

**AC400 for r134a**  
**AC Recycle & Recharge Machine**  
**USER MANUAL**

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**Service and support**

**Tel: 443-380-0088**

**Web: [www.bludee.com](http://www.bludee.com)**

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7090 GOLDEN RING RD STE107, ROSEDALE, MD 21237

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## 1 INTRODUCTION

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Thank you for choosing the Bludee AC400 R-134a Recycle and Recharge Machine—a precision-engineered solution for professional automotive air-conditioning service.

The AC400 is designed exclusively for R-134a refrigerant, delivering high-efficiency recovery, accurate charging, and streamlined diagnostics. Whether servicing passenger cars, heavy-duty trucks, agricultural tractors, construction equipment, or specialty fleets, the AC400 adapts to your workshop's needs with reliability and ease.

Developed through collaboration with A/C system manufacturers and feedback from technicians worldwide, this unit integrates advanced microprocessor control for intuitive operation and consistent performance. Its technician-friendly interface and robust design help reduce service time, improve diagnostic accuracy, and increase shop profitability.

Bludee is committed to supporting your success. For assistance with equipment operation, maintenance, or refrigerant handling inquiries, contact our support team at 443-380-0088 or visit [www.bludee.com](http://www.bludee.com).

Key Features:

-  Single-Refrigerant Optimization – Purpose-built for R-134a systems
-  High Recovery Efficiency – Maximizes refrigerant capture with minimal loss
-  Precision Load Cell Measurement – Ensures accurate charging and diagnostics
-  Self-Diagnostic Capabilities – Built-in system checks for enhanced reliability
-  USB Upgrade Support – Enables firmware updates and long-term serviceability
-  Technician-Friendly Maintenance – DIY access supported; professional servicing recommended

The AC400 is a valuable addition to any workshop, delivering consistent results, regulatory compliance, and long-term value across a wide range of R-134a-equipped vehicles.

## 2 GENERAL SAFETY

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The storage cylinder contains liquid R-134a refrigerant under high pressure. Overfilling can lead to an explosion. Do not disable the overfill safety feature and always keep the cylinder on the load cell platform during operation.

Only EPA Section 609-certified technicians should operate this equipment.

Read this manual thoroughly before operating the machine. Incorrect operation may result in improper A/C service, equipment damage, or vehicle A/C system failure.

Use only cylinders supplied or recommended by Bludee for this equipment.

Avoid inhaling refrigerant or oil vapor/mist. Refer to the Material Safety Data Sheets (SDS) on refrigerant and oil packaging.

Switch off and disconnect the power cable before removing covers or servicing to prevent electric shock, which can be fatal.

Never use compressed air to test for leaks in the machine or vehicle A/C system.

Wear safety goggles and gloves to protect eyes and skin from refrigerant contact, which can cause frostbite or blindness. In case of accidental contact, rinse the affected area with plenty of fresh water and seek medical attention immediately.

Avoid using extension cords with a copper core thinner than 14 AWG (10A capacity).

Keep gasoline and other flammable substances away from the equipment.

Operate the machine in a well-ventilated area, away from heat sources or direct sunlight.

Store the machine in a cool, well-ventilated area when not in use.

## 2.1 EMERGENCY SHUTDOWN PROCEDURE

If an R-134a leak is detected:

1. Immediately turn off the machine using the power switch.
2. Disconnect the power cable from the outlet.
3. Close all cylinder valves and disconnect service hoses from the vehicle or external cylinder.
4. Ventilate the area to disperse refrigerant vapors.
5. Use a SAE J2791-compliant leak detector to identify the leak source.
6. Contact Bludee at 443-380-0088 or [www.bludee.com](http://www.bludee.com) for assistance before resuming operation.

## Safety Symbols Key

### Symbol Description



**Warning:** Indicates a risk of injury or equipment damage.



**Electrical Hazard:** Risk of electric shock; disconnect power before servicing.



**Protective Equipment:** Wear safety goggles and gloves during operation.



**Fire Hazard:** Keep flammable substances away from the machine.



**SDS Reference:** Consult Material Safety Data Sheets for refrigerant/oil handling.

## Bilingual Warnings (English/Spanish)

- **English:** Overfilling the storage cylinder can cause a violent explosion.  
**Spanish:** Llenar en exceso el cilindro de almacenamiento puede causar una explosión violenta.
- **English:** Wear safety goggles and gloves to prevent refrigerant-related injuries.  
**Spanish:** Use gafas de seguridad y guantes para prevenir lesiones relacionadas con el refrigerante.

## 2.2 REFRIGERANT AND OIL DISPOSAL

To comply with EPA regulations (40 CFR Part 279) and local laws:

1. Store recovered R-134a in approved containers for on-site recycling or transfer to an EPA-approved reclamation facility.
2. Dispose of used oil and filter-driers at certified hazardous waste facilities. Contact your local waste management authority for locations.
3. Maintain a log for all disposal and purity check activities at least 3 years per EPA Section 609, including:
  - Date of disposal/check
  - Type and amount of refrigerant/oil
  - Purity check results (if applicable)
  - UV dye usage (if applicable)
  - Disposal facility name and address

#### Expanded EPA Maintenance Log Template:

Date	Refrigerant Type	Amount Recovered (lb)	Oil Disposed (fl oz)	UV Dye Used (oz)	Purity Check (% R-134a)	Filter-Drier Replaced	Disposal Facility
MM/DD/YYYY	R-134a					Yes/No	

**Note:** For disposal guidance, contact Bludee at 443-380-0088 or visit [www.bludee.com](http://www.bludee.com).

### 2.3 U.S. REGULATORY COMPLIANCE

This equipment must comply with U.S. Environmental Protection Agency (EPA) regulations under Section 609 of the Clean Air Act for refrigerant recovery and recycling equipment used in motor vehicle air conditioning systems. Key requirements include:

- **Certification:** The AC400 meets SAE J2210 standards for R-134a, ensuring at least 95% recovery efficiency.
- **Technician Training:** Operators must be certified under an EPA-approved Section 609 program, renewed annually. Uncertified personnel must not operate this equipment.
- **Refrigerant Handling:** Recovered R-134a must be stored in approved containers and either recycled on-site using EPA-certified equipment or sent to an EPA-approved reclamation facility. Venting is prohibited.
- **Recordkeeping:** Maintain records of refrigerant recovery, recycling, disposal, and purity checks, including the amount recovered and filter-drier condition.
- **Equipment Maintenance:** Perform regular maintenance, including filter-drier replacement and leak checks, to comply with EPA standards and prevent emissions.

Failure to comply may result in fines or penalties. Refer to [www.epa.gov/section609](http://www.epa.gov/section609) for guidance.

## 2.4 R-134A SPECIFIC HANDLING PRECAUTIONS

- **Purity Verification:** Use an external SAE J2791-compliant refrigerant identifier to confirm R-134a purity (>98%) before recovery or tank fill to prevent contamination with other refrigerants like R-12 or HFO-1234yf, which can damage the AC400 or vehicle A/C system.
- **Oil Compatibility:** Use only PAG oil (46, 100, or 150 viscosity) for R-134a systems in fuel vehicles. For hybrid/electric vehicles, use a separate POE oil injector to avoid electrical issues with conductive PAG oil.
- **Pressure Monitoring:** R-134a systems operate at specific pressures (25–45 psi low side, 150–250 psi high side at 77°F). Monitor gauges during charging to avoid over pressurization.
- **Storage:** Store R-134a cylinders upright in a cool, ventilated area (<104°F) to prevent pressure buildup. Never expose yourself to direct sunlight or heat sources.
- **Leak Detection:** Use a SAE J2791-compliant electronic leak detector for R-134a to identify leaks, as R-134a is a potent greenhouse gas.

## 2.5 CALIFORNIA REGULATIONS AND PROPOSITION 65 WARNING

Proposition 65 Warning: This product may expose you to chemicals, including R-134a and compressor oils (PAG/POE), which are known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov). Always wear protective gear and operate in a well-ventilated area to minimize exposure.

California Refrigerant Regulations: In California, the AC400 must comply with the California Air Resources Board (CARB) regulations for refrigerant management. Operators must:

- Use CARB-certified equipment for R-134a recovery and recycling.
- Maintain detailed records of refrigerant recovery, recycling, and disposal, as per CARB requirements.
- Ensure technicians are EPA Section 609-certified and trained in California-specific refrigerant handling protocols.
- Use only approved containers for R-134a storage and disposal. For further details, visit [www.arb.ca.gov](http://www.arb.ca.gov) or contact Bludee at 443-380-0088.

