittings are sealed for shipping.

The pump is shipped with the following:

- A 2-meter (6.5-foot) main power cable with plug.
- An Allen key for removing or installing the exhaust silencer.

1.3 Ordering Data

	Catalog No.
DRYVAC ₂ 25 B	138 00
DRYVAC ₂ 50 B	138 30
DRYVAC ₂ 100 B with 3-phase motor	
200–208-240/400-480 V*, 60 Hz, 3 phase ...	138 62
200/400 V*, 50 Hz, 3 phase	138 60
Repair kit:	
DRYVAC ₂ 25/50 B	899551
DRYVAC ₂ 100 B	899554
Exhaust silencer SD 25-501	137 50
Dry canister for shipping and storage	200 78 563

*All voltage ±10% from value listed.

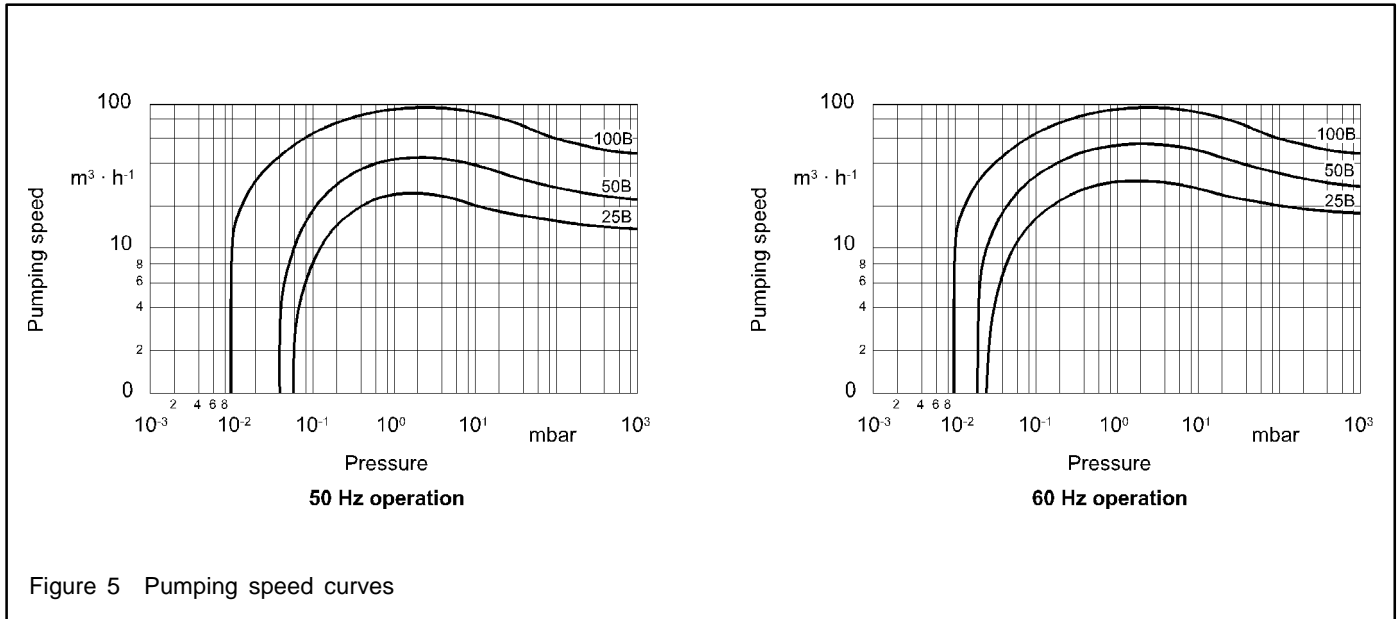


Figure 5 Pumping speed curves

1.4 Technical Data

	DRYVAC ₂ 25B	50B	100B
Pumping Speed			
50 Hz operation	25 m ³ · h ⁻¹ (14.7 cfm)	45 m ³ · h ⁻¹ (26.5 cfm)	100 m ³ · h ⁻¹ (59 cfm)
60 Hz operation	30 m ³ · h ⁻¹ (17.7 cfm)	55 m ³ · h ⁻¹ (32.4 cfm)	100 m ³ · h ⁻¹ (59 cfm)
Ultimate pressure*			
50 Hz operation	6 · 10 ⁻² mbar (4.5 × 10 ⁻² Torr)	4 · 10 ⁻² mbar (3 × 10 ⁻² Torr)	1 · 10 ⁻² mbar (0.8 × 10 ⁻² Torr)
60 Hz operation	3 · 10 ⁻² mbar (2.3 × 10 ⁻² Torr)	2 · 10 ⁻² mbar (1.5 × 10 ⁻² Torr)	1 · 10 ⁻² mbar (0.8 × 10 ⁻² Torr)
Maximum intake pressure			
in continuous operation	1000 mbar (750 Torr)	300 mbar (25 Torr)	150 mbar (112 Torr)
Motor power	2.8 kW (4 hp)	2.8 kW (4 hp)	4.0 kW (5.4 hp)
Rotational speed of pump			
50 Hz operation	3000 rpm	3000 rpm	3000 rpm
60 Hz operation	3600 rpm	3600 rpm	3000 rpm
Noise level with the exhaust			
line connected	60 dB(A)	64 dB(A)	68 dB(A)
Cooling water requirements (approx.) at 5 bar (60 psig) water pressure and 15°C (59°F)			
water temperature	70 l · hr ⁻¹ (18.5 gal/hr)	180 l · hr ⁻¹ (48 gal/hr)	180 l · hr ⁻¹ (48 gal/hr)
Maximum cooling water temp.	25 °C (77 °F)	25 °C (77 °F)	25 °C (77 °F)
Cooling water pressure*	2 – 10 bar (14 – 130 psig)	2 – 10 bar (14 – 130 psig)	2 – 10 bar (14 – 130 psig)
Cooling water connection, female threads	NPT ½"	NPT ½"	NPT ½"
Lubricant quantity in gear box	0.75 l (0.8 qt)	0.75 l (0.8 qt)	0.8 l (0.85 qt)
Maximum ambient temperature	40 °C (104 °F)	40 °C (104 °F)	40 °C (104 °F)
Weight	160 kg (353 lbs)	170 kg (375 lbs)	200 kg (441 lbs)
Intake port	DN 63 ISO-K	DN 63 ISO-K	DN 63 ISO-K
Exhaust port	DN 25 KF	DN 25 KF	DN 40 KF

