Vacuum Pump and Manifold Gauge Set

User Manual

Please Read Carefully Before Use
Retain This Manual for Future Reference

Disclaimer

Please read this disclaimer thoroughly and carefully before continuing with the rest of this manual.

1. **As-Is Condition**

   This BACOENG product is provided and sold “as is,” without any express or implied warranties, including, but not limited to, implied warranties of merchantability or fitness for a particular purpose.

2. **Product Modifications**

   Any modification, alteration, or unauthorized change made to BACOENG products will void any applicable warranties and may cause property damage or personal injury. BACOENG shall not be responsible for any damage, loss, or injury resulting from such modifications or alterations.

3. **Legal Compliance**

   Customers are responsible for ensuring that their use of BACOENG products complies with all applicable laws and regulations in their respective jurisdictions. BACOENG assumes no responsibility for any violation of laws or regulations arising from the use of its products.

4. **Proper Use**

   Always use BACOENG products strictly in accordance with the instructions provided in the accompanying manuals. Failure to follow these instructions may result in personal injury or property damage. Assembly, installation, operation, maintenance, and repair of BACOENG products should always be performed by a qualified and competent person. Regular maintenance must be carried out throughout the service life of the product. It is your responsibility to keep the product in proper working condition and to ensure it operates as intended. Always wear suitable personal protective equipment.

5. **Third-Party Products**

   BACOENG shall not be liable for any damage, loss, or injury resulting from the use of third-party products together with BACOENG products. Customers should refer to the relevant instructions, guidelines, and warranties, if any, provided by the third-party manufacturer.

6. **Limitation of Liability**

   BACOENG shall not be liable for any direct, indirect, punitive, incidental, special, or consequential damages, including damage to property or injury to persons, arising from or related to the use or misuse of BACOENG products. Under no circumstances shall BACOENG’s total liability exceed the purchase value of the products sold.

This disclaimer represents the full extent of BACOENG’s obligations regarding BACOENG products. If any part of this disclaimer is found to be void, invalid, unenforceable, or unlawful, including, but not limited to, the warranty disclaimers, liability disclaimers, and limitations of liability stated above, the invalid or unenforceable provision shall be replaced by a valid and enforceable provision that most closely reflects the original intent. The remaining provisions shall continue to remain in full force and effect.

Contents

1. Safety Information

1.1 General Instructions

- This product is **not** intended for use by persons under 18 years of age.
- **Read** all instructions carefully before setup, operation, and maintenance. Follow all instructions strictly during setup, use, and maintenance. Failure to do so may result in serious property damage or personal injury.
- **Use** this product only for its intended purpose: evacuating and charging vehicle air-conditioning (A/C) systems that use R134A refrigerant.
- **Do not** use this product with any refrigerant other than R134A. Using incompatible refrigerants may damage the product and create safety hazards.
- This product is not a toy. **Do not** use it carelessly, improperly, or for amusement.
- Any use not specifically described in this manual may create hazards and may void all express or implied warranties.
- These instructions provide a general introduction to this product. For task-specific procedures, also refer to the service manual provided by the manufacturer of your A/C system.

1.2 Workspace Safety

- **Always** keep the work area clean, organized, and well lit. Cluttered or poorly lit areas increase the risk of accidents.
- **Always** ensure that the work area is adequately ventilated. Servicing refrigerant systems in enclosed or poorly ventilated spaces may cause harmful vapor buildup and other serious hazards.
- **Never** place flammable materials, explosives, or heat sources in the work area. Fireworks, open flames, sparks, and similar hazards may cause fire or explosion.
- **Limit** access to the work area as needed to prevent interference and reduce the risk of injury.