## 3 SPECIFICATIONS

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### Dimensions:

- Packaged: 28.3 × 26.4 × 46.9 inches (720 × 670 × 1190 mm)
- Unpacked: 24.8 × 22 × 42.3 inches (630 × 560 × 1075 mm)

### Input Power:

- AC110V ±10%, 60 Hz

### Operating Conditions:

- **Operating Temperature:** 32–104°F (0–40°C)

- **Humidity:** <80% non-condensing
- **Storage Temperature:** -4–140°F (-20–60°C)

**Compressor Power:** 3/8 HP

**Average Gas-State Refrigerant Recovery Speed:** 0.55 lb/min (0.25 kg/min)

**Recovery Rate:** 95%

**Pressurization:** Speeds up old oil discharge

**Vacuum Pump Capacity:** 2.12 cfm (60 L/min); optional 4.24 cfm (120 L/min)

**Filter-Drier Capacity:** 20.3 fl oz (600 ml) for 220 lb (100 kg) of refrigerant

**Accuracy of Gas Cylinder Load Cell:** ±0.35 oz (±10 g)

**Accuracy of Oil Bottle Load Cell:** ±0.18 oz (±5 g)

**Gas Cylinder Capacity:** 22 lb (10 kg) for R-134a

**New Oil Bottle Capacity:** 8.45 fl oz (250 ml)

**Used Oil Bottle Capacity:** 13.5 fl oz (400 ml)

**Cooling System:** Condenser and cooling fan included

**Max. Pressure:** 290 psi (20 bar)

**Charge Speed:** 4.4 lb/min (2 kg/min, max.)

**Display:** 7-inch full-color touch screen

**Pressure Gauges:**

- High Pressure: -14.5 to 580 psi (-1 to 40 bar)
- Low Pressure: -14.5 to 319 psi (-1 to 22 bar)

**Automatic Service Reminder:** The filter-drier is designed to process 220 lb (100 kg) of R-134a. When the filter-drier life expires, the machine locks, requiring maintenance (filter-drier replacement, pump oil replacement, solenoid spool washer replacement, leak testing).

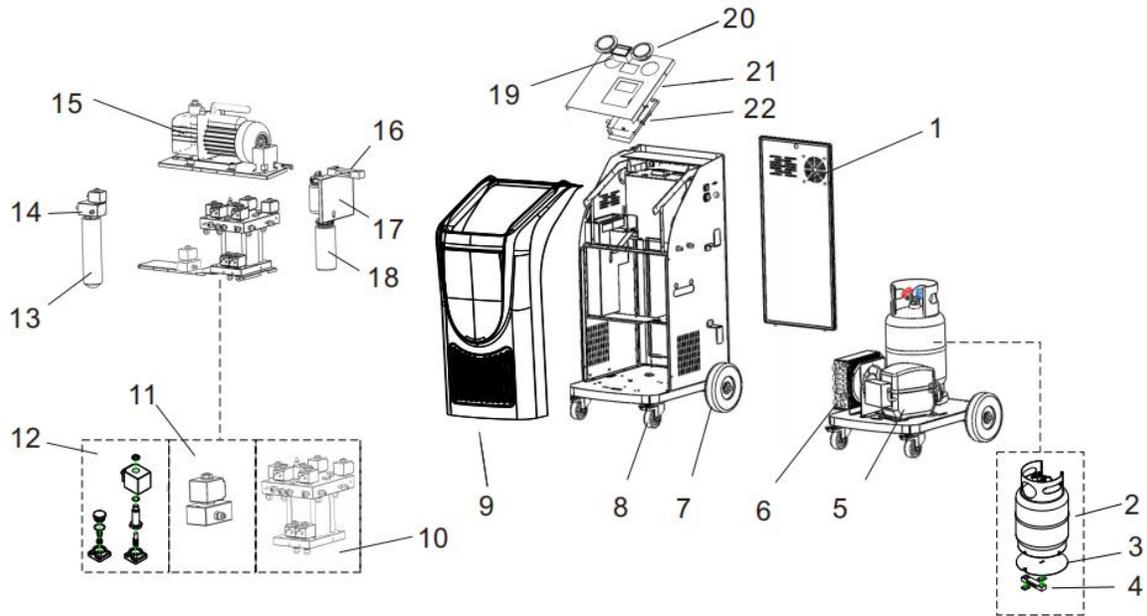
**Thermal Printer:** Included

**Heater Band:** Included

**Optional Features:**

- Vacuum leak test
- Flushing function
- Automatic air purge
- UV dye injection

## System Component and Location

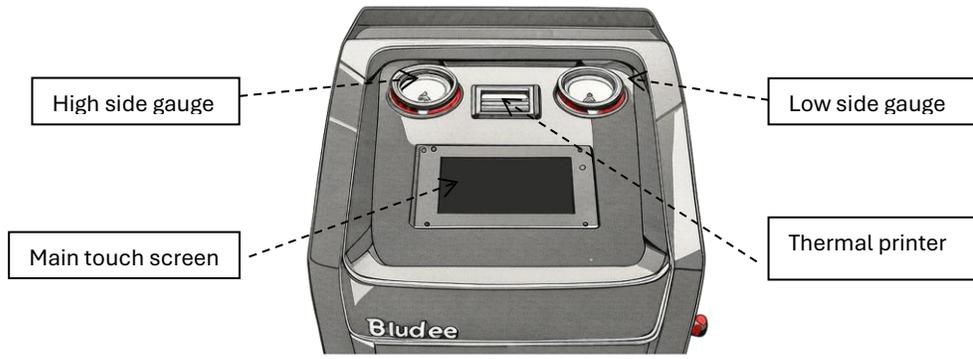


1) Back cover	2) Refrigerant gas cylinder	3) Gas cylinder support plate
4) Gas cylinder load cell	5) Compressor	6) Condenser and cooling fan(optional)
7) Rear wheel	8) Front wheel	9) Front cover(plastic)
10) Manifold assembly 1	11) UV manifold	12) Assembly of solenoid valve and check valve
13) Drier-filter	14) Manifold 2	15) Vacuum pump
16) Oil bottle load cell	17) Oil bottle support	18) Oil bottles
19) Printer	20) Pressure gauges	21) Upper cover
22) PCA		

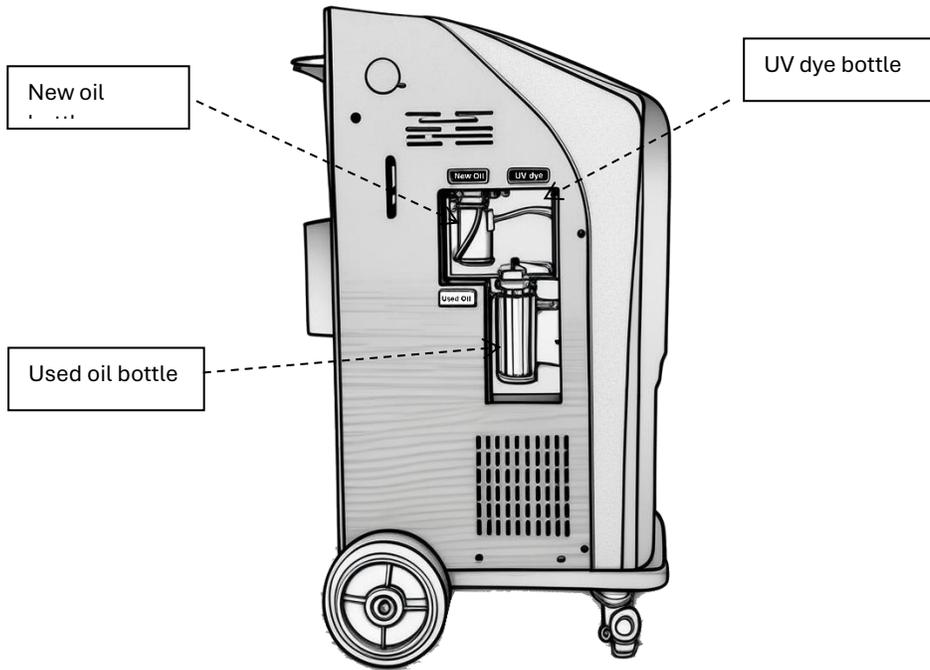
Component	Description	Location
Back Cover	Protects internal components	Rear
Refrigerant Gas Cylinder	Stores R-134a, 22 lb capacity	Internal, center
Gas Cylinder Support Plate	Secures cylinder	Below cylinder
Gas Cylinder Load Cell	Measures cylinder weight, ±0.35 oz accuracy	Below support plate
Compressor	3/8 HP, recovers refrigerant	Internal, lower
Condenser and Cooling Fan	Cools refrigerant during recovery	Internal, rear

