

CHANGING OUT A CONDENSING UNIT ON SPECIALTY R-290 DISPLAY CASES

Preparations for Changing Out an R-290 Condensing Unit

1. Check that all R-290 condensing units and compressors **are** clearly labeled as R-290 charge compliant.
2. Make sure all necessary tools required to perform the job are readily available before beginning the repair.
3. The system should **never** be opened to the atmosphere for more than 15 minutes to help prevent moisture from entering the system.
 - a. Change out the drier after any time the system has been opened to the atmosphere.
 - b. A 500-micron vacuum **must** be pulled before proceeding.
4. The repair, detailed in this procedure, is for changing out a condensing unit that has been determined to have failed.

Tool List for Changing Out an R-290 Condensing Unit

- Vacuum pump
- Micron digital gauge scaled to below 500-microns
- Small tubing cutter
- Fire extinguisher
- Refrigeration manifold with shut-off valve and the shortest hoses available (preferably 6")
- Warning sign/placard – work area and hazardous material
- Refrigerant-grade R-290 (may be purchased at local refrigeration wholesale house)
- Hand-held combustible gas detector
- Refrigerant scale for weighing in the refrigerant charge
- Small, portable copper pipe brazing set-up
- Oxygen-free, dry nitrogen with flow regulator
- Refrigerant tank adaptor
- Required safety equipment (PPE, safety glasses, gloves, liquid leak detector or soap bubbles, a fan for work area ventilation)

Step-by-Step Procedure for Changing Out an R-290 Condensing Unit

1. **Ensure** that the work area is well ventilated. Use a fan to further dissipate any vented R-290.
2. Turn on the combustible gas detector and set it in front of the work area. Allow time for the combustible gas detector to warm up and self-calibrate.

Ensure that the gas detector continues operating in front of the work area until all work has been completed.

3. All required Personal Protective Equipment (PPE), such as safety glasses, gloves, etc. should be worn.

Also, an applicable “propane hazard” placard should be prominently displayed near the work area.

4. Remove all power from the unit/case (unplug, disconnect, etc.).
5. Remove the cover panels from all four sides of the bottom base of the case to allow completely unobstructed and easy access to the compressor.
6. Connect a manifold gauge using the shortest hose possible (preferably 6”).

Note: the combustible gas detector may again temporarily sound an alarm at this time.

7. **Slowly** open the low-side ports on the manifold gauge to remove the refrigerant from the system while keeping in mind that during the venting process, the combustible gas detector may again sound an alarm. Do not exceed the lower flammability limit of R-290 (39 ppm) while venting.

If and when the alarm does sound, stop venting the R-290 refrigerant and allow the gas to dissipate into the surrounding air. Wait a few minutes and recommence venting ensuring that the reading gas detector does not exceed the safe level of 39 ppm.

Repeat the above step of venting the R-290 refrigerant by opening the manifold gauge ports. As before, continue to vent the refrigerant until the gas detector alarm sounds, and ensure the safe level of 39 ppm is not exceeded

8. Perform these steps until the entire charge of the R-290 refrigerant is purged from the system.

9. Cut the suction line using a set of tubing cutters at a point as close to the compressor as possible.
10. Cut the discharge line at a point as close to the compressor as possible.
11. Unbolt and remove the condensing unit.
12. Set the new condensing unit and bolt in place.
13. Make sure the suction and discharge lines that were cut loose have been deburred, cleaned and set into place before pulling the plugs on the new compressor.

Taking these actions will help to reduce the amount of time the unit is open to the atmosphere. It is important to limit how long the system is open due to the hygroscopic (moisture-absorbing) nature of the POE oil used in this system.

14. Flow oxygen-free, dry nitrogen through the system for two (2) minutes before beginning to braze. Doing so is necessary whenever brazing on an R-290 refrigeration system
15. **Continue** to flow dry nitrogen through the system for the entire duration of the brazing process. (Hillphoenix recommends that the nitrogen flow regulator be set to 3 to 5 psig.)
16. Once the brazing is complete and the lines have cooled, charge the system with 200 psig of nitrogen.
17. **Carefully** and thoroughly leak-check the lines with either a liquid leak detector or soap bubbles (look for the formation of bubbles).
18. Once the system has been checked for leaks, vent the nitrogen pressure down to approximately 2 psig to prevent moisture from entering the system.
19. Reconnect the manifold gauge by:
 - Attaching the suction hose to the process tube with the shortest possible hose (preferably 6")
 - Attaching the center charging hose to the vacuum pump
 - Attaching the liquid hose to the micron gauge
20. Pull a minimum 500-micron vacuum on the entire system (condensing unit and evaporator). Make certain that there is **only** clean oil in the vacuum pump.
21. Once the vacuum has reached 500-microns, shut off the gauges and remove the charging hose from the vacuum pump.

22. Connect the R-290 tank adapter to the R-290 (boxed) tank.
Place the refrigerant back in the box and place the box on a refrigeration scale.
Connect the charging hose to the tank and open the tank and make sure you purge the charging hose of all air.
23. Secure the manifold and hoses so that no unnecessary stress is placed on the scale and zero-out the refrigeration scale.
24. Open up the low-side valve of the manifold set until the proper amount of R-290 has been weighed and charged into the system.
25. If the system did not take the full charge (as listed on the case data plate) by weight, turn on the compressor and run the case for one (1) minute.
26. Add the more R-290 into the suction port until the unit is fully charged.
27. Close the valve on the refrigerant tank and the hose. Allow the system to run and verify that the system is operating properly.