*All pressures given in bar or mbar are absolute values.

2 Installation

2.1 Setting up the Pump

Eyebolts are provided for lifting and moving the pump. Do not tip or turn the pump during movement. Do not stand beneath the suspended pump during movement.

Set the pump on a flat even surface in a dry location. Lock the casters after the pump is in place.

The pump is of safety class IP 20. Protect the pump against dripping and splashed water.

The ambient temperature must not exceed 40°C (104°F). Do not obstruct the ventilation grids. If installing the pump in an enclosed cabinet or system, ensure that sufficient ventilation is available.

2.2 Electrical Connections

Warning



Electrical connections should be made only by a qualified and licensed electrician, in accordance with local codes. Disconnect the pump from all voltages before beginning any assembly or disassembly work. Take measures to ensure that the pump cannot be started.

2.2.1 Connecting the Switches

The DRYVAC₂ B has four switches; the switch connections are brought together in a sub-D connector (X18) at the back housing panel. The contacts open in response to excessive temperature or insufficient oil pressure.

Connect the switches to the plant control as shown in Figure 6.

The voltage source for the control circuits must be provided from the secondary windings of an isolation transformer or from some other isolated source. In addition, ensure that the control voltage applied to X18 does not exceed 24 V (AC or DC), and that the contact load of each switch does not exceed 24 V AC/DC, 250 mA.

The DRYVAC₂'s input and output signals must be positively isolated from potentially hazardous voltages in down-line processing. This isolation shall be effective even if there is a defect in the electrical system.

Caution Do not connect equipment to terminals other the ones listed in the following instructions.

Failure to connect the switches as described may result in major damage to the pump, and lead to a loss of warranty.

Connect the switches to the plant control equipment as described below.

Connect a **control voltage** of 24 V (max.) AC or DC to connector X18, pin 6. This control voltage is applied to the contacts of all switches for the purpose of indicating whether a switch is opened or closed.

Connect the **oil-pressure switch** so that the pump will switch off when its contact opens (connector X18, pin 8). The switch opens when the oil pressure is <1.5 bar (7 psig), indicating that the pump isn't operating or that the oil level is very low. Note that it is also open for 3 seconds during start-up, until the oil pressure increases. Bridge this switch for 3 seconds to allow the oil pressure to build during start-up.

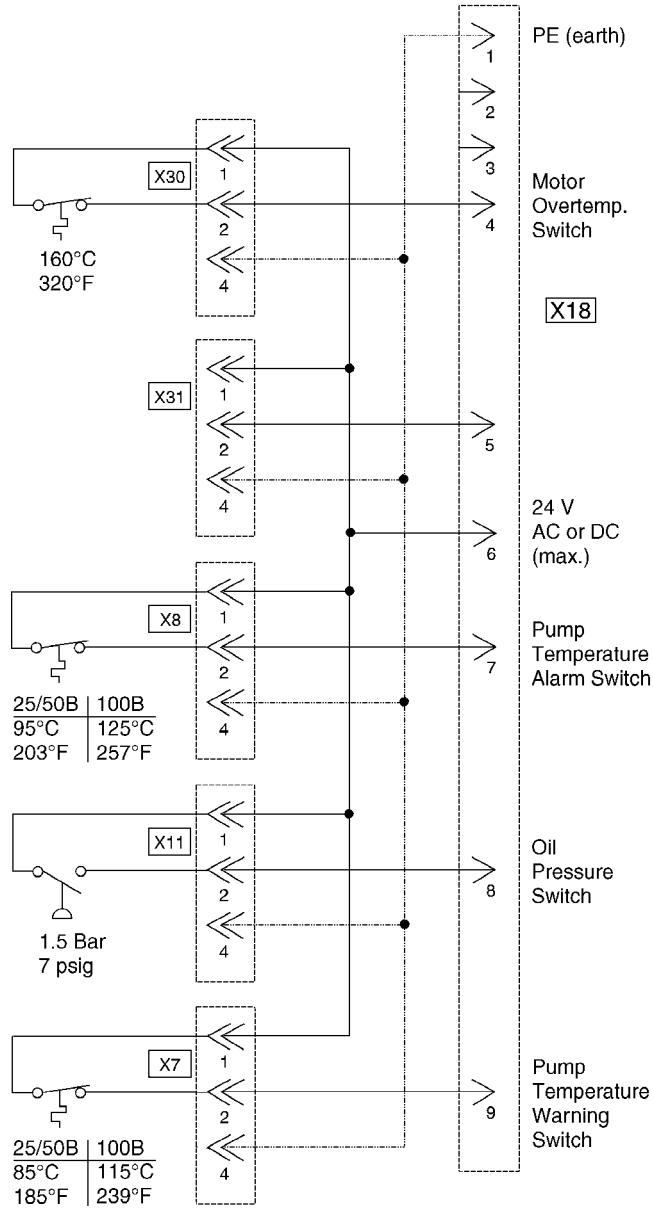
Caution Don't bridge the oil-pressure switch for more than 3 seconds. If this switch is bridged for >3 seconds and the rotation direction is wrong during start-up, the pump will be damaged from insufficient lubrication.

