TEKEDGE

MODEL:
TEP-162BD-A2L

BULLDOG A2L/A3
VACUUM PUMP

Safety Instructions & Operation Manual

C&D

USA EST. 1967

BULLDOG A2L/A3

SPARK PROOF VACUUM PUMP

Thank you for purchasing a TEKEDGE BULLDOG A2L/A3.

The **BULLDOG A2L/A3** Vacuum pump is a two-stage vacuum pump designed for fast evacuation, deep vacuum, simplified maintenance/repair and durability. With normal use and care as prescribed in this manual your BULLDOG A2L/A3 will provide you with many years of trouble-free operation.

⚠ SAFETY FIRST

This international symbol is intended to alert the user to the presence of important operating, safety and maintenance (servicing) instructions in this Manual. As used in the manual, it is intended to draw your attention to critical items.

It is important to read this entire manual and be familiar with its contents before using the machine.

The **BULLDOG A2L/A3** must only be operated by a Qualified Technician who has been properly trained in the care and use of such equipment. Use of this equipment by unqualified personnel is potentially dangerous and should not be attempted.

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1.0 GENERAL SAFETY INSTRUCTIONS

ADDITIONAL SAFETY INSTRUCTIONS FOR REFRIGERATION SYSTEMS CONTAINING CLASS A2, A2L & A3 REFRIGERANTS:

The following are additional safety recommendations when servicing refrigeration equipment that contain Class A2L, A2 or A3 refrigerants. These instructions do not replace existing occupational hazard procedures or other regulations that may be required by local, state or federal agencies.

Technicians working on Class A2L, A2 and A3 systems should have detailed knowledge of and skills in handling flammable refrigerants, personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection and proper disposal. Additional knowledge of legislation, regulations and standards relating to flammable refrigerants may also be required. **Special Certification or licensing may be required on Class A2L, A2, and A3 and refrigerant handling. Check your local occupational safety codes.**

The area of service should be marked as **Temporary Flammable Zone**. This will be 9 foot (3 meter) perimeter around the refrigeration equipment being serviced and should have NO SMOKING and other hazardous signs posted. Local supervisor should be notified of the zone's existence.

- A flammable gas detector should be used to monitor air in the **Temporary Flammable Zone**
- A dry powder or CO^2 fire extinguisher must be available at service location
- Vacuum pump exhaust may contain harmful vapors. Provide adequate ventiliation
- A suitable ventilation fan should be used to maintain in the work space at a minimum of 5 air changeovers per hour
- Ensure the refrigeration equipment's power has been discontinued
- All potential ignition sources within temporary flammable zone must be disabled
- When connecting service equipment (such as vacuum pumps, scales, recovery units) to a power source, the connection must be made outside the **Temporary Hazardous Zone**
- Check the system to ensure the refrigerant has been properly removed from the refrigeration system being serviced
- Before evacuating a Class A2 or A3 system, the system should be purged with 100% Nitrogen. **DO NOT USE AIR**

DANGER-EXPLOSION RISK: Do not mix Class A2L, A2 or A3 refrigerants with air. All precautions must be taken to eliminate mixing of air with flammable refrigerants including monitoring Recovery Cylinder for air content.

2.0 SAFETY PRECAUTIONS

⚠ **1.1 THIS EQUIPMENT MUST ALWAYS BE OPERATED BY A QUALIFIED TECHNICIAN WHO IS FAMILIAR WITH REFRIGERANT SYSTEMS, REFRIGERANTS, REFRIGERANT SAFETY AND LOCAL REQUIREMENTS**.

⚠ **1.2 READ THIS MANUAL** and become familiar with the specifications and operation of this machine prior to use.

⚠ **1.3 WEAR APPROPRIATE SAFETY PROTECTION APPAREL** such as gloves, eye protection and foot protection when working on refrigeration systems.

⚠ **1.4 DISCONNECT POWER** before moving or servicing the **BULLDOG A2L/A3**. Improper use or connections may cause **ELECTRICAL SHOCK** hazards. Be sure that all associated devices are properly grounded before energizing circuits.

1.5 CARE MUST BE EXERCISED IF TOUCHING THE PUMP, AS CERTAIN COMPONENTS MAY BE HOT.

1.6 The exhaust gas from the vacuum pump is composed of oil and gases entering the pump. **THE EXHAUST GAS SHOULD BE WELL VENTILATED**.

