



H.G RUNNINGS TECHNICAL CENTER RED DOT CORPORATION

General Air Conditioning Charging Guide Refrigerant R-134a

Safety Precautions & Warnings:

1. Charging of an air conditioning system should be conducted by a qualified a/c technician.
2. Always wear the proper protective eyewear and clothing before working on any air conditioning system.
3. Always wear work gloves when working with condensers or evaporators. The aluminum edges can be sharp, and cause serious cuts.
4. Always use DOT-approved tanks for storing refrigerants.
5. Always provide plenty of ventilation when working with refrigerants. Avoid breathing refrigerant vapor, or lubricant mist.
6. Never use compressed air to leak test or pressure test an R134a system. Under certain conditions, pressurized mixtures of R134a and air can be combustible. In addition, shop air injects moisture into the system.
7. Always use mineral oil to lubricate O-rings, even on R134a systems.

Recommended Tools:

1. Safety glasses and work gloves.
2. Thermometer
3. R134a Refrigerant
4. Compressor oil (if needed)
5. Mineral oil to lubricate o-rings
6. Manifold Gauge Set – similar to RD-5-11104-0P
7. Vacuum Pump – similar to RD-5-11118-0P
8. Charging Scale – similar to RD-5-11153-0P
9. Alternately a Recovery/Charging Station similar to RD-5-11087-0P can be used instead of items 6, 7 and 8 above.
10. Thermistor Vacuum Gauge Sensor – similar to RD-5-11115-0P
11. Infrared temperature sensor



Field Charging Procedure:

1. Ensure all fittings are tight and components installed correctly.
2. Attach manifold gauge set to high and low side service ports. The blue coupler attaches to low pressure charge port and red coupler attaches to high pressure charge port.
3. Attach yellow (center) hose from manifold gauge set to vacuum pump.
4. Attach Thermistor Vacuum Gauge to a/c system not at the vacuum pump. The reading at the vacuum pump may not give an accurate indication of the true vacuum in the a/c system.
5. Start vacuum pump.
6. Open both red and blue (high and low side) valves on manifold gauge set.
7. Let vacuum pump run until thermistor vacuum gauge reads 1000 microns. Then run an additional 15 minutes.
8. Close red and blue valves on manifold gauge set.
9. Monitor pressure reading on thermistor vacuum gauge for 10 minutes with vacuum pump off and manifold gauge valves closed. Reading should be between 1000 and 400 microns and should not climb above 1000 microns.
10. If pressure in a/c system rises above 1000 microns the system has a leak and needs to be repaired prior to charging system.
11. **After verifying the system has no leaks, remove thermistor vacuum gauge.** Vacuum gage may be damage if pressurized above atmospheric pressure.
12. Attach yellow hose from manifold gauge set to refrigerant.
13. Place refrigerant tank upside down on charging scale. (Yellow hose should be attached and tank valve open.)
14. Zero charging scale measurement.
15. Open red (high side) valve on manifold gauge set and add the factory recommended charge amount if known. **Close red valve on manifold gage set.** Charging is complete. Verify proper a/c operation. Document total refrigerant added to system and apply appropriate label near compressor stating refrigerant charge amount.
16. If the proper refrigerant charge amount is not known, add one to two pounds of liquid refrigerant to the system through the high side port (red). The amount of refrigerant added depends on the estimated full charge amount. It is typically $\frac{1}{2}$ to $\frac{3}{4}$ of the estimated full charge. **Close red valve on manifold gauge set.** This type of refrigerant charging should be done at an ambient temperature of 32°C (90°F) or greater with machine doors open to provide a load on the evaporator.
17. Turn refrigerant tank right side up on charging scale (vapor charge position).



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18. Start machine engine and turn on a/c system. Condenser fan must remain engaged for a proper charge determination. Install a fan pressure switch jumper if necessary.
19. Record ambient temperature, evaporator inlet temperature, evaporator air outlet temperature, suction pressure and discharge pressure.
20. If suction pressure is 5 psig or less, keep engine speed at idle until additional refrigerant has been added and suction pressure exceeds 5 psig.
21. With an infrared thermometer measure condenser tube temperatures from refrigerant inlet to refrigerant outlet (typically from top to bottom).
22. The temperature will be highest at the refrigerant inlet (superheated region). The temperature will then decrease to the saturation temperature of the refrigerant at the operating discharge pressure (saturation or condensing temperature). Near the outlet of the condenser the temperature should once again decrease by 10-14°F below the saturation temperature (sub-cooled region).
23. If the refrigerant at the outlet of the condenser is not sub-cooled by 10-14°F below the saturation temperature, continue to add vapor refrigerant in small increments through the blue (low side) charge port.
24. When 10-14°F of condenser outlet sub-cooling is reached, verify proper a/c operation.
25. Document total refrigerant amount added to system and apply appropriate label near compressor stating refrigerant charge amount. Remove pressure switch jumper if installed in step 18.