Connect the **“Warning” thermal switch** so that it activates a warning annunciator (such as a light, horn, bell, or buzzer) when its contact opens (connector X18, pin 9). The switch opens to alert you that the pump is approaching a critical state. You can, however, continue to operate the pump after the “warning” thermal switch opens.

Connect the **“Alarm” thermal switch** so that the pump shuts down when its contact opens (connector X18, pin 7). Failure to shutdown the pump when this switch opens results in major damage to the pump.

Connect the **motor overtemperature switch** so that the pump shuts down when its contact opens (connector X18, pin 4). Failure to shutdown the pump when this switch opens results in major damage to the motor.

Note: Sub-D connector X18 is located on the rear panel (see Figure 9)



Maximum contact rating for each switch:
 250 mA
 6W/6VA
 24 V AC/DC

Figure 6 DRYVAC₂ 25/50/100 B Switch Connections

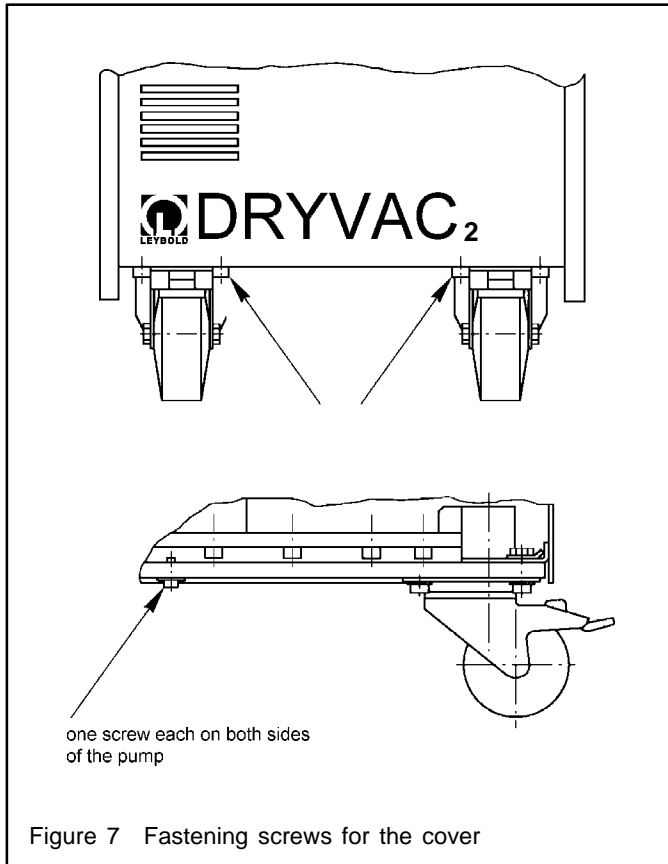


Figure 7 Fastening screws for the cover

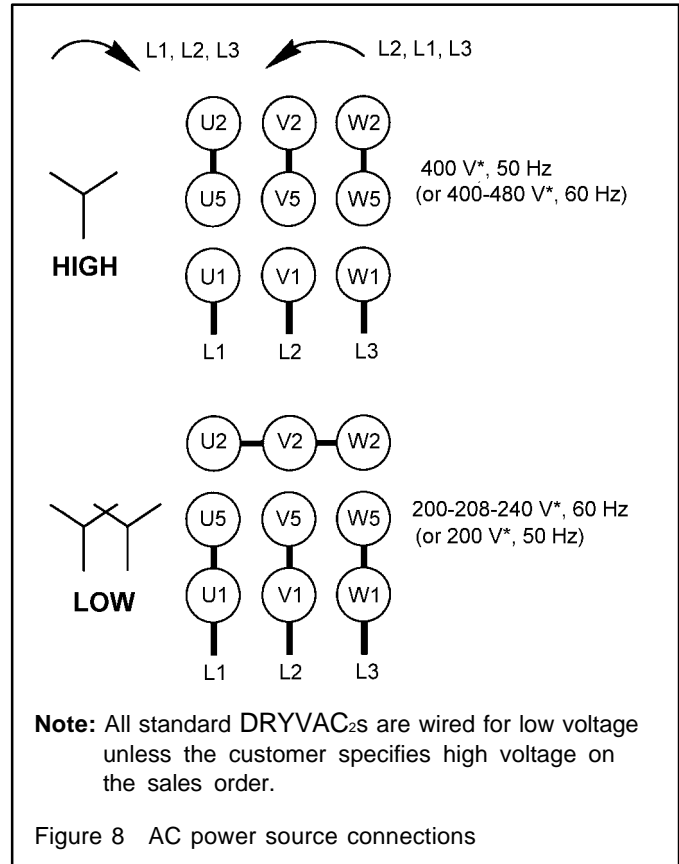


Figure 8 AC power source connections

2.2.2 AC Power Source

The DRYVAC₂ is supplied with a 2-meter (6.5 ft) power cable (3-phase + ground).