1.3 Personal Safety

- **Do not** use this product while tired or under the influence of alcohol, drugs, or medication that may impair judgment or coordination.
- **Do not** allow this product to be used by children, persons without proper HVAC training, persons unfamiliar with this product or the compatible A/C system, or anyone whose physical or mental condition prevents safe operation.
- **Always** keep bystanders, children, and pets away from the work area during operation.
- **Always** wear ANSI- or OSHA-approved personal protective equipment (PPE), including respiratory, eye, and hand protection. Refrigerant may irritate the eyes, nose, throat, and skin, and may cause frostbite, irregular heartbeat, loss of consciousness, or even death. Hearing protection is also required due to the noise produced by the vacuum pump during operation.
- Any assistants or other persons permitted near the work area must wear equivalent PPE.

1.4 Electrical Safety

- **Always** inspect the vacuum pump power cord for damage before evacuation. Never use any electrical device with a damaged or defective power cord. Replace the power cord only with an identical or approved replacement.
- **Use** the vacuum pump only with a stable, compatible, and properly grounded power supply.
- **Do not** use damaged outlets, 3-prong to 2-prong adapters, ungrounded extension cords, or extension cords with an insufficient wire gauge for the pump's electrical load.
- If power is interrupted during operation, unplug the vacuum pump **immediately** and keep it disconnected until power is restored.
- **Do not** move or carry the vacuum pump by pulling on the power cord.
- **Do not** attempt to disassemble, alter, or repair the power cord.
- **Keep** the vacuum pump dry. Do not operate it with wet hands or in highly humid environments. Do not rinse the entire pump with tap water, immerse it in water, or expose it to rain.
- If any electrical component becomes wet, disconnect the pump from power immediately and allow it to dry completely before resuming use.
- **Disconnect** the vacuum pump from power before performing any maintenance or repair. If testing or other procedures require power to be restored, wear insulated hand protection throughout the entire process.

1.5 Operational Safety

- **Before** each use, check that all parts of this product are intact, properly installed, and securely tightened.
- **Never** operate this product if any component is damaged or shows signs of malfunction. Repair or replace defective parts before further use. Use only identical or authorized replacement parts.
- **Always** turn off the A/C system before performing evacuation with this product.
- **Avoid** all direct contact with vacuum pump oil. If oil contacts the skin, remove contaminated clothing and rinse the affected area with plenty of water. If oil contacts the eyes, flush immediately with plenty of water for at least 15 minutes and seek medical attention. Never swallow vacuum pump oil, as it may cause fatal injury.
- **Always** use the correct attachments and connections. Incorrect connections may cause serious equipment damage or personal injury.
- **Always** perform leak tests on both this product and the A/C system before charging. Repair any leaks promptly and confirm that the system is leak-free before proceeding.
- **Do not** make threaded connections without the provided sealing tape or another suitable leak-proof equivalent.
- **Do not** charge the A/C system beyond the pressure range specified in the system's service manual.
- **Stay** alert, pay close attention to the task, and use sound judgment when operating this product.
- If you experience symptoms such as headache, dizziness, or nausea during use, stop work immediately and move to fresh air. Do not resume work until proper ventilation has been

provided.

- **Do not** leave this product unattended while it is connected to power, the A/C system, or a refrigerant can.
- **Use** extreme caution when disconnecting quick couplers and hoses after use. They may still contain pressurized refrigerant.
- **Do not** operate the vacuum pump without the specified oil, ISO 100 or SAE 30, or with oil of an unsuitable viscosity.
- **Do not** operate the vacuum pump if the oil appears cloudy or contaminated.
- **Do not** operate the vacuum pump with the oil inlet open or the drain cap loose.
- During operation, always keep the oil level between the **MIN** and **MAX** marks on the reservoir window. Do not overfill the reservoir, and do not allow the pump to run without sufficient oil.
- **Do not** clean or maintain this product with harsh abrasives or corrosive chemicals.
- **Never** disassemble the vacuum pump or manifold gauge set unless you have proper professional training.
- **Only** trained technicians should access or service internal components.
- **Dispose** of this product in accordance with all applicable local and national laws and regulations.