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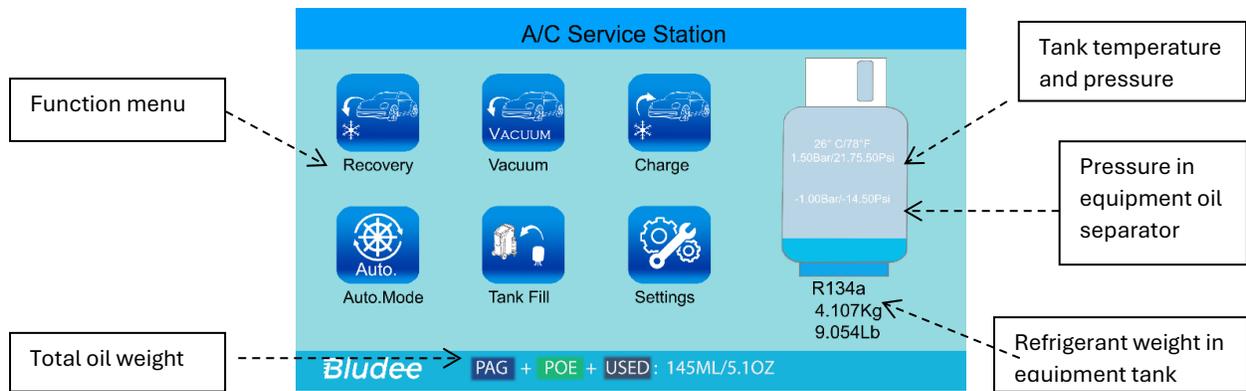
Rear Wheel	Facilitates mobility	Rear base
Front Wheel	Facilitates mobility	Front base
Front Cover	Plastic cover for aesthetics	Front
Manifold Assembly 1	Manages refrigerant flow	Internal, center
UV Manifold	Manages UV dye (optional)	Internal, left
Solenoid and Check Valve Assembly	Controls refrigerant/oil flow	Internal, center
Drier-Filter	Removes moisture/contaminants, 20.3 fl oz	Left side
Manifold 2	Secondary flow management	Internal, right
Vacuum Pump	2.12 cfm, evacuates system	Internal, lower
Oil Bottle Load Cell	Measures oil weight, $\pm 0.18$ oz accuracy	Below oil bottles
Oil Bottle Support	Secures oil bottles	Front, lower
Oil Bottles	New oil (8.45 fl oz), used oil (13.5 fl oz)	Front, lower
Printer	Thermal printer for reports	Front, upper
Pressure Gauges	HP (-14.5 to 580 psi), LP (-14.5 to 319 psi)	Front panel
Upper Cover	Protects control panel	Top
PCA	Printed circuit assembly for control	Internal, upper
Touch Screen	7-inch full-color interface	Front panel
Sight Glass	Monitors flushing (optional)	Front, center



Control panel



Left view



Main screen

## 4 SYSTEM FUNCTION OVERVIEW

Function	Description
<b>Recovery</b>	Recovers and purifies R-134a from the vehicle A/C system into the internal storage cylinder.
<b>Evacuation</b>	Removes air, moisture, and debris from the A/C system; optional vacuum leak test.
<b>Charge</b>	Injects PAG oil (UV dye optional) and R-134a into the A/C system.
<b>Tank Fill</b>	Transfers R-134a from an external cylinder to the internal cylinder.
<b>Flushing (Optional)</b>	Extracts compressor oil and contaminants from the A/C system using forward/reverse refrigerant flow.
<b>Automatic Mode</b>	Performs selected functions (recovery, evacuation, oil injection, charge) in sequence, stopping automatically.
<b>System Settings</b>	Configures language, calibration, database, units, empty container weight, component testing, and owner information.

### Initial Setup Checklist:

Step	Action	Completed (✓)
1	Unpack and inspect components	
2	Place on level surface, 32–104°F	
3	Connect to AC110V ±10%, 60 Hz	
4	Verify gauges and oil vessels	

5	Connect and secure HP/LP hoses	
6	Initialize system and set language/units	
7	Unlock load cell	
8	Fill with R-134a and PAG oil	
9	Perform component test and leak check	

**Warning:** Only EPA Section 609-certified technicians should perform setup. Improper setup may lead to inaccurate operation or non-compliance.

## 5 INITIAL MACHINE SETUP

### 1. Unpacking and Inspection

- Unpack the machine and verify all components (hoses, couplers, oil vessels, power cable) are included and undamaged.
- Report damage to Bludee at 443-380-0088 or [www.bludee.com](http://www.bludee.com).

### 2. Placement

- Place on a flat, stable surface in a well-ventilated area, away from heat sources or direct sunlight.
- Operate in 32–104°F (0–40°C); avoid direct sunlight to prevent overheating.
- Ensure 12 inches clearance for ventilation and port access.

### 3. Power Connection

- Connect to a grounded AC110V ±10%, 60 Hz outlet using a 14 AWG power cord. Avoid extension cords unless necessary.
- Ensure the power switch is OFF before plugging in.

### 4. Initial Component Check

- Verify HP/LP gauges read zero when no pressure is applied.
- Ensure new/used oil vessels are empty and secure.
- Confirm the R-134a cylinder is on the load cell platform.

### 5. Hose and Coupler Setup

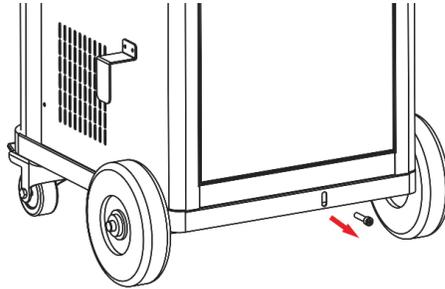
- Connect HP/LP hoses to machine ports and secure R-134a couplers.
- Store hoses on adapters when not in use.

### 6. System Initialization

- Turn on the power switch and complete the 30-second pre-ventilation cycle (if equipped).
- Set language and imperial units via “System Settings.”

### 7. Unlock Tank Load Cell

- Remove the safety locking bolt securing the gas cylinder load cell (see “Component Identification”).



- Store the bolt for use during transportation.

### 8. Refrigerant and Oil Preparation

- Fill with R-134a and PAG oil (46/100/150 viscosity) as per “Tank Fill.”
- Consult the database for vehicle-specific oil requirements.

### 9. Verification

- Perform a component test (see “Component Test”) to verify solenoids, vacuum pump, and compressor.
- Check for leaks using a SAE J2791-compliant leak detector.
- Confirm filter-drier life on startup (see “Regular Maintenance and Reset”).

## 6 TANK DIGITAL SCALE CALIBRATION

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This procedure outlines the steps to calibrate the digital scale inside the machine tank using a 1 kg calibration weight for R134a cylinder.

### Prerequisites

- **Calibration Weight:** Prepare a certified 1 kg calibration weight. Do not use any other weight, as this will cause calibration failure or inaccurate.
- Ensure the machine is on a flat, stable, and level surface, free from vibrations or air drafts.
- Power on the machine and allow the scale to warm up as per the manufacturer’s recommendation (typically 15–30 minutes).
- Do not place any weight on the scale until prompted by the system.
- No additional wire, cable, or anything else attached to the tank.

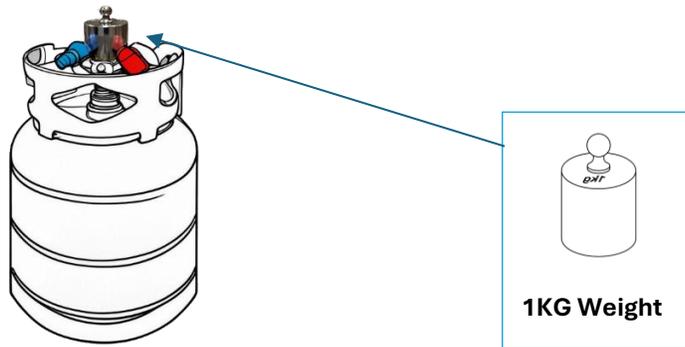
### Calibration Steps

1. **Access Calibration Mode:**

- Navigate the machine's **System Settings** menu.
- Select **Calibration**.
- Choose R134a **Cylinder** based on the cylinder type in use.

## 2. Place Calibration Weight:

- Wait for the system to display the message: "**Please place 1KG weight on top of the tank**", then click OK."
- **Important:** Do not place 1 kg weight on the tank before this message appears, as it will cause the calibration to fail.



- Once the message is displayed, carefully place the certified 1 kg weight on top of the tank.
- Press **OK** on the system interface to proceed.

## 3. Complete Calibration:

- Allow the scale to stabilize and process the calibration.
- Once the system confirms calibration is complete, carefully remove the 1 kg weight from the tank.
- **Note:** Do not remove the tank itself during this procedure.