The following are the standard pump voltages and frequencies. Note that all standard DRYVAC₂s are wired for low voltage, unless the customer specifies high voltage on the sales order.

Catalog No.	Voltage, Frequency
25 B: 138 00	200-208-240/400-480 V*, 60 Hz
	200/400 V*, 50 Hz
50 B: 138 30	200-208-240/400-480 V*, 60 Hz
	200/400 V*, 50 Hz
100 B: 138 62	200-208-240/400-480 V*, 60 Hz
138 60	200/400 V*, 50 Hz

If necessary, change the pump's terminal connections in the motor junction box to match the applied AC line voltage as follows:

1. Access the motor junction box by first removing the four screws (Figure 7) on the base of the pump, and then removing the front panel.

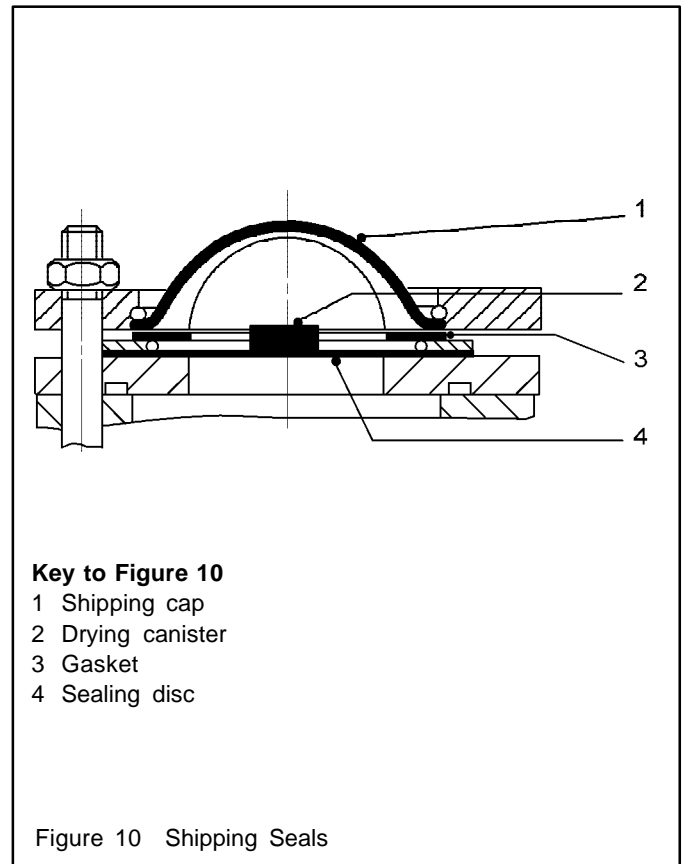
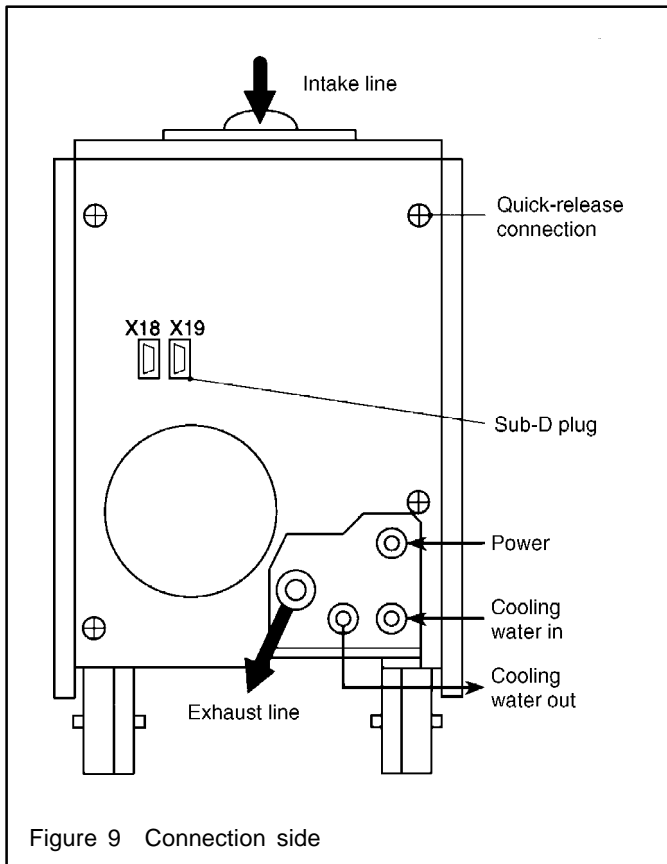
2. Change the connections on the terminals (Figure 8) to match the applied AC line voltage and frequency.

3. Replace the front panel.

Connect the pump's AC line cord to its rated AC voltage and frequency through a suitable circuit breaker (see the DRYVAC₂ nameplate). Don't turn ON the breaker until all electrical and vacuum connections have been made.