2. Specifications

Vacuum Pump

Input Voltage & Frequency	110 (V) AC, 60 Hz	
Rated Power	¼ HP	186 W
Evacuation Speed	3.6 cfm	0.10 m^3/m
Oil Capacity	8.8 fl. oz.	250 mL
Overheat Protection	160°F	70°C
Dimensions	11.02×4.72×9.45 (in.)	28×12×24 (cm)
Net Weight	12.35 lb.	5.6 kg

Gauge Set

Compatible Refrigerant	R134A, R410A, R22, R12		
Low Pressure Gauge	**Pressure Range**	−30* to 350 (psi)	−1 to 25 (bar)
	Temp. Range	0 to 90 (°F)	−18 to 32 (°C)
High Pressure Gauge	**Pressure Range**	−30 to 760 (psi)	−1 to 53 (bar)
	Temp. Range	0 to 190 (°F)	−18 to 88 (°C)
Hoses	**Length**	4.9 ft.	1.5 m
	Max. Pressure	3000 psi	206 bar
Net Weight		4.9 lb.	2.2 kg

* Note: Negative pressure readings are shown in inches of mercury (inHg), which are approximately equal to one-half of the corresponding psi value.

3. Package List

A Vacuum Pump  ×1	**B** Pressure Gauge Set  ×1	**C** Vacuum Pump Oil  ×1
D Dual-Purpose Hose (Yellow)  ×1	**E** Low-Pressure Hose (Blue)  ×1	**F** High-Pressure Hose (Red)  ×1
G R134A Quick Coupers  ×2	**H** 1/4" SAE Male to 1/2" ACME Female Adapter  ×1	**I** 5/16" SAE Female to 1/4" SAE Male Adapter  ×2
J Hook  ×1	**K** Valve Core Removal Tool  ×1	**L** Accessory Kit  ×1
M Bag  ×1		

Not Included but Required or Recommended

- Refrigerant Can
- Flathead Screwdriver
- Dust Mask
- Micron Gauge
- Funnel
- Safety Goggles
- 4 mm Hex Wrench
- AAA Batteries (×2)

4. Product Diagram

Refer to the product diagram supplied with this manual.

4. Product Diagram

5. Preparation

> ⚠ **Danger**
>
> *Refrigerant may irritate the eyes, nose, throat, and skin. It may also cause frostbite, irregular heartbeat, loss of consciousness, or even death. Inadequate preparation may increase the risk of accidents and result in serious consequences.*

5.1 Clearing the Work Area

Before starting, make sure the work area meets the following requirements:

- No bystanders, children, or pets are present.
- Any assistants nearby are wearing the required PPE.
- The area is well lit and properly ventilated, while still being adequately protected from weather and outdoor elements.
- The area is clean, organized, and free of clutter that may interfere with the work or create safety hazards.
- The area is free of flammable materials, explosives, and heat sources, including fireworks, open flames, sparks, and similar hazards.

5.2 Wearing Proper PPE

Breathing, eye, and hand protection are required and should meet the standards by ANSI (American National Standards Institute) or OSHA (Occupational Safety and Health Administration). Hearing protection is also necessary for the use of the vacuum pump.

Recommended PPE:

Not Included

5.3 Checking This Product

- After unpacking and before setup or operation, check that all parts of this product are present, intact, and in proper working condition.
- If any part is damaged, missing, broken, or defective, contact your local dealer or contractor for an identical replacement before use.

- Using this product with missing, damaged, non-identical, or unauthorized parts may create serious safety hazards.

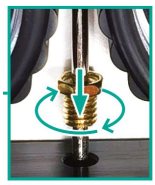
5.4 Getting Familiar with Your A/C System

- For safe and proper operation, make sure you understand your A/C system and have received sufficient training before using this product.
- Lack of knowledge or training may lead to equipment failure, incorrect operation, accidents, or personal injury.