## 4. Verification:

- Go back to front page to check the weight
- To verify scale accuracy, place a 1 kg test weight on the platform, then remove it.
- Observe the displayed value to ensure the system registers the correct weight change.

## 5. Documentation:

- Record the calibration details (date, time, cylinder type, and confirmation of 1 kg weight used) in the machine's maintenance log.
- If required, attach a calibration label to the machine indicating the calibration date and next due date.

## Important Notes

- Use only a certified 1 kg calibration weight. Using any other weight will result in calibration weight inaccurate.
- Ensure the weight is placed only after the system prompts with the message to avoid errors.
- The tank remains in place throughout the procedure; do not remove it.
- If calibration fails, check for environmental factors (e.g., vibrations, uneven surface) or consult the machine's manual for troubleshooting.
- Perform calibration as part of initial setup and at regular intervals as specified by the manufacturer.

## 7 OIL BOTTLE SCALE CALIBRATION

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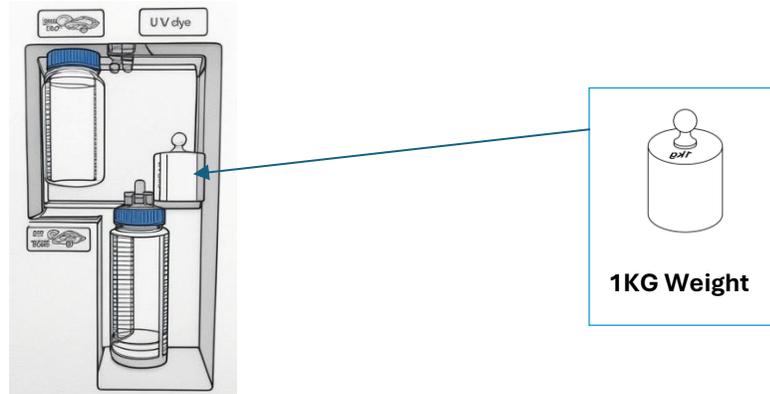
This procedure outlines the steps to calibrate the digital scale module located on top of the used or new oil bottle. The scale supports a frame that attaches all oil bottles together, with the frame hanging from the scale at the top. The calibration weight must be placed at the bottom of the metal frame connected to the used or new oil bottle.

### Prerequisites

- **Calibration Weight:** Prepare a certified 1 kg calibration weight. Do not use any other weight, as this will cause calibration failure.
- Ensure the machine is on a flat, stable, and level surface, free from vibrations or air drafts.
- Do not place any weight on the frame or scale until prompted by the system.

### Calibration Steps

1. **Access Calibration Mode:**
  - Navigate the machine's **System Settings** menu.
  - Select **Calibration**.
  - Choose either **Oil Load Cell** based on the bottle type being calibrated.
2. **Place Calibration Weight:**
  - Wait for the system to display the message: "**Please place 1KG weight on oil bottle frame**, then click OK."
  - **Important:** Do not place the 1 kg weight before this message appears, as it will cause the calibration to fail.
  - Once the message is displayed, carefully place the certified 1 kg weight at the bottom of the metal frame connected to the used or new oil bottle.



- Press **OK** on the system interface to proceed.
3. **Complete Calibration:**
- Allow the scale to stabilize and process the calibration.
  - Once the system confirms calibration is complete, carefully remove the 1 kg weight from the bottom of the metal frame.
  - **Note:** Do not remove the frame, bottles, or any other components during this procedure.
4. **Verification:**
- Go back to front page to check the weight
  - To verify scale accuracy, place a 1 kg test weight on the platform, then remove it.
  - Observe the displayed value to ensure the system registers the correct weight change.
5. **Documentation:**
- Record the calibration details (date, time, bottle type, and confirmation of 1 kg weight used) in the machine's maintenance log.
  - If required, attach a calibration label to the machine indicating the calibration date and next due date.

### Important Notes

- Use only a certified 1 kg calibration weight. Using any other weight will result in calibration inaccurate.
- Ensure the weight is placed only after the system prompts with the message to avoid errors.
- The frame and bottles remain in place throughout the procedure; do not remove them.
- If calibration fails, check for environmental factors (e.g., vibrations, uneven surface) or consult the machine's manual for troubleshooting.
- Perform calibration as part of initial setup and at regular intervals as specified by the manufacturer.

## 8 PRE-SERVICE CHECKUP

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Before each operational session, perform the following tasks to ensure the AC400 is ready for R-134a handling:

1. **Visual Inspection:**

Inspect the machine for physical damage, loose connections, or signs of refrigerant leaks. Use a SAE J2791-compliant leak detector to check hose connections and tank fittings

2. **Oil Bottle Verification:**

- Confirm the new oil vessel contains the correct PAG oil viscosity (46, 100, or 150) for the vehicle's R-134a system. Refer to the database for specifications.
- Ensure the used oil bottle is empty to collect recovered oil

3. **Ambient Temperature Check:**

- Verify the ambient temperature is within 32–104°F (0–40°C) using a thermometer. R-134a's pressure-temperature relationship affects recovery and charging accuracy. The reference table is on side of the machine next to tank pressure gauge.

4. **Hose Condition Check:**

- Inspect HP/LP service hoses for cracks, wear, or degradation. Replace damaged hoses to prevent R-134a leaks, which impact EPA compliance.

5. **Power Supply Stability:**

- Confirm the power supply is stable at AC110V  $\pm$ 10%, 60 Hz, using a voltage meter. Unstable power can damage electronics during R-134a operations.

6. **Unlock Tank Load Cell:**

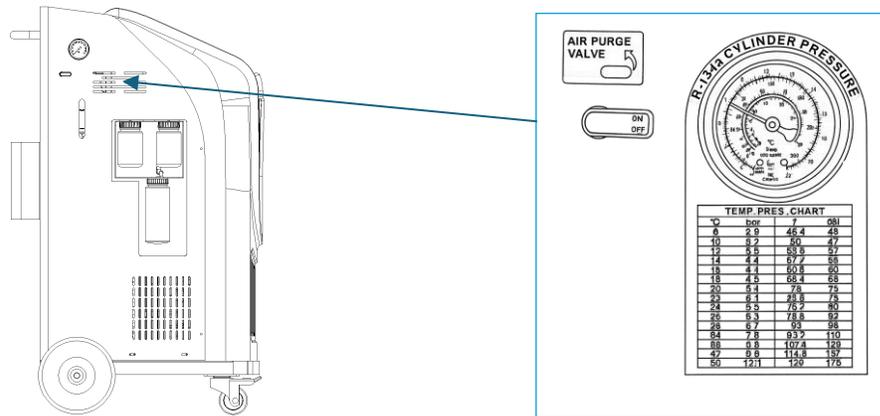
Remove the safety locking bolt securing the gas cylinder load cell (see "Unlock Tank Load Cell").

7. **Tank Fill :**

Ensure 4.4–13.2 lb (–6 kg) of R-134a is in the internal cylinder. Follow "Tank Fill" instructions if needed.

8. **Non-Condensable Air Purge:**

Purging non-condensable gases removes air and other non-refrigerant gases from the internal refrigerant tanks to maintain refrigerant purity and ensure optimal A/C system performance. This procedure, required monthly or after tank filling, prevents excessive pressure buildup and ensures compliance with EPA regulations. The AC400 may perform an automatic purge (if equipped) or a manual purge using the purge valves located on the left and right sides of the machine, guided by the pressure-temperature chart.



- **Manual Purge Valve:**

- Locate the purge valve (see “Component Identification”)
- Refer to the R-134a pressure-temperature chart below and purge until the tank pressure matches the expected value for the ambient temperature.

**R-134a Pressure-Temperature Chart:**

Temperature (°F)	Pressure (psi)
32	28.8
77	78.7
104	124.2

- **Automatic Air Purge (Optional):** The machine purges non-condensable gases within 10 minutes based on ambient temperature and tank pressure.

For machines equipped with Auto Air Purge, the system will automatically purge air as needed during operation.

If you prefer to perform air purge manually, navigate to System Settings and select Air Purge to initiate the process.

⚠ Regular air purging helps maintain refrigerant purity and system performance.

⚠ **Warning:** Over-purging can result in R-134a loss, impacting EPA compliance. Monitor the tank gauge carefully.