1.7 NEVER OPERATE THE PUMP WITH BLOCKED OR RESTRICTED OUTLET (exhaust), the resulting backpressure may blow out the sight glass or otherwise damage the pump.

1.8 THE BULLDOG A2L/A3 HAS BEEN DESIGNED TO OPERATE MOST EFFICIENTLY ON APPROVED LOW VISCOSITY OIL (Part No. VS4014).

1.9 THE BULLDOG A2L/A3 Vacuum pump IS NOT DESIGNED FOR PUMPING CORROSIVE, AGGRESSIVE OR EXPLOSIVE GASES, OR FOR USE IN FLAMMABLE OR EXPLOSIVE ENVIRONMENT. THE PUMP IS SUITABLE FOR USE WITH A2L REFRIGERANTS.

⚠ **WARNING:** This product can expose you to chemicals including lead which are known to the state of California to cause cancer and birth defects or other reproductive harm. For more information go to **www.p65warnings.ca.gov**

This vacuum pump was reviewed for ignition proof construction under the standard for Refrigerant. Recovery/Recycling UL 1963:2011 Ed4, Supplement SB, which references one of the test methods per ANSI/ISA 12.12.01

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3.0 TECHNICAL SPECIFICATIONS

REF	FEATURES	TECHNICAL SPECIFICATIONS
2.1	Flow Rate	156 l/min, 5.5 CFM
2.2	Motor	460 W
2.3	Ultimate Vacuum (Microns)	15
2.4	Oil Capacity	15 fl.oz (450 ml)
2.5	Port Flare Sizes	1/4”, 5/16" & 3/8” SAE intake fittings
2.6	Voltage	Dual Voltage 115-230V, 60Hz
2.7	Oil Operating Temperature	122-158°F (50-70°C)
2.8	Ambient* Operating Temperature	50-140°F (10-40°C)
2.9	Dimensions	19.6 x 7 x 12" (49.8 x 18.1 x 31.3 cm)
3.0	Weight	27.5lb (12.5 Kg)
3.1	Oil Type	**Cool/Mild** 41-86°F (5°C-30°C) **Warm/Hot** 77-104°F (25°C-40°C)

*Ambient Operating Temperature is dependent on the type of oil used. The ambient temperature listed above is the general operating temperature when using approved Low Viscosity Vacuum Pump Oil.

4.0 FEATURES

4.1 SOLENOID VALVE - The integrated solenoid valve isolates on shut down or on power failure, preserves vacuum integrity of system and eliminates oil returning or contamination.

4.2 IGNITION PROTECTED SWITCH and circuit breaker for use with A2L/A3 gases/refrigerant.

4.3 INTEGRATED DEMISTER - The dual stage oil mist filter effectively filters oil mist, reducing pollution and oil consumption.

4.4 FORCED OIL LUBRICATION - The purpose is to provide lubrication to the bearings and seals enhancing the life of the vacuum pump.

4.5 INTEGRATED VACUUM GAUGE (optional).

4.6 GAS BALLAST - The function is to allow condensable vapors (i.e. water) to be discharged through the pump to atmosphere instead of accumulating in oil reservoir.

4.7 WIDE BODY - Ensures maximum stability by preventing tipping over.

4.8 FAN offers positive air-cooling that channels air over motor and vacuum pump casing. This not only prevents overheating but maintains the temperature at a controlled level.

4.9 INTEGRATED MOTOR - is high torque for low temperature starts.

4.10 INTEGRATED SPARKPROOF POWER SWITCH, LEAD AND CIRCUIT BREAKER.

4.11 COMPACT, LIGHT WEIGHT AND A LOW NOISE PUMP.

5.0 START-UP PROCEDURE

⚠ **THE BULLDOG A2L/A3 IS SHIPPED WITHOUT OIL IN ITS RESERVOIR…**
DO NOT START PUMP WITHOUT ADDING OIL!

5.1 Place pump on flat surface REMOVE Oil Filler cap.
5.2 Pour oil SLOWLY to avoid OVERFLOW AND SPILL. Fill up to the centre of the sight glass with approved LOW VISCOSITY OIL [Part No. VC2063 (1L) OR VS4015 (5L)].

NOTE: Oil level will rise when the pump warms up & reaches the operating temperature. Check oil level when warm & adjust if required. **DO NOT OVERFILL**.

5.4 Remove cap the inlet ports.
5.5 Turn power switch ON.
5.6 Let the BULLDOG A2L/A3 run for 10-20 minutes to reach operating temperature.
5.7 Turn power switch OFF and CONNECT to system.

