

ENGINEERING
TOMORROW

Danfoss

User Guide

Gas cooler replacement for Optyma™ iCO₂



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Step 1 : Preparation

- Condensing unit should still have a small blanket charge of nitrogen to keep the system dry, please check and release nitrogen through service valves
- To be manipulate deep switches and set the unit, ensure Power supply is turned OFF.
- Turn ON dip SW5-7 (Up) and turn ON power. All electronically operated valves and electronic expansion valves will be fully open, this will ensure of nitrogen released from the unit and help with the re-works
- Remove the fan motors from the top panel and connecting cables from the PCB
- Remove the top panel from the unit,(fig. 1) show a little caution as this top panel gives the unit some structure and the gas coolers will move a little
- De-braze the inlet / outlet piping connections(fig 2 and fig.3) of the gas coolers working in parallel and lift out the gas coolers
- Connect the nitrogen cylinder at HP service valve via regulator and gauge manifold for brazing work and airtightness test.

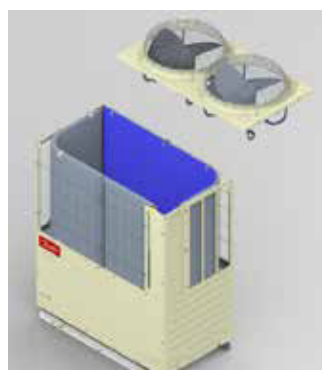


Fig. 1



Fig. 2

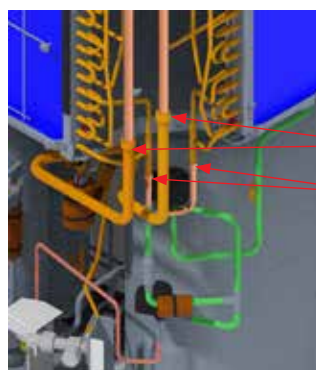


Fig. 3

Gas cooler inlet
Gas cooler outlet



Please use appropriate PPE kit while removing and replacing gas coolers.

Step 2 : Heat exchanger replacement

- Lift the new gas cooler into position and re-braze the piping connections
- Make sure to purge with nitrogen to avoid oxidation during the brazing process
- In addition to this, please make sure to fill the piping connection with a sufficient amount of brazing rod
- In the image below you can see some examples

Design and practice the piping work as instructed below.

- Sufficiently clean the inside of low pressure device, pipes, etc., to remove dirt or moisture, and dry them before use. Use always a pipe cutter to cut refrigerant pipes, and blow off dirt with nitrogen, or air, before connection. (Avoid to use a saw, or grinder, because it could produce a lot of Swarf.)
- Use the nitrogen gas blow when brazing pipes to prevent oxide scale.

Step 3 : Airtightness test for heat exchanger high pressure tubing

- Power off the unit, then dip SW5-7, Turn ON dip SW5-8 (UP) and turn on power. All electronically operated valves and electronic expansion valves will be fully closed (see fig. 6)
- In this case of Heat exchanger replacement, please make sure to apply 140bar (14Mpa) from the HP service port
- When you applying nitrogen to the system, charge the nitrogen in steady increments and stop for 5 minutes at each incremental increase
- As shown in the presentation material, start at 10bar (1Mpa), 30bar (3Mpa), 70bar (7Mpa), 100bar (10Mpa), 130bar (14Mpa)
- Finally charge the nitrogen to 140bar (14Mpa) and hold for 10 minutes to check for any pressure drop, visible tube deformation