6. Initial Setup

6.1 Installing the Hook

1. Attach the hook (N) to the center hole of the manifold gauge set (B).
2. Slide the locking nut downward and tighten it securely into place.
3. Hang the gauge set by the hook as needed during use.



6.2 Connecting the Pressure Hoses to the Gauge Set

1. Turn the knobs on the manifold gauge set fully clockwise to completely close both the low-pressure (LP) and high-pressure (HP) valves.
2. Remove the protective caps from the valve ports located below the knobs.
3. Wrap the port threads with the provided sealing tape (E).

   Note: Failure to use sealing tape may result in refrigerant leakage.

   Make sure the tape does not block the port openings.
4. Connect the pressure hoses to the corresponding valve ports.
   - **Do not** interchange the two color-coded hoses. They are not interchangeable.
   - Use the hose ends without copper cores inside for this connection.
   - Connect the blue LP hose (G) to the port below the blue LOW knob.
   - Connect the red HP hose (H) to the port below the red HIGH knob.
5. Tighten the connections securely using the locking nuts on the hoses.

6.3 Connecting the Quick Couplers to the Pressure Hoses

1. Wrap sealing tape around the threads of the blue LP quick coupler (I) and the red HP quick coupler (J).
2. Connect the blue and red pressure hoses to the quick couplers of the same color.
   - The hoses and quick couplers are **NOT** interchangeable.
   - Use the hose ends with copper cores inside for this connection.
3. Tighten the connections securely using the locking nuts on the hoses.

6.4 Connecting the Quick Couplers to Your A/C System

Before connection:

6. Initial Setup

- Make sure the A/C system is completely turned off.
- Read and follow the instructions provided by the manufacturer of your A/C system.

1. Turn the knobs on the quick couplers fully counterclockwise.
2. Pull back the sleeves on the quick couplers.
3. Push the quick couplers onto the matching service ports of your A/C system.
    - **Do not** interchange the couplers or service ports. The LP and HP connections are **NOT** interchangeable.
4. Release the sleeves to lock the quick couplers securely onto the service ports.

Example: LP quick coupler connected to the LP service port.

7. Operation

7.1 Evacuation

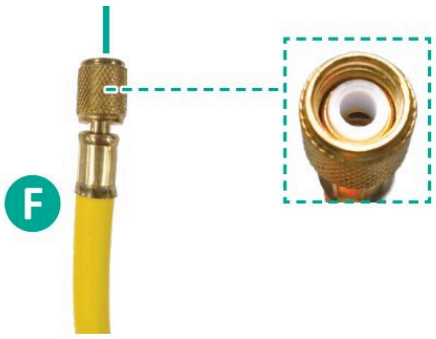
Before proceeding, confirm again that your A/C system has been completely turned off.

7.1.1 Connecting the Dual-Purpose Hose to the Gauge Set

1. Remove the protective cap from the dual-purpose port located in the center of the manifold gauge set.
2. Connect a micron gauge (not included) to the center port and the yellow dual-purpose hose (F). Use additional adapters if required.
3. Tighten all connections securely.

Notes:

- Wrap the provided sealing tape (E) around the port threads to help prevent leaks.
- Use the hose end without a copper core for this connection.



7.1.2 Connecting the Dual-Purpose Hose to the Vacuum Pump

1. Locate the 1/4 in. gas inlet on the vacuum pump (A).
2. Unscrew and remove the inlet cap.
3. Wrap the inlet threads with the provided sealing tape.
4. Connect the copper-core end of the yellow hose to the gas inlet.
5. Tighten the connection securely using the hose locking nut.

Additional hose connection options:

- To use a 1/2 in. hose (not included), connect it directly to the 1/2 in. inlet, or connect it to the 1/4 in. inlet using the 1/2 in. male to 1/4 in. female adapter (L).
- To use a 5/8 in. hose (not included), connect it to the 1/4 in. gas inlet using the 5/8 in. male to 1/4 in. female adapter (M).