## 9 OPERATING PROCEDURE

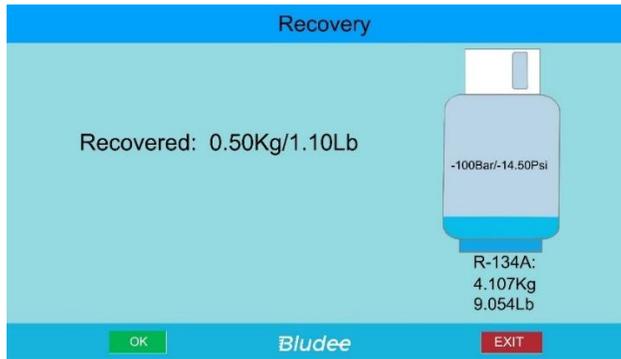
### Cold Weather Operation Tips

For operations in cold climates (<50°F):

- Extend recovery pause time to 5–7 minutes to ensure complete refrigerant extraction, as R-134a vaporizes slowly at low temperatures.

- Increase evacuation time by 5–10 minutes to remove moisture effectively.
- Use the heater band to maintain R-134a flow during recovery and charging
- Store the machine in a heated area when not in use to prevent component freezing.

## 9.1 RECOVERY



1. Empty the used oil vessel.
2. Connect Service Hoses
  - Attach high and low side hoses to the vehicle's A/C ports.
  - Ensure valves are opened.
3. Verify R-134a purity (>98%) using an external SAE J2791-compliant refrigerant identifier. Do not proceed if purity is <98%.
4. Select "Recovery" and press "OK."
5. The machine recovers refrigerant until a vacuum is reached, purifying it from moisture, oil, and debris.
6. Pause for 3–5 minutes (extend to 5–7 minutes in cold climates) to check for pressure rise. If pressure rises, recovery resumes.
7. The printer displays/prints the recovered refrigerant and oil amounts.

## 9.2 VACUUM

The vacuum process removes air, moisture, and residual gases from the vehicle's A/C system to prepare it for oil injection and refrigerant charging. Follow these detailed steps to ensure proper evacuation:

### 1. Preparation

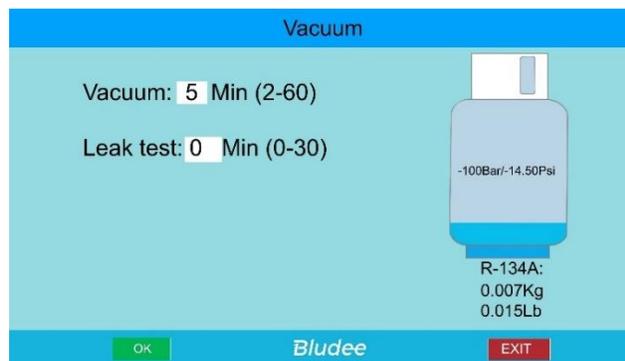
- Ensure the vehicle's engine and A/C system are off.
- Connect the high-pressure (HP) and low-pressure (LP) service hoses to the vehicle's A/C system using the appropriate R-134a.
- Verify that the service hose connections are secure and leak-free using a SAE J2791-compliant leak detector.
- Check that the used oil vessel is empty to collect any oil extracted during the process.

- Monitor the front gauge pressure. If there is pressure, the vacuum will stop and you must run the recovery.

## 2. Access Vacuum Function

- From the main menu, select the “Vacuum” icon.
- Set the vacuum time (recommended: 10–30 minutes, depending on system size and ambient conditions; longer times ensure thorough evacuation).
- Confirm the settings by pressing “OK.”

## 3. Vacuum Process



- The machine activates the vacuum pump to evacuate the A/C system.
- Monitor the LP and HP gauges to ensure pressure drops to a vacuum state (below -14.5 psi). Target vacuum: 500 microns or lower for optimal moisture removal.
- The system automatically stops when the set vacuum time is reached or a stable vacuum is achieved.
- Note: In cold climates (<50°F), extend vacuum time by 5–10 minutes to account for slower moisture evaporation.
- If the vacuum level does not stabilize (e.g., pressure rises after stopping), check for leaks in the vehicle’s A/C system or service hoses using a leak detector and repair as needed before repeating the process.

## 4. Oil injection [Manual oil injection, not for Auto Oil Injection]

### Manual Oil Injection Procedure

After the vacuum cycle is complete, you may proceed with manual oil injection:

- Activate the Manual Oil Injection switch.
- Monitor the oil flow through the sight glass or scale.
- When the desired amount is reached, turn off the switch to stop injection.

⚠ Ensure the correct oil type and quantity are selected based on the vehicle manufacturer’s specifications. This is only working for Manual Injection. Auto oil injection will be under Charge.

## 9.3 CHARGE

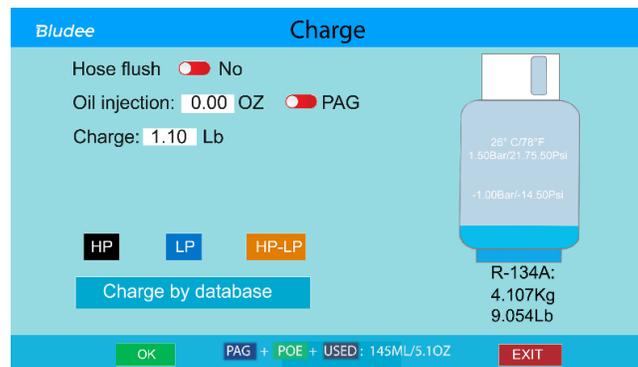
The charge process transfers refrigerant from the machine's internal cylinder to the vehicle's A/C system. Follow these detailed steps to ensure accurate and safe charging:

### 1. Preparation

- Complete the vacuum process (see "Vacuum") to ensure the A/C system is free of air and moisture.
- Verify that the internal refrigerant tank (R-134a) has sufficient refrigerant (8.8–13.2 lb) for charging. If low, perform a tank fill (see "Tank Fill"). If refrigerant is less than 4.4lb, it can't charge.
- Ensure the vehicle's engine and A/C system are off unless specified.
- Confirm that the HP and LP service hoses are securely connected to the vehicle's A/C system with the correct couplers.

### 2. Access Charge Function

- From the main menu, select the "Charge" icon and press "OK."
- Choose the charging mode:
  - **Normal Charging:** For fuel vehicles, with optional hose flushing.
  - **High Voltage Charging:** For hybrid/electric vehicles, with mandatory hose flushing to remove oil residue.



- Set the charge amount:
  - Manually enter the amount (in ounces or pounds) based on the vehicle's service manual.
  - Or use the database (see "Database") to select the refrigerant volume by car make and model.
- Set Oil Injection, PAG oil (46/100/150) or POE oil by manual input.

Avoid over-injection to prevent clogging A/C components. Use a graduated injector for precision.
- Select the charging port: high side, low side, or both

HP & LP are recommended for even distribution. It manually turns the compressor hub post-charge to expel liquid refrigerant.

If charging via low side, turn on the vehicle A/C.

- Confirm settings by pressing “OK.”

### 3. Hose Flushing (If Selected)

- For Normal Charging, hose flushing is optional to clear oil residue from the service hoses. If selected, the machine uses liquid refrigerant to flush the hoses, collecting residue in the used oil vessel.
- For High Voltage Charging, hose flushing is mandatory to prevent oil contamination in hybrid/electric vehicle systems. The machine automatically flushes the hoses before charging.
- Monitor the process on the touch screen and ensure the used oil vessel does not overflow.

### 4. Charging Process

- The machine begins transferring refrigerant at a maximum speed of 4.4 lb/min.
- Monitor the HP and LP gauges to ensure pressure remains within safe limits (see table below).
- The machine stops automatically when the specified charge amount is reached.
- If the charge is interrupted (e.g., due to low refrigerant or high pressure), address the issue (refer to “Main Troubleshooting”) and resume.

### 5. Hose Purge

- After charging, perform a “Hose Purge” to transfer residual refrigerant in the service hoses to the vehicle’s A/C system, ensuring accurate charging.
- Select “Hose Purge” from the charge menu and follow the on-screen prompts.
- The machine recovers any remaining refrigerant into the internal tank to minimize loss.

### 6. Verification

- Start the vehicle’s engine and turn on the A/C system to test performance. Check for proper cooling and monitor gauge readings against the following targets (at 77°F ambient; adjust per temperature):

#### Pressure Targets:

Refrigerant	Low-Side Target (psi)	High-Side Target (psi)
R-134a	25–45	150–250

(At 77°F; adjust per ambient temperature using the R-134a pressure-temperature chart.)

- Use a leak detector to check connections for refrigerant leaks.
- Record the charge amount and any issues in your EPA-required maintenance log.