DRYVAC ₂	Main power	Full load current
25 B	3 Ph AC 200 V*, 50 Hz	11 A
	3 Ph AC 200-208-240 V*, 60 Hz	11 A
	3 Ph AC 400 V*, 50 Hz	5.5 A
	3 Ph AC 400-480 V*, 60 Hz	5.5 A
50 B	3 Ph AC 200 V*, 50 Hz	11 A
	3 Ph AC 200-208-240 V*, 60 Hz	11 A
	3 Ph AC 400 V*, 50 Hz	5.5 A
	3 Ph AC 400-480 V*, 60 Hz	5.5 A
100 B	3 Ph AC 200 V*, 50 Hz	15 A
	3 Ph AC 200-208-240 V*, 60 Hz	15 A
	3 Ph AC 400 V*, 50 Hz	7.5 A
	3 Ph AC 400-480 V*, 60 Hz	7.5 A

*All voltage ±10% from value listed.



2.3 Connecting the Cooling Water

The cooling water should have the following properties:

pH.....	7.0 to 8.5
Chloride (Cl ⁻)	≤ 75 mg/l = 2.1 mmol/l
Sulfate (SO ₄ ⁻²)	≤ 70 mg/l = 0.7 mmol/l
Calcium ions	> 1.0 mmol/l = 100 ppm
	≤ 2.7 mmol/l = 268 ppm
Hydrogencarbonate hardness	125 – 179 ppm

Significant deviations from the recommended values may result in premature corrosion or deposits.

Connect the cooling water lines. Ensure that your water supply line is connected to the DRYVAC₂ water inlet and your drain line is connected to the DRYVAC₂ water outlet (see Figure 9).

Caution **Operation without cooling water will damage the pump.**

Note: Special modifications may be required when using deionized (DI) water. Consult your Leybold sales or service representative for information.

Note: If you will be using a closed-loop cooling system, flush out the DRYVAC₂'s cooling water to remove any residual rust before connecting the pump to your cooling system; also add a rust inhibitor to the cooling water.

2.4 Checking the Direction of Rotation

Caution **Don't remove the shipping seals until you are ready to install the pump. The pump's interior must be protected against humidity for as long as possible.**

Check the direction of rotation as follows:

1. Remove the shipping seals from the intake port (see Figure 10) and ensure that the pump's intake and exhaust ports are open. Save the shipping seals for future use.

2. Loosen the four ¼-turn retaining clips, and remove the front top half of the housing.
3. **Briefly** switch ON the pump and check the direction of rotation of the motor fan; then, immediately turn OFF the pump. The motor fan should rotate counterclockwise.

If the pump rotated in the wrong direction, first ensure that the incoming power to the pump is OFF, and then interchange two of the input leads at the power source.

4. Reinstall the cover.

Warning



All housing panels and covers must be reinstalled to protect the operators against contact with the hot pump.

If the oil-pressure switch is connected correctly as described in Section 2.2.1, the pump will switch off after 3 seconds if its rotation direction is wrong. The pump will be damaged if it rotates in the wrong direction for longer than 3 seconds.

2.5 Connecting the Intake Line

The intake line should have the same or larger diameter than the DRYVAC₂ intake flange. The line must be clean and oil-free.

We recommend installing a valve between the pump and the vacuum chamber.

A RUVAC WS 151 or WS 251 roots pump can be connected directly to the intake port of a DRYVAC₂ 25B. A RUVAC WS 251 or WS 501 can be connected directly to the intake port of a DRYVAC₂ 50B or 100B.

Connect the intake line to the intake port; use bellows to eliminate tension in the line.

Always install the supplied dirt trap in the intake flange to prevent dirt from entering the pump from the vacuum chamber or from the piping.

2.6 Connecting the Exhaust Line

Connect the exhaust line; use bellows to eliminate tension in the line.

The exhaust line should have the same or larger diameter than the DRYVAC₂ exhaust flange.

Avoid connecting the DRYVAC₂ together with oil-sealed pumps to one central exhaust system. Using a common exhaust line could result in condensate backstreaming into the DRYVAC₂ or in dust adhering in the exhaust line.

Special modifications may be necessary to eliminate noise and vibration when connecting several exhaust lines to a single plenum. Consult your Leybold sales or service representative.

The outlet for the ventilation air is on the top of the DRYVAC₂; if necessary, you can place an exhaust hood over the pump for certain clean-room applications.

3 Operation

3.1 Start-up and Operation

Open the cooling water supply.

Switch ON the pump.

If the motor's circuit breaker trips when evacuating a large vacuum chamber, preevacuate the chamber with a small-diameter line (soft pump line).

3.2 Shutdown

We recommend that you operate the DRYVAC₂ continuously. Allow it to continue operating overnight with its inlet closed to avoid corrosion during idle periods.

To shutdown, close the valve to the vacuum chamber and allow the pump to run for an additional 15 minutes. Then switch OFF the pump and close the water supply.

Warning



During operation, the pump's temperature can exceed 100°C (212°F). Always allow the pump to cool down before removing it from the system or before opening its housing.

If the DRYVAC₂ will be shutdown for an extended period, seal its intake and exhaust ports, and purge it with inert gas at a pressure of 1,000 mbar (760 Torr).

Refer Section 3.3 if the DRYVAC₂ will be disconnected from the system.

3.3 Storing and Shipping

Shutdown the pump as described in Section 3.2.

Warning



During operation, the pump's temperature can exceed 100°C (212°F). Always allow the pump to cool down before removing it from the system or before opening its housing.

Place drying canisters onto the pump's inlet to protect the pump's interior from moisture. Then, seal the DRYVAC₂'s intake and exhaust ports. You can reuse the shipping seals that were originally on the pump (see Figure 10); but you must use new drying canisters (P/N 200-78-563).

Caution

Always drain the cooling water before storing or shipping the pump. Failure to drain the water can result in the water freezing and bursting the pump housing.