7.1.3 Filling the Oil Reservoir

7. Operation

Never operate the vacuum pump without the provided vacuum pump oil or a proper equivalent. Failure to use the correct oil may damage the pump, create safety hazards, and void all express or implied warranties.

1. Place the vacuum pump on a clean, firm, flat, level, nonflammable, and nonslip surface.
2. Retighten the oil drain cap using a 4 mm hex wrench (not included).
3. Unscrew and remove the filter to expose the oil inlet.
4. Carefully add the vacuum pump oil (D) until the oil level in the reservoir window is between the **MIN** and **MAX** marks. To avoid spills, use a funnel (not included) that fits the oil inlet.
5. Reinstall and tighten the filter.

Warnings:

- Vacuum pump oil is flammable and must be kept away from open flames, sparks, and other ignition sources.
- Never swallow vacuum pump oil or allow it to contact bare skin.

7.1.4 Evacuating Your A/C System

1. Turn on the micron gauge.
2. Open the LP valve by turning the blue LOW knob fully counterclockwise.
3. Connect the power cord (C) to the vacuum pump.
4. Plug the power cord into a stable, compatible, and properly grounded power source.
5. Flip the power switch to the **I** position. Evacuation should begin.

Important:

- Always monitor the oil reservoir window during evacuation. If the oil level drops to the **MIN** mark, stop the pump and refill the reservoir properly before continuing.

6. When the micron gauge reads below 500 microns, close the LP valve by turning the blue LOW knob fully clockwise. The A/C system should now be fully evacuated.
7. Flip the power switch to the **O** position to turn off the vacuum pump.
8. Disconnect the micron gauge from the manifold gauge set and the yellow hose.
9. Loosen the locking nut and disconnect the yellow hose from the vacuum pump.

7.2 Charging

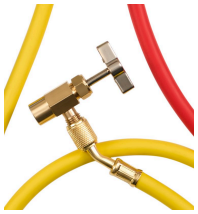
7. Operation

Before charging, observe the following precautions:

- **Always** keep refrigerant cans away from heat sources and direct sunlight.
- Take care not to open or puncture refrigerant cans accidentally.
- Make sure both gauge valves are **FULLY** closed before starting.
- **Never** leave the refrigerant can or manifold gauge set unattended while charging is in progress.
- The round pin of the provided R134A can tap is designed only for self-sealing refrigerant cans.
- For puncture-style cans, use a compatible tap with a tapered pin (not included).

7.2.1 Connecting the Dual-Purpose Hose to the R134A Can Tap

1. Remove the protective cap from the threaded male port of the R134A can tap (K).
2. Connect the copper-core end of the yellow dual-purpose hose (F) to this port.
3. Tighten the connection securely using the hose locking nut.
4. Make sure the other end of the yellow hose remains securely connected to the manifold gauge set.



7.2.2 Connecting the R134A Can Tap to a Refrigerant Can

Before connection:

- **Never** use an incompatible refrigerant can.
- Make sure the blue LP valve is **FULLY** closed before proceeding.

1. Turn the tap handle fully counterclockwise.
2. Attach the tap securely to the R134A refrigerant can using the female port on the tap.
3. Turn the tap handle fully clockwise to open the can and allow refrigerant to flow into the hose.

7. Operation

7.2.3 Testing for Leaks

Charging without performing a leak test first may create safety hazards.