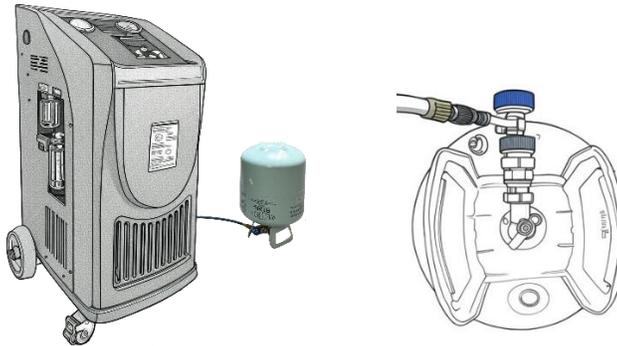
## 10 TANK FILL

The tank fill process transfers liquid refrigerant from an external storage cylinder to the machine's internal cylinder. Follow these detailed steps to maintain adequate refrigerant levels:

### 1. Preparation

**Warning:** Do not proceed with tank fill if purity is <98%. Contamination can damage the machine or vehicle A/C system.

- Verify R-134a purity (>98%) using an external SAE J2791-compliant refrigerant identifier. Do not proceed if purity is <98%
- Verify the internal tank (R-134a) has sufficient capacity for filling (maximum 17.6 lb, or 80% of the 22 lb tank capacity, minus the current amount). For example, if 4.4 lb is present, the maximum fill is 13.2 lb.
- Obtain an external R-134a cylinder approved by Bludee. Ensure it matches the selected refrigerant type to avoid contamination.



- Set the external cylinder valve to liquid output to enable faster filling.
- For single-valve tanks, position the cylinder upside down during filling to ensure liquid delivery.
- Monitor for vapor lock throughout the process to prevent flow interruption and ensure proper charging.
- Connect the LP service hose to the external cylinder using the appropriate tank fitting (R134a P/N: BDE-LP1-134). Secure all connections to prevent leaks.
- Ensure the external cylinder valve is set to liquid output for faster fill; monitor for vapor lock.

### 2. Access Tank Fill Function

- From the main menu, select the “Tank Fill” icon.
- Choose the refrigerant type (R-134a) to match the external cylinder.
- Enter the desired fill amount (minimum 1.1 lb, maximum based on remaining tank capacity).
- Confirm settings by pressing “OK.”



### 3. Filling Process

- Open the external cylinder's hand valve to begin transferring liquid refrigerant to the internal tank.
- Monitor the touch screen for the fill progress and ensure the internal tank does not exceed 17.6 lb (80% capacity).
- The machine automatically stops when the specified amount is reached, or the tank reaches maximum capacity.
- If the fill stops prematurely, check for low refrigerant in the external cylinder, blockages in the hose, or machine errors (see "Main Troubleshooting").

### 4. Post-Fill Recovery

- The machine prompts the technician to close the external cylinder's hand valve.
- The system recovers residual refrigerant from the transfer hose and internal pipelines to minimize loss, storing it in the internal tank.
- Disconnect the service hose from the external cylinder and store it securely.

### 5. Verification

- Check the internal tank's weight on the main menu to confirm the fill amount (maintain 8.8–13.2 lb for optimal performance).
- Inspect connections for leaks using a SAE J2791-compliant leak detector.
- Record the fill amount and external cylinder details in your EPA-required maintenance log.
- If issues arise, refer to "Main Troubleshooting" or contact Bludee support at 443-380-0088 or [www.bludee.com](http://www.bludee.com).

**Warning:** Never overfill the internal tank beyond 17.6 lb, as this can cause overpressure and potential explosion. Ensure the correct refrigerant type is used to prevent contamination. Only EPA Section 609-certified technicians should perform tank filling.

### 6. Tank Fill vs Recovery

While Tank Fill and Recovery perform similar extraction functions, their purposes differ:

- Tank Fill allows the operator to specify the target amount of refrigerant to transfer into the internal cylinder. It is ideal for controlled filling based on system requirements.

- Recovery, by contrast, extracts all available refrigerant from the external tank or any source connected to the service hoses. It does not stop at the present quantity.

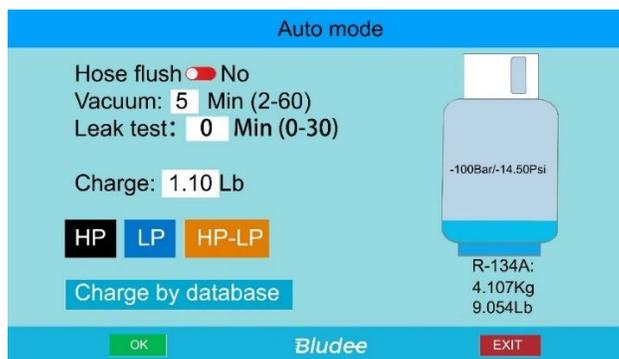
 Tip: If your goal is to fully evacuate an external tank, select Recovery instead of Tank Fill.

## Flushing Function (Optional)

1. Empty the used oil vessel. Verify 4 kg R-134a in the tank.
2. Verify R-134a purity (>98%) using an external SAE J2791-compliant refrigerant identifier.
3. Select “Flushing,” set time (30–60 minutes based on system size, e.g., 30 min for 500 g, 60 min for ≥1 kg).
4. The machine flushes in forward/reverse directions to remove oil and contaminants.
5. For systems with evaporator solenoids/electronic expansion valves, activate or bridge them with a diagnostic scanner or fittings.
6. Recovered refrigerant is purified and stored.
7. After flushing, perform a recovery cycle to ensure all flushing refrigerant is removed.

**Note:** Flushing may not fully clean multi-flow condensers. Ensure adequate R-134a for effective flushing.

## 11 AUTOMATIC FUNCTION MODE



Auto Mode enables a complete, hands-free A/C service cycle, combining multiple functions into a single automated sequence. This mode is ideal for streamlining workflow and ensuring consistent service quality.

### Pre-Operation Checklist

- Empty the used oil vessel to ensure accurate oil separation.
- Verify refrigerant type, tank capacity, and filter status.
- Confirm vehicle type (fuel or high-voltage) to select the correct charging mode.

### Automated Service Sequence

Once “Auto Mode” is selected, the machine performs the following operations in sequence:

- Recovery – Extracts refrigerant from the vehicle system
- Vacuum – Evacuates air and moisture from A/C lines
- Oil Injection – Injects oil (for fuel vehicles only)
- Charging – Dispenses refrigerant to target weight

⚡ Charging Options:

- Normal Charging – For conventional fuel vehicles
- High Voltage Charging – For hybrid or electric vehicles

🔧 Hose flushing is optional for Normal Charging but mandatory for High Voltage Charging to prevent cross-contamination.

✅ Bludee Best Practices Integrated

- Automated leak detection and pressure monitoring are built into the cycle.
- EPA-compliant recovery and disposal protocols are followed.
- System prompts and alerts guide technicians through any required manual steps.

## 12 SYSTEM SETTINGS

Enter password “111111” to access “System Settings.” Change the default password via owner information for security. Configure:



- **Language:** Select operating language.
- **Calibration:** For load cells, pressure transducers, and temperature sensors (qualified technicians only).
- **Database:** Access R-134a and PAG oil volumes for vehicle makes/models.
- **Unit Settings:** Select imperial units; view sensor values for diagnostics.

- **Empty Container Weight Set:** Adjusts load cell readings for refrigerant/oil.
- **Component Test:** Activates/deactivates components for troubleshooting (qualified technicians only).

**Warning:** Improper calibration or testing can damage the machine or A/C system.

## 13 EQUIPMENT MAINTENANCE

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To ensure optimal performance and longevity of the AC400 R134a Recycle and Recharge Machine, adhere to the following maintenance guidelines:

- **Cleanliness:** Regularly clean the exterior and touch screen with a soft, dry cloth to prevent dust buildup. Ensure service hoses are stored on their adapters when not in use to avoid contamination of couplers, which could introduce debris into the vehicle's A/C system. Clean vehicle A/C service ports before connecting couplers to prevent system malfunctions.
- **Storage:** Store the machine in a cool, well-ventilated area (below 104°F/40°C) away from direct sunlight, artificial heat sources, or flammable materials. This prevents overheating and ensures component integrity.
- **Regular Inspections:** Routinely inspect hoses, couplers, and fittings for wear or damage. Use a SAE J2791-compliant leak detector to check for refrigerant leaks in the machine's internal system and connections.
- **Maintenance Schedule:** Follow the recommended maintenance schedule (see "Regular Maintenance and Reset") for filter-drier replacement, vacuum pump oil changes, and solenoid washer replacements. Frequent servicing of contaminated A/C systems requires more frequent oil and filter changes to prevent corrosion or reduced refrigerant purity.
- **Handling Precautions:** Avoid moving the machine during charging to maintain load cell accuracy. If the machine is accidentally bumped or tipped, verify calibration and perform a leak check before resuming operation.
- **Professional Assistance:** For any operational uncertainties or complex maintenance tasks, contact Bludee support at 443-380-0088 or [www.bludee.com](http://www.bludee.com). Only EPA Section 609-certified technicians should perform maintenance or calibration to ensure compliance and safety.