Draining Water From the DRYVAC₂ 100B

1. Turn off the water supply.
2. Disconnect the cooling water hoses and drain the water.
3. Blow compressed air through the DRYVAC₂'s water out port to remove as much of the residual water as possible.

Draining Water From the DRYVAC₂ 25B and 50B

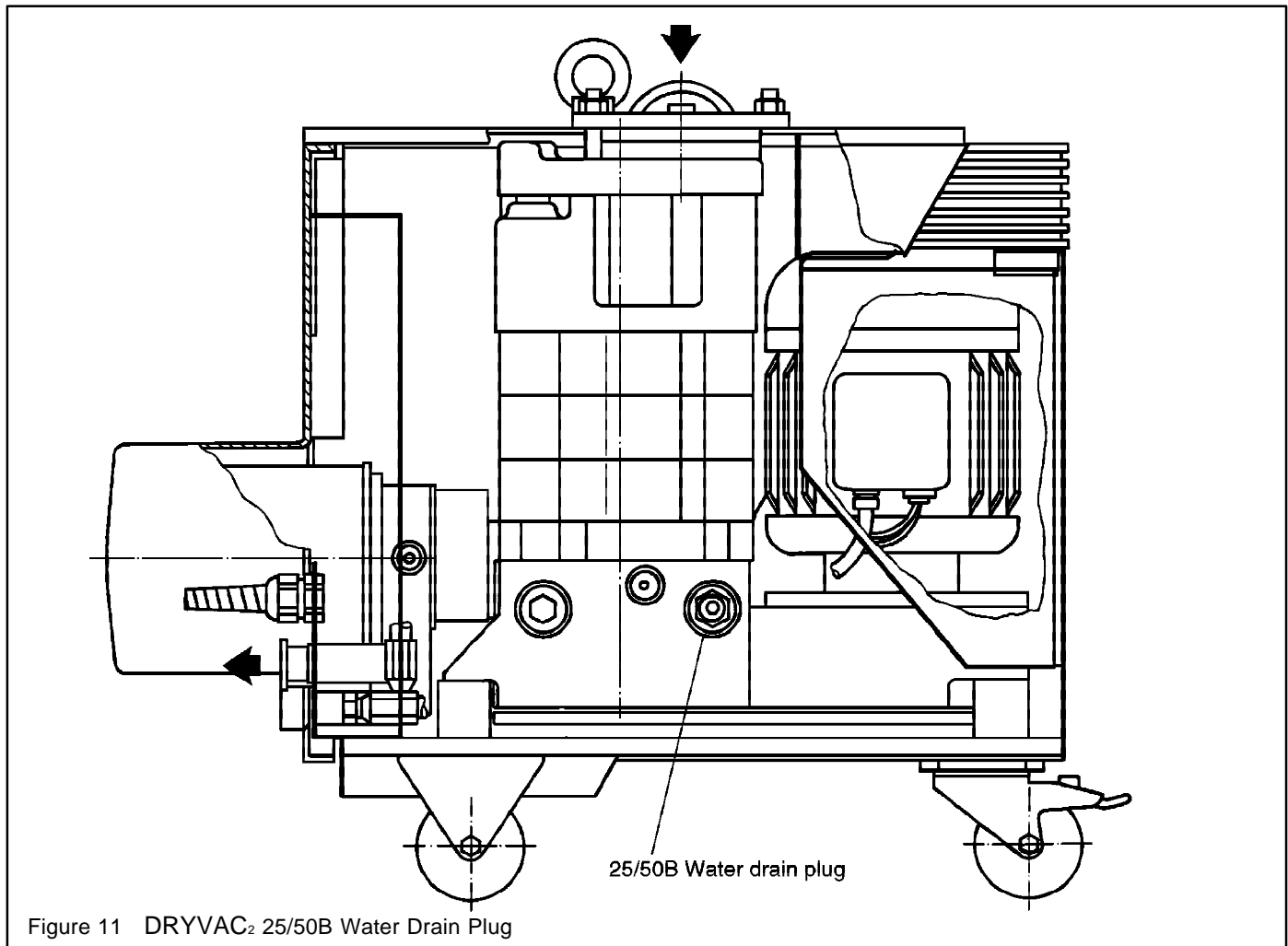


Figure 11 DRYVAC₂ 25/50B Water Drain Plug

1. Turn off the water supply.
2. Open all necessary ¼-turn retaining clips and take off the rear panel and the top covers.
3. Unscrew the hex socket screws at the bottom of the left-side panel and remove the panel.
4. Disconnect the cooling water hoses; remove the M12x1.5 plug screw (see Figure 11); and let the water drain out. Blow compressed air through the DRYVAC₂'s water out port to remove as much of the residual water as possible.
5. Reinstall the plug screw, the side panel, the top covers, and the rear panel.

Service by Leybold

If you ship a pump to Leybold, be sure to indicate whether the pump is free of substances that could be hazardous to health or if it is contaminated. If it is contaminated, indicate the nature of the hazard.

You must complete the form at the back of this manual before sending any equipment to Leybold. Attach the form to the pump or enclose it with the pump. This statement detailing the contamination is required to satisfy legal requirement and to protect our employees.

Leybold will return to the sender any pumps that are not accompanied by a contamination statement.

Pack the pump so that it cannot be damaged during shipping. The pump must also be shipped either in a gas tight container or sealed in plastic so that no contaminants can escape from the packaging.