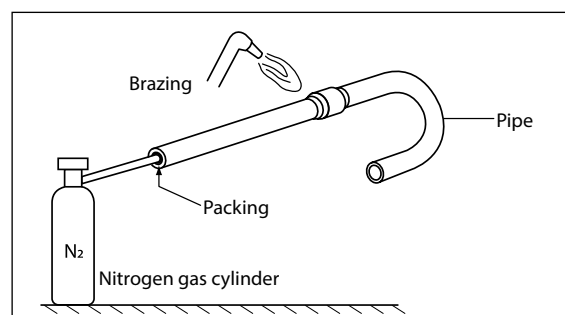


Fig. 4

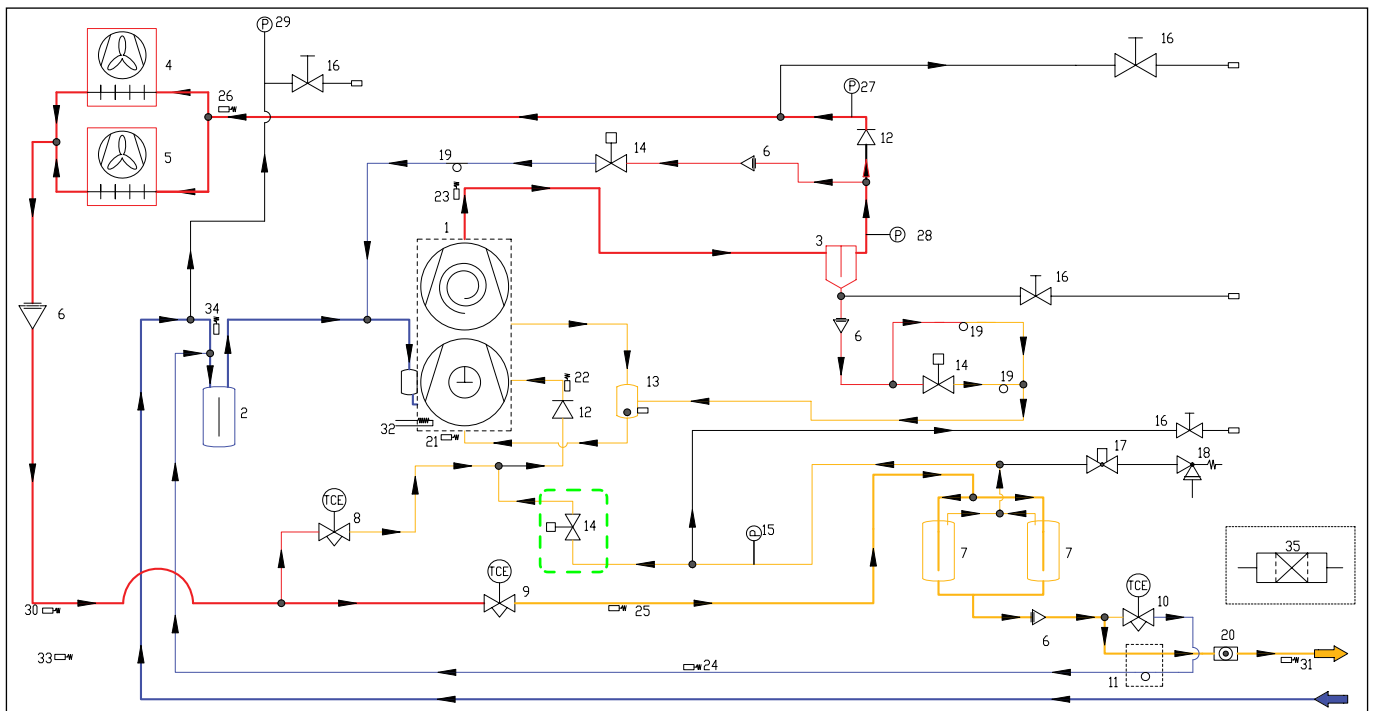


Fig. 5

- | | | |
|---|---|---|
| 1. Two stage compressor (scroll-rotary) | 14. Solenoid Valve | 27. High pressure sensor |
| 2. Suction line Accumulator | 15. Middle Pressure sensor | 28. High Pressure switch |
| 3. Oil Separator | 16. Service Valve | 29. Low pressure sensor |
| 4. DC Fan assembly | 17. Shut off Valve | 30. Gas cooler temperature sensor |
| 5. Micro Channel Heat Exchanger with Fan | 18. Pressure Relief valve | 31. Liquid feed pipe temperature sensor |
| 6. Strainer | 19. Capillary | 32. Crankcase Heater |
| 7. Liquid Receiver | 20. Sight glass | 33. Outside air temperature sensor |
| 8. EEV for liquid bypass | 21. Under dome temperature sensor | 34. Suction pipe temperature sensor |
| 9. EEV for Middle pressure receiver inlet | 22. Injection inlet temperature sensor | 35. Filter Drier (Accessory) |
| 10. EEV for Subcooling coil | 23. Discharge pipe temperature sensor | |
| 11. Subcooling coil | 24. Subcooling coil temperature sensor | |
| 12. Check Valve | 25. Middle pressure receiver inlet temperature sensor | |
| 13. Oil pod | 26. Gas cooler temperature sensor | |
- High Pressure Circuit
— Low Pressure Circuit
— Medium Pressure Circuit

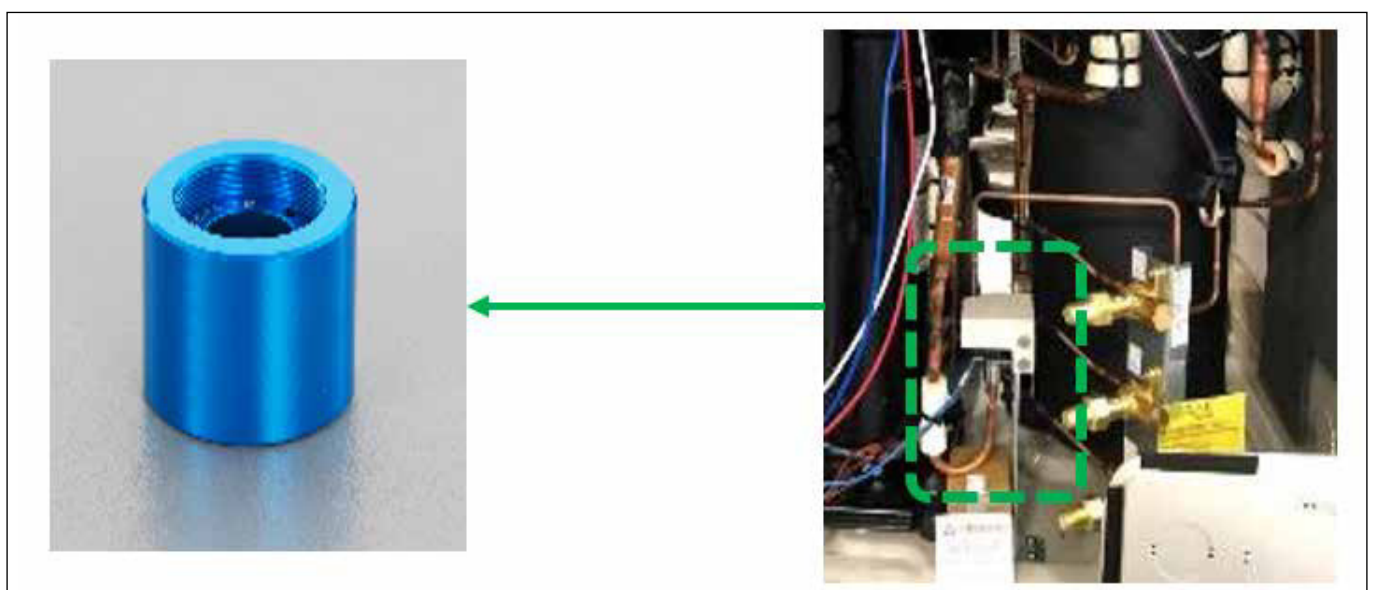


Fig. 6

Yellow highlight should be pressurised with N2 140bar (14MPa) after replacement of the gas cooler

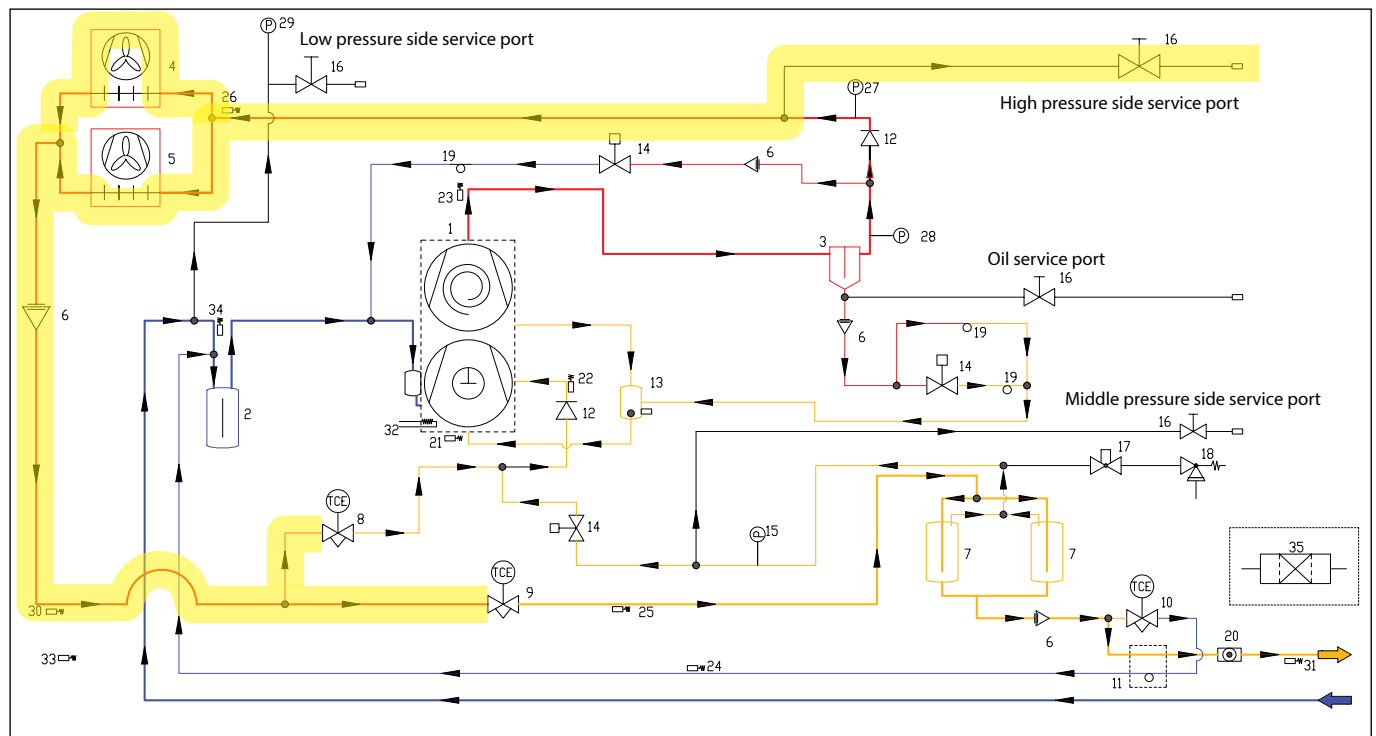


Fig. 7

Maintenance

If the components located in medium and low-pressure area (Yellow and blue colour) are replaced

-Same manner with Air tightness test at installation