**Warning:** Never use compressed air to test for leaks, as this can damage the machine or vehicle A/C system. Failure to maintain the equipment properly may lead to reduced performance, EPA non-compliance, or component failure.

## 14 SOFTWARE UPDATE

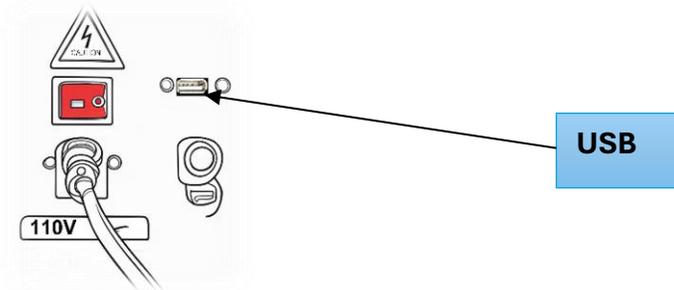
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### 14.1 DATABASE UPDATE

1. Unzip the received compressed file.  
**dwin\_set.zip**
2. Copy the extracted folder to a USB disk (ensure it is the only file on the disk).

## DWIN\_SET

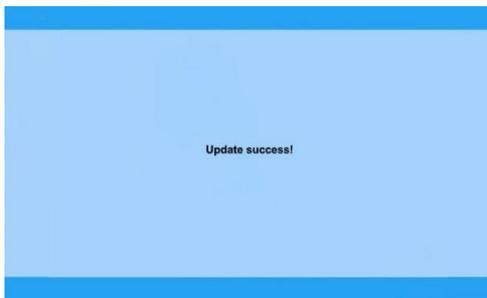
3. Insert the USB disk into the machine's USB Type-A port.



4. Turn on the machine to display the upgrade interface.



5. Upon successful upgrade, shut down, remove the USB disk, and restart the machine.

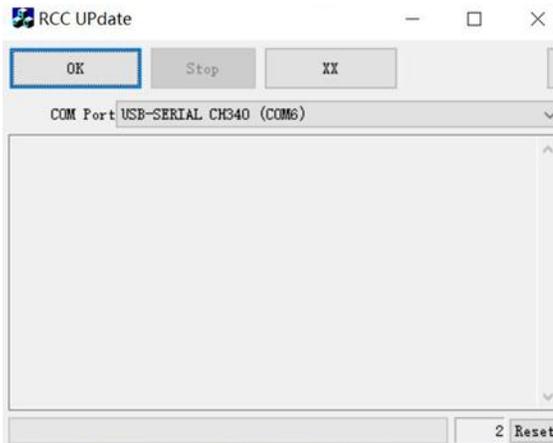


## 14.2 MAIN PROGRAM UPDATE

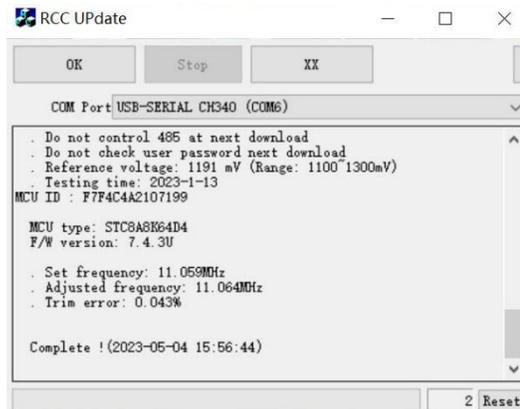
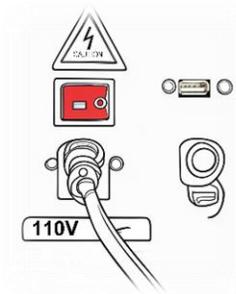
1. Install the "ch341ser" program on a computer.



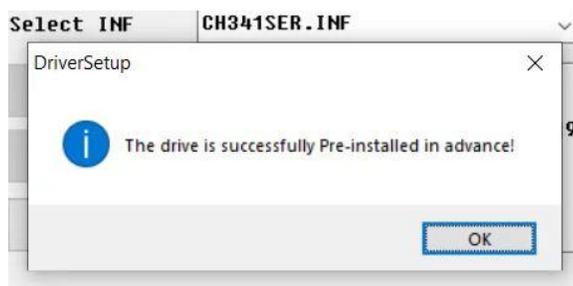
- Run "AC400D 23.5.4.exe" on the computer.



- Turn off the machine, insert the black update cable into the USB Type-B port, and select "OK" within 6 seconds.



- A successful update is indicated on the interface.



## 15 REGULAR MAINTENANCE AND RESET

The filter-drier processes 220 lb (100 kg) of R-134a before locking the machine. Perform maintenance:

- Preparation:**
  - Check filter-drier life on startup.

- Obtain a replacement filter-drier, vacuum pump oil, solenoid spool washers, and o-rings from Bludee (443-380-0088 or [www.bludee.com](http://www.bludee.com)).
- Disconnect power and wear safety goggles/gloves.

## 2. Filter-Drier Replacement:

- Locate the filter-drier. Open rear door and filter is on the left side.
- Close the tank valve, remove the old filter-drier, and install the new one.
- Collect residual oil in an approved container.

## 3. Vacuum Pump Oil Replacement:

- Drain old oil from the pump reservoir and refill to the centerline with Bludee-specified oil.

## 4. Solenoid Spool Washer Replacement:

- Replace washers for solenoid valves (see “Main Troubleshooting” for locations).

## 5. Leak Testing:

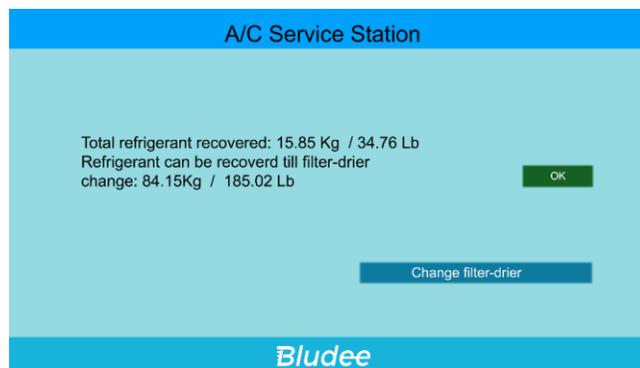
- Reconnect power and test connections with a SAE J2791-compliant leak detector.

## 6. Periodic Calibration Check:

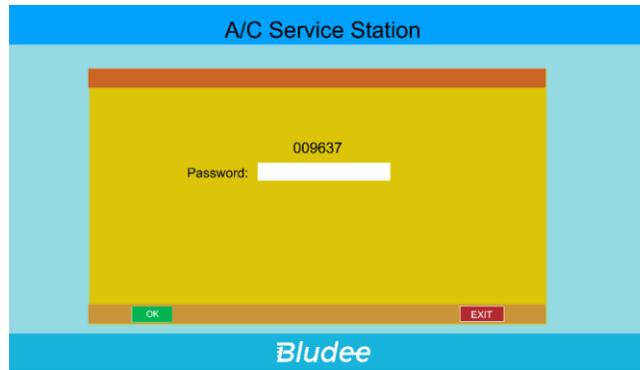
- Every 3 months, verify load cell and pressure sensor calibration using a 2.2 lb weight and a reference pressure gauge.
- If discrepancies are found, recalibrate per the “Calibration” section or contact Bludee support.

## 7. Service Reset Procedure

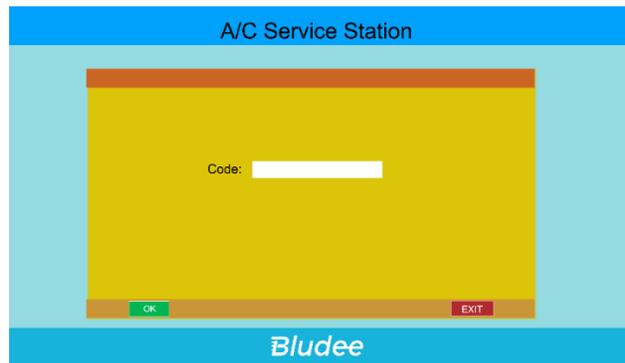
- When the filter-drier life expires, the machine displays a maintenance prompt with a unique number.
- Contact your Bludee distributor at 443-380-0088 or visit [www.bludee.com](http://www.bludee.com) and provide the displayed number to obtain a dynamic password (passwords are unique for each reset).
- Click “Change filter-drier” when the machine is powered on.