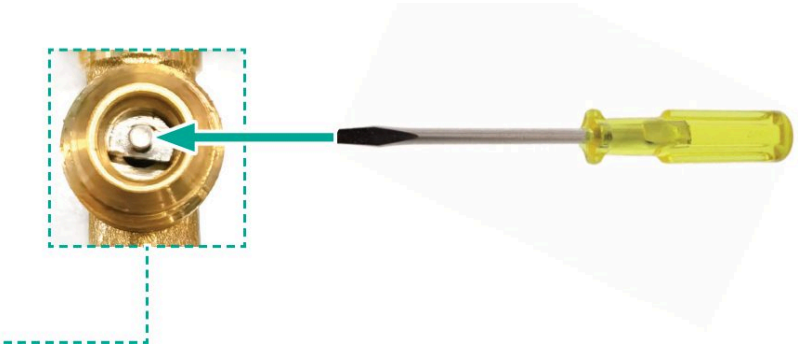
1. Start the A/C system and set it to the maximum cooling setting and highest fan speed.
2. Locate the red HP quick coupler (J) connected to the HP service port of the A/C system.
3. Turn the knob on the red HP quick coupler fully clockwise to open the HP service port.
4. Open the HP valve by turning the red HIGH knob fully counterclockwise.
5. Observe the pointer on the red HP gauge.
   - If the pointer remains steady, no leak is indicated.
   - If the pointer continues to fluctuate, proceed as follows:
     a. Open the battery compartment on the back of the leak detector (O). Insert two AAA batteries (not included) correctly, then close the compartment.
     b. Turn the detector knob to a setting between 2 and 7 to activate it. A higher number indicates a higher detection intensity.
     c. Move the sensing tip close to each hose and connection point. If the warning light turns on and the audible alarm sounds, a leak is present at the location of the sensing tip.
     d. Close the HP valve **IMMEDIATELY**, then turn the detector knob to 1 to deactivate it.
     e. Retighten, repair, or replace any problematic parts, then repeat the leak test before continuing.
6. After confirming that there are no leaks, close the HP valve by turning the red HIGH knob fully clockwise.

service port using the red **HIGH** coupler.

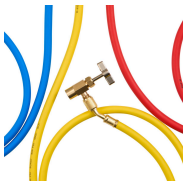
7.2.4 Charging Your A/C System

Before charging:

- Start charging **ONLY** after confirming that there are **NO** leaks.
- **DO NOT** overcharge the A/C system.
- Consult the specifications for your A/C system before charging. Confirm the recommended pressure that indicates a full charge. This value is usually between 25 psi (1.7 bar) and 80 psi (5.5 bar), but the correct value must be determined according to your specific A/C system.



1. If the pressure gauges read above 0 psi before charging, unscrew the cap above the dual-purpose port and press the valve core inside until excess air is fully released and the readings return to the proper state.
2. Locate the blue LP quick coupler (I) connected to the LP service port of the A/C system. Turn its knob completely clockwise to open the service port.
3. Turn the knob on the blue LP quick coupler fully clockwise to open the LP service port.
4. Open the LP valve by turning the blue LOW knob fully counterclockwise. Charging should begin.
5. Watch the sight glass on the manifold gauge set. Make sure refrigerant continues to flow and does not run out during charging.



7. Operation

Notes:

- A small amount of refrigerant may remain in the can even when the sight glass shows no visible flow. If necessary, gently shake the can while holding it upside down, then check the sight glass again.
- If the refrigerant runs out before charging is complete, close the LP valve as described in Step 5 before attaching the tap to a new can.
- Refrigerant cans **MUST** be disposed of in accordance with all applicable laws and regulations.

6. When the LP gauge reaches the recommended pressure, close the LP valve by turning the blue LOW knob fully clockwise. Charging should stop.
7. Loosen the locking nuts and disconnect the three hoses from the can tap, quick couplers, and manifold gauge set.

8. Maintenance

- **Always** disconnect this product from power and from the A/C system before performing any maintenance. Failure to do so may result in accidents, equipment damage, or personal injury.
- For tests or other procedures that require power or system connections to be restored, wear insulated hand protection, as well as ANSI- or OSHA-compliant respiratory and eye protection.
- Take care not to scrape, cut, or abrade the hoses. Do not drop the vacuum pump or manifold gauge set onto hard or rough surfaces.

8.1 Cleaning

After each use, remove debris, dust, and oil from the external surfaces of the vacuum pump, manifold gauge set, hoses, and other accessories as needed.