PRIOR TO CONNECTING THE BULLDOG A2L/A3 TO AN AC/R SYSTEM, REMOVAL OF REFRIGERANT FROM THE SYSTEM IS NECESSARY; WE RECOMMEND THE TEKEDGE VELO-X A2L/A3 FOR THIS PURPOSE. DAMAGE TO THE PUMP MAY OCCUR IF EVACUATION IS STARTED WHILE THE SYSTEM IS UNDER HIGH PRESSURE.

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5.8 Keep the valves closed on system or keep the manifold closed.
5.9 Turn power switch ON.
5.10 “OPEN” Gas Ballast valve for a few minutes if desired.

IT IS VITALLY IMPORTANT THAT THE PUMP HAS REACHED ITS NORMAL OPERATIONAL TEMPERATURE (122°F-158°F / 50°C-70°C) BEFORE ANY CONDENSABLE VAPORS ARE PUMPED. FAILURE TO DO THIS MAY CONTAMINATE THE OIL AND DAMAGE THE PUMP.

5.11 The BULLDOG A2L/A3 is NOW READY TO EVACUATE air conditioning and refrigeration systems.

NOTE: If a system leak test needs to be done, it is recommended to keep the pump running after the isolation valve on the manifold is closed.

6.0 USING THE GAS BALLAST

6.1 The Gas Ballast valve allows a controlled amount of air to enter the compression cycle, diluting the condensable vapor (i.e. water), then exhausting it out of the compression chamber before it condenses and accumulates in oil reservoir.

FOR EXAMPLE: In a wet system, the partial pressure of water increases as the pump removes the air. When the partial pressure of the water vapor of the system gas reaches its Saturation Vapor Pressure (SVP) during the compression cycle of the pump, it condenses back into a liquid, mixes with the oil, and the pump WILL NOT achieve vacuum better than the SVP of the water. This is because the water evapo-rates from the oil on the suction cycle and then re-condenses back into the oil during the compression cycle. However, if you reduce the partial pressure of the water vapor during the pump’s compression cycle with a measured and controlled amount of non-condensable gas, the water vapor WILL NOT reach its SVP during compression and will therefore be discharged from the pump. The gas ballast allows a controlled amount of atmospheric gas into the compression cycle of the pump, thus “diluting” the water vapor that is being compressed and exhausting it out of the compression chamber before it condenses.

6.2 The gas ballast valve can be opened or closed at any time during pump operation after the operating temperature has been achieved.

6.3 During the evacuation process, the gas ballast will minimize the effect of vapor condensing within the pump, but it may slightly reduce ultimate vacuum. If ultimate vacuum is required, the gas ballast may be “closed” during the evacuation process.

6.3 The gas ballast valve is located on the top of the vacuum pump. Normal operating condition is about 1/4-1/2 turns counter-clockwise, at which a slight “popping” noise occurs. The valve when shut down must only be finger tight otherwise the precision valve seat may get damaged.

NOTE: Excessive high volumetric pressure pump down may result in residual oil around the gas ballast valve. This is normal. Clean as necessary.

7.0 SHUT DOWN PROCEDURE

7.1 CLOSE the manifold valve between the pump and the system.

7.2 “OPEN” gas ballast valve for a few minutes before shut down. This allows the pump to purge condensable vapors.

7.3 Turn power switch OFF.

7.4 If necessary, drain oil while the pump is warm.

8.0 MAINTENANCE

⚠ **DISCONNECT BULLDOG A2L/A3 FROM POWER SUPPLY BEFORE CARRYING OUT ANY MAINTENANCE. THE OIL MUST BE CHANGED WHEN CONTAMINATED OR AT 20 HOUR INTERVALS.**

8.1 EVACUATION of most used systems results in some contamination of the oil, causing deposits of sludge containing water and acids. These substances will corrode your pump. Changing the oil will remove damaging substances and will enhance the life of the vacuum pump.

8.1.1 Poor vacuum reading or a grey or milky appearance usually indicates oil contamination. If the vacuum pump is pumping condensable vapors, it may be necessary to change the oil after each process so that the pump does not stand idle with contaminated oil.

8.1.2 To change oil REMOVE the Oil Drain plug and DRAIN OIL into a suitable receptacle, this process is easier if the vacuum pump is tilted slightly.