4 Maintenance

4.1 Routine Maintenance

The DRYVAC₂ may require rebuilding periodically depending on your application and your production cycle. In some installations, the rebuild interval may vary from 12 to 24 months. If you seldom need to clean the inlet and exhaust lines, then the rebuild interval could be longer. **Contact your Leybold service center for recommendations on rebuild intervals for your particular installation.** Also ask about the service options available in your region.

All work must be done by suitably trained personnel. Maintenance or repair done by inexperienced personnel may affect the life and performance of the pump and may void the warranty.

Warning



During operation, the pump's temperature can exceed 100°C (212°F). Always allow the pump to cool down before removing it from the system or before opening its housing.

Before doing any maintenance or repair, shutdown the pump as described in Section 3.2 and disconnect it from the system.

Caution

Always drain the cooling water before storing or shipping the pump. Failure to drain the water can result in the water freezing and bursting the pump housing.

If the pump will be returned to Leybold, it must be accompanied by a listing of all hazardous substances which might be present in or around it. Complete the form at the back of this manual before sending any equipment to Leybold. Refer to Section 3.3 to prepare the pump for shipping.

5 Troubleshooting

Symptom	Possible cause	Recommended corrective action	References*
1.1 Pump does not start.	Motor circuit breaker is off.	Check setting of motor breaker. Turn ON the breaker.	2.2.2
	Error in power connection.	Check wiring and repair. Check the voltage at your AC power source.	2.2.2
	See Symptom 2, 3, or 4 below.	See notes on malfunction 2, 3, or 4.	---
	Pump has seized causing the motor circuit breaker to open at start-up.	Repair the pump.	Service
	Motor malfunction.	Repair or replace the motor.	Service
1.2 Pump runs up briefly and then shuts down.	Direction of rotation is wrong. If the oil pressure switch is connected as described in Section 2.2.1, the pump will shutdown after running in the wrong direction for 3 seconds.	Disconnect the pump from your AC power source. Interchange two of three input leads.	2.4
2. Pump temperature is too high. The "Warning" thermal switch opens to alert the operator that the pump temperature is above normal. When the "Alarm" thermal switch opens, the pump must be shut down.	Intake pressure is too high in continuous operation.	Modify the system.	1.4
	Process gas is too hot.	Modify the process.	---
	Ambient temperature is too high.	Change site or supply cooler air.	---
	Cooling air is restricted.	Clean the ventilation grids and cooling air channels. Increase the distance between the vent grids and the walls.	---
	Too much friction inside the pump.	Repair the pump.	Service
	Cooling water inlet is not open.	Open the cooling water supply.	3.1
	Cooling water pressure is too low.	Ensure sufficient supply of cooling water.	1.4
	Lime deposits in cooling water channels inside the pump. [During normal operation, the cooling water temperature will be below 50°C (120°F). At these temperatures, deposits form very slowly. Early clogging is an indication of some operational difficulty.]	Repair the pump.	Service
	Dirt deposits in the pump's cooling water channels.	Dismantle the pump and clean the cooling water channels.	Service
	Cooling water lines connected incorrectly.	Connect the cooling water lines correctly.	2.3
Switch, plug, or cord malfunction.	Replace malfunctioning part.	Service	

* This column refers to the section in the Operating instructions that contains the applicable repair information.

Symptom	Possible cause	Recommended corrective action	References*
3. Oil pressure is too low. Switch has opened.	Pump rotation direction is incorrect; see malfunction 1.2.	Disconnect the pump from the power supply. Interchange two phases at your AC power source.	2.4
	Too little lubricant in the gearbox.	Measure the lubricant level via the fill plug. The target value is 6 to 9 mm ($\frac{1}{4}$ to $\frac{3}{8}$ inch) for the 100B and 12 to 15 mm ($\frac{1}{2}$ to $\frac{5}{8}$ inch) for the 25/50B.	Service
	Oil pump malfunction.	Repair the oil pump.	Service
	Switch, plug, or cord malfunction.	Replace malfunctioning part.	Service
4. Motor temperature is too high. Switch has opened.	Intake pressure is too high in continuous operation.	Modify the system.	1.4
	Exhaust pressure is too high.	Clean or modify the exhaust line.	2.6
	Ambient temperature is too high.	Change site or supply cooler air.	---
	Cooling air is restricted.	Clean the ventilation grids and cooling air channels. Increase the distance between the vent grids and the walls.	---
	Incorrect AC power connection.	Change the connections in the motor junction box to match the AC power source.	2.2.2
	Pump contaminated by deposits.	Rebuild the pump.	Service
	Switch, plug, or cord malfunction.	Replace malfunctioning part.	Service
5. Evacuation period is too long. (Pumping speed is too low.)	Intake line is too long or too narrow.	Install a shorter or wider diameter intake line.	2.5
	Dirt trap at intake port is clogged.	Clean dirt trap.	---
	Intake line is leaking or dirty.	Seal or clean the intake line.	---
6. Pump does not reach ultimate pressure.	Unsuitable measurement procedure or measuring instrument.	Use correct measurement procedure with proper measuring instrument. Check pressure directly at pump intake port.	---
	Pump has external leak.	Find leak and repair pump.	Service
	Evaporating liquids in pump.	Measure the partial pressure of non-condensable gases. To do so, insert a cryo trap between the gauge and the intake port. If the ultimate pressure is reached using this measurement, there are liquids evaporating in the pump. A possible remedy is to allow the pump to run for half an hour without process load.	---
	Vacuum vessel is leaking or dirty.	Seal or clean vacuum vessel.	---
	Intake line is leaking or dirty.	Seal or clean the intake line.	---
7. Pump is extremely loud.	Motor bearing failure.	Replace or repair the motor.	Service
	Liquid "knocking" in pump. (Too much liquid in pump.)	Install the exhaust line with a downward slope away from the pump, or install a condensate trap.	2.6

* This column refers to the section in the Operating instructions that contains the applicable repair information.