- Input the service code provided by the distributor or Bludee direct.



- Enter the 2<sup>nd</sup> code printed on the new filter-drier [all upper case].



- If the code is recognized, the machine will initiate a 60-second evacuation cycle to clear internal lines.
- Upon completion, the system resets, allowing another 220 lb of refrigerant to be recovered and charged.
- Verify the reset by checking the filter-drier life display on startup (it should show 220 lb remaining).

## 16 EXPANDED MAINTENANCE SCHEDULE

Interval	Task
Daily	Empty used oil vessel; inspect hoses for wear
Weekly	Check gauge calibration; verify tank pressure
Monthly	Purge non-condensable gases; inspect oil vessels
Quarterly	Check vacuum pump oil clarity; replace if cloudy; verify load cell/pressure sensor calibration
Annually	Perform full leak test
Every 220 lb	Full service: replace filter-drier, pump oil, solenoid washers

**Warning:** Only EPA Section 609-certified technicians should perform maintenance. Dispose of waste per local and federal regulations.

## 17 PACKING LIST

Part Number	Article	Quantity
BDE-400-134	AC400 Main Unit	1
BDE-HOS-3MR	Red Service Hose	1
BDE-HOS-3MB	Blue Service Hose	1
BDE-CPR-13L	Low-Pressure Quick Coupler, R134a	1
BDE-CPR-13H	High-Pressure Quick Coupler, R134a	1
BDE-FUS-30A	30A Fuse	1
BDE-USB-01B	Update Cable with USB	1
BDE-LP1-134	R134a Low-Side Tank Adapter	1

## 18 TROUBLESHOOTING

Error Code	Malfunction	Reasons	Solution
005	Low Vacuum Degree	<ol style="list-style-type: none"> <li>1. Low vacuum pump oil.</li> <li>2. Dirty/emulsified oil.</li> <li>3. Plugged oil inlet.</li> <li>4. Pump connection leaks.</li> <li>5. Worn components.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add oil to centerline.</li> <li>2. Replace oil.</li> <li>3. Clean inlet.</li> <li>4. Check connections.</li> <li>5. Replace o-rings/washers.</li> </ol>
-	Vacuum Pump Injects Oil	<ol style="list-style-type: none"> <li>1. Excessive oil.</li> <li>2. High entrance pressure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain excess oil.</li> <li>2. Run recovery first.</li> </ol>
-	No Display	<ol style="list-style-type: none"> <li>1. Blown fuse (PCA/power cable).</li> <li>2. Burnt PCA.</li> <li>3. Loose power cable.</li> <li>4. Faulty LCD.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace fuses.</li> <li>2. Replace PCA.</li> <li>3. Secure cable.</li> <li>4. Replace LCD.</li> </ol>

-	Recovery Does Not Stop	<ol style="list-style-type: none"> <li>1. A/C or machine pipeline leak.</li> <li>2. Compressor failure.</li> <li>3. Faulty pressure sensor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Test for leaks.</li> <li>2. Replace compressor.</li> <li>3. Secure/replace sensor.</li> </ol>
-	No Change in Recovery Volume	<ol style="list-style-type: none"> <li>1. No refrigerant in A/C.</li> <li>2. Load cell bolt not removed.</li> <li>3. Faulty load cell/PCA.</li> </ol>	<ol style="list-style-type: none"> <li>1. Stop recovery.</li> <li>2. Remove bolt.</li> <li>3. Calibrate/replace load cell/PCA.</li> </ol>
004	High Pressure Alarm	<ol style="list-style-type: none"> <li>1. High pressure switch disconnected.</li> <li>2. Blocked compressor exit pipeline.</li> </ol>	<ol style="list-style-type: none"> <li>1. Secure switch plug.</li> <li>2. Inspect hoses/valves.</li> </ol>
-	Contaminated Refrigerant	<ol style="list-style-type: none"> <li>1. External identifier detects non-R-134a (e.g., R-12, HFO-1234yf).</li> </ol>	<ol style="list-style-type: none"> <li>1. Stop operation.</li> <li>2. Do not proceed with recovery or tank fill.</li> <li>3. Isolate contaminated system and contact Bludee for guidance.</li> </ol>

**Note:** Contact Bludee at 443-380-0088 or [www.bludee.com](http://www.bludee.com) for unresolved issues.

## 19 WARRANTY AND REGISTRATION

The AC400 includes a 1-year limited warranty for defects in materials and workmanship. Register at [www.bludee.com/register](http://www.bludee.com/register) within 30 days of purchase. Contact Bludee at 443-380-0088 or [www.bludee.com/support](http://www.bludee.com/support) for claims. Retain proof of purchase and maintenance records.

## 20 ACCESSORIES AND PARTS

Part Number	Accessory	Description
BDE-HOS-3MB	Low-Pressure Service Hose, 10ft, Blue	
BDE-HOS-3MR	High-Pressure Service Hose, 10ft, Red	
BDE-CPR-13L	Low-Pressure Quick Coupler, R134a	
BDE-CPR-13H	High-Pressure Quick Coupler, R134a	
BDE-020-DF3	Dry Filter for AC400	
BDE-020-G22	High-Pressure Gauge, 1.6	
BDE-020-G21	Low-Pressure Gauge, 1.6	
BDE-LP1-134	R134a Low-Side Tank Adapter	
BDE-020-1KG	1kg Calibration Weight	
BDE-025-B20	Oil Bottle, 200ml Capacity	

BDE-025-B40	Oil Bottle, 400ml Capacity
BDE-022-80K	Digital Tank Scale, 80kg Capacity
BDE-022-CVB	Plastic Blue Front Cover for AC400

Order accessories at [www.bludee.com](http://www.bludee.com) or call 443-380-0088.

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## 21 GLOSSARY

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- **Charge:** Transfers R-134a from the internal tank to the vehicle A/C system to restore cooling.
- **Cross-Contamination:** Mixing R-134a with other refrigerants, potentially damaging the machine or A/C system.
- **Evacuation:** Removes air, moisture, and debris from the A/C system using a vacuum pump to prepare for charging.
- **Filter-Drier:** Removes moisture and contaminants from recovered R-134a for purity.
- **Flushing:** Uses refrigerant to extract compressor oil and contaminants from the A/C system in forward/reverse flow.
- **Hose Flush:** Cleans service hoses with liquid R-134a to remove oil residue, preventing contamination.
- **Load Cell:** Measures the weight of the refrigerant or oil containers with high accuracy.
- **Microns:** A pressure unit (1 micron = 1/1000 mmHg); 500 microns indicates a deep vacuum.
- **Non-Condensable Purge:** Removes air or other gases from the refrigerant tank to maintain purity.
- **PAG Oil:** Polyalkylene glycol oil for R-134a fuel vehicles; conductive, unsuitable for hybrid/electric vehicles.
- **POE Oil:** Polyol ester oil for hybrid/electric vehicles; non-conductive, used separately.
- **Recovery:** Extracts R-134a from the vehicle A/C system into the internal tank for recycling.
- **SAE J2210:** Standard for R-134a recovery/recycling equipment, ensuring 95% efficiency.
- **Solenoid Valve:** Controls refrigerant/oil flow within the machine.
- **Vacuum Pump:** Evacuates the A/C system; capacity measured in cfm (e.g., 2.12 cfm).
- **Vapor Lock:** Vaporized refrigerant in the hose slowing liquid transfer during tank fill.

## Refrigerant Purity Check

The AC400 does not include an integrated refrigerant identifier. Use an external SAE J2791-compliant refrigerant identifier to verify R-134a purity before recovery or tank fill to ensure compliance and prevent contamination:

**1. Preparation:**

- Ensure the external identifier is calibrated per manufacturer instructions.
- Connect the identifier to the vehicle A/C system or external R-134a cylinder's vapor port.

**2. Purity Check:**

- Follow the identifier's instructions to analyze the refrigerant (typically 120 seconds).
- Confirm R-134a purity is >98%.

**3. Verification:**

- If purity is <98%, the refrigerant is contaminated (e.g., with R-12 or HFO-1234yf). Do not proceed with recovery or tank fill.
- Isolate the contaminated system or cylinder and contact Bludee at 443-380-0088 or [www.bludee.com](http://www.bludee.com) for guidance on handling contaminated refrigerant.

**4. Recordkeeping:**

- Log the purity check results, including date, purity percentage, and any contaminants detected, in your EPA-required maintenance log.

**Warning:** Contaminated refrigerant can damage the AC400 and vehicle A/C system. Always verify purity with an external identifier to comply with EPA regulations.