8.1.3 Turn power switch ON momentarily with the inlet port open, thus removing any residual oil.

8.1.4 REPLACE the Oil Drain plug when the flow of oil has stopped.

8.1.5 REMOVE Oil Fill cap and FILL the oil reservoir with NEW approved low viscosity oil up to the center of the sight glass. The oil level will rise when the pump warms up and is operating under vacuum conditions. The oil level should be checked later and adjusted as required.

8.1.6 REPLACE Oil Fill cap, then turn power switch ON and check for any oil leakage.

8.1.7 DISPOSE of waste oil in accordance with local regulations.

NOTE: OIL UNDERNEATH THE HOUSING COULD BE CAUSED BY CARELESS FILLING AND SPILL OR FROM GAS BALLAST VALVE. THIS WILL NOT BE COVERED BY WARRANTY (SEE 8.0 TROUBLE SHOOTING UNDER OIL LEAKING).

8.2 SERVICING EXHAUST DEMISTER

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8.2.1 The BULLDOG A2L/A3 is equipped with dual oil demisters which will need replacing every 200 hours or when blocked when excessive oil mist is visible.

8.2.2 Filter Elements must be replaced periodically or immediately if dirt or oil soaked.

8.2.3 The oil demister is accessible via the front removable plug. The rear demister is under the side label cover.

8.3 MEASURING VACUUM

The performance of the BULLDOG A2L/A3 Vacuum pump can be checked, by measuring its ability to achieve a good “ultimate vacuum”. To do this you need to connect a vacuum gauge to the pump’s inlet port.

8.3.1 Connect the electronic or mercury gauge to one of the pump’s inlets. Make sure that all connections are secured and vacuum tight.

8.3.2 Switch on the BULLDOG A2L/A3 and allow it to warm up before taking a reading from the gauge. Remember, contaminated or dirty oil will have an impact on the ultimate vacuum as will the type of gauge used. With clean oil and a pump that is in ‘new’ condition, there would be a vacuum reading of 15-20 micron (on a digital gauge) and 5-10 micron (on a mercury gauge).

8.4 STORAGE

If storing for long periods:
- Run the pump until hot
- Drain the oil
- Add fresh oil
- Run for 5 minutes
- Switch off
- Seal inlet and exhaust

9.0 TROUBLESHOOTING

PROBLEM	CAUSE	ACTION
FAILURE TO START	• Power disconnected or switched off • Circuit breaker tripped • Line voltage • Electrical failure • Burnt capacitor/motor • Motor internal thermal over load activated or inoperative • Pump seizure	• Connect to power source/switch on • Reset breaker • Check local voltage • Check motor/switch • Replace capacitor/motor • Switch on after cooling if still inoperative replace motor • Repair pump or replace cartridge
POOR OR NO VACUUM	• Isolation valve closed/defective valve • Poor hose connection/system	• Open isolation valve/replace valve assy • Check all vacuum connections
LEAKS	• Low oil level • Oil contaminated • Pump worn out/damaged • Oil type used unknown • Gas ballast valve open • Pump overheated	• Add or change oil • Change oil • Replace cartridge • Replace with low viscosity oil or equivalent grade oil • Close gas ballast valve • Allow to cool or reduce heat exposure
MILKY OIL COLOUR	• Water vapor mixture in oil • Oil contaminated	• Open gas ballast • Change oil
DARK OIL COLOUR	• Water vapor mixture in oil • Oil contaminated	• Open gas ballast • Change oil
LEAKING OIL	• Seals hardened or worn • Oil mist accumulated from exhaust running within casing • Careless oil filling • Backflow from gas ballast	• Service pump/new seals • Occurs in normal use, cleaning may be needed, monitor sight glass or open case to check • Wipe housing & pump with a dry cloth • Wipe housing & pump with a dry cloth
NOISY PUMP	• Loosen pump housing screws • Oil level too low • Pump worn out	• Tighten with socket spanner • Add/replace oil • Replace cartridge/pump

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PROBLEM	CAUSE	ACTION
NOT HOLDING DEEP VACUUM (WHEN PUMP TURNED OFF)	• Isolation valve leaking • System leaking	• Replace valve assembly. • Leak check system and vacuum lines (allow for some pressure rise due to system residual gas)

PLEASE NOTE: All repairs should be carried out by a qualified service technician. Please contact for your nearest service agent.

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6.0 GUARANTEE

If your C&D product incurs a fault or a warranty issue, please register your claim directly on the C&D website www.C&D.com. Our technical service team will then issue next steps pending the outcome of the claim review.

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