Vacuum Solutions

Application Support

Service



LEYBOLD SEMICONDUCTOR
VACUUM SOLUTIONS

Declaration of Vacuum-Equipment Contamination

Complete this form before sending any equipment to Leybold Service for repair.

Contact the Leybold Service Center nearest you. **If you are located in the USA, you must get an RMA number.**

Telefax the completed form to the Service Center and then attach the form to the equipment.

Prepare the pump for shipping as follows:

WARNING: Always use the proper safety precautions when handling contaminated equipment. Purging the pump reduces the levels of damaging & dangerous contaminants, but doesn't eliminate the hazard.

1. **If the pump is operational**, seal its intake port and purge the pump with inert gas for at least 12 hours while it's running. Then, shutdown the pump.
If the pump is not operational, do Step 2 before purging it with inert gas for at least 12 hours.
2. Drain the oil from **oil-lubricated pumps**. To avoid exposure to contaminated oil, use a flexible drain line connected to a sealed container.
3. Disconnect any accessories.
4. Place a desiccant canister or pack onto the pump's inlet screen, and attach an air-tight seal to the intake and exhaust ports and any other openings.
5. Pack the pump in a suitable sealed shipping container.
Don't use shipping peanuts since they can't support the weight of the pump.

Condition of Equipment	Description of Vacuum Equipment
How long has pump operated?	Type/model:
What type of oil was used?	Catalog Number:
Reason for return:	Serial No. (see nameplate):
	Are partial shipments acceptable? <input type="checkbox"/> Yes; <input type="checkbox"/> No

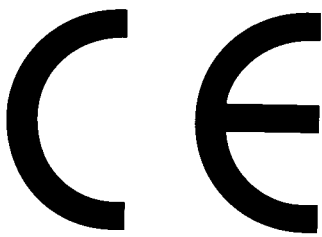
Has the equipment been exposed to the following: (Please respond to each item!)		
Safe gases only ... <input type="checkbox"/> Yes; <input type="checkbox"/> No	Flammable <input type="checkbox"/> Yes; <input type="checkbox"/> No	Equipment and components which have been contaminated by biological, explosive, or radioactive substances will not be accepted without written evidence of decontamination.
Toxic <input type="checkbox"/> Yes; <input type="checkbox"/> No	Biological hazard .. <input type="checkbox"/> Yes; <input type="checkbox"/> No	
Carcinogenic <input type="checkbox"/> Yes; <input type="checkbox"/> No	Explosive <input type="checkbox"/> Yes; <input type="checkbox"/> No	
Corrosive <input type="checkbox"/> Yes; <input type="checkbox"/> No	Radioactive <input type="checkbox"/> Yes; <input type="checkbox"/> No	
Other harmful substances <input type="checkbox"/> Yes; <input type="checkbox"/> No		

List all substances, gases, & by-products which came into contact with the equipment:		
CAS number	Product Name, Manufacturer*	Chemical name or formula
1		
2		
3		
4		

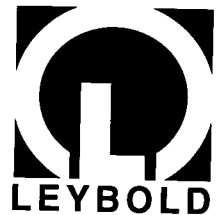
*Attach MSDS sheets or use reverse side of this form to provide details on precautions and first aid.

Customer Contact:	Phone No. () - ext:
Company:	Date:
Address:	PO Number:
	RMA Number:

Customer's Signature: _____



EC Conformance Declaration



We, Leybold Vacuum Products Inc., herewith declare that the products listed below, on the basis of their design and engineering as well as in the embodiment which we have placed on the market, comply with the applicable safety and health requirements set forth in EC guidelines.

This declaration becomes invalid if modifications are made without consultation with us.

Designation of the products:

Dry-running vacuum pump

DRYVAC®

Models:

25B; 50B; 100B

25P; 50P; 100P

50S; 100S

251SET; 501SET

and Leybold Vacuum Products Inc.
designed and modified variants.

The products comply with the following guidelines:

- EC Machinery Guidelines (89/392/EEC) in the 91/368/EEC version
- EC Low-Voltage Guidelines (73/23/EEC)
- EC Electromagnetic Compatibility (89/336/EEC)

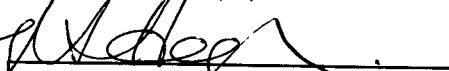
Applicable, harmonized standards:

- EN 292 Parts 1 and 2 Nov. 1991
- pr. EN 1012 Part 2 1993
- EN 60 204 1993
- EN 50082-2 Mar. 1995
 - IEC-1000-4-2 (801-2) 1994
 - IEC-1000-4-4 (801-4) 1994
 - ENV 50141 1994
 - ENV 50140 1994
 - ENV 50204 1994
- EN 55011 1991

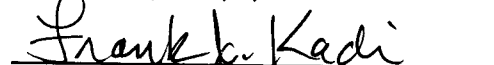
Applied national standards and technical specifications:

- DIN 31 001 April 1983

Export, PA, USA, 1, March 1996


R. T. Heglin, President

Export, PA, USA, 1, March 1996


Dr. F. Kadi, Vice President-Engineering



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