Recommended tools:

- Soft dry brush
- Soft damp cloth
- ANSI- or OSHA-compliant compressed air

Cleaning precautions:

- **Always** avoid direct high-pressure spraying.
- **Do not** flush or soak this product.
- **Never** use abrasive or caustic cleaners.

8.2 Replacing the Vacuum Pump Oil

Monitor the oil through the reservoir window. If the oil becomes cloudy or contaminated, replace it as follows:

1. Make sure the oil is warm.

   If you are unsure, run the pump for approximately 10 minutes to warm the oil sufficiently. Turn off and unplug the pump before continuing.
2. Unscrew the oil drain cap using a 4 mm hex wrench (not included).
3. Hold the carrying handle and tilt the pump downward to drain the oil into a suitable container.
4. Once the reservoir is empty, reinstall and tighten the drain cap.
5. Refill the reservoir according to Section 7.1.3.
6. Use only the provided vacuum pump oil or an equivalent oil of the same viscosity, ISO 100 or SAE 30.

8.3 Inspection

- After each use, inspect the vacuum pump, manifold gauge set, hoses, and other accessories for wear, damage, or malfunction.
- Repair or replace any defective parts before further use.
- Do not disassemble the vacuum pump or manifold gauge set unless you have proper professional training.
- Only trained technicians should repair internal components.

- Never use non-identical or unauthorized replacement parts.
- Any unauthorized modification may void all express or implied warranties.

8.4 Storage

If this product will not be used for an extended period, clean all components, seal all ports with their protective caps, place the components in the included case and bag (Q), and store everything in a location that is:

- Clean, cool, and dry
- Away from flammable materials, explosives, corrosive substances, and heat sources
- Inaccessible to children and pets
- Protected against unauthorized use
- Well protected from weather and outdoor elements

9. Troubleshooting

Problem	Solution(s)
The vacuum pump does not turn on or shuts off automatically.	Make sure the power source is working properly.
	Firmly reconnect the power cord to both the power source and the pump inlet.
	Check the power cord for damage. If damage is found, contact your local dealer or contractor for an identical replacement.
	Pry open the fuse box and inspect the fuse inside. If the fuse is burnt, replace it with a new **F6AL250V** fuse and **FULLY** resolve the cause **BEFORE** resuming use.
	Move the pump to a warmer location and wait for a while before restarting it.
	The thermal protector will shut off the pump if the motor reaches 160°F (70°C). Wait approximately 15 minutes for the motor to cool down before restarting the pump.
Oil leaks from the vacuum pump.	Retighten the oil drain cap.
	Make sure the pump is placed on a flat and level surface.
Smoke comes out of the filter.	This is normal and requires **NO** repair. To reduce smoke emission, make sure all connections are secure and keep the oil level between the **MIN** and **MAX** marks on the reservoir window.

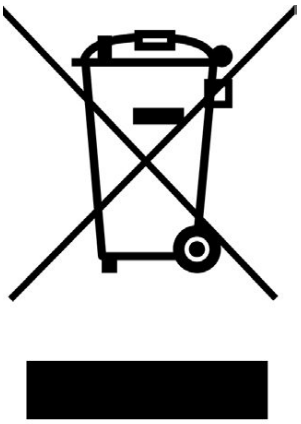
Possible solutions are listed for each problem above.

10. Disposal

Electrical products should **NOT** be disposed of together with household waste.

In the EU and the UK, under European Directive 2012/19/EU on waste electrical and electronic equipment and its implementation in national laws, used electrical products must be collected separately and disposed of at designated collection facilities.

Similar disposal and recycling regulations may apply in Australia, Canada, the United States, and other regions. Contact your local authorities or dealer for proper disposal and recycling guidance.



Contact Us

Thank you for choosing BACOENG products! If you have any questions or comments, or need further assistance, please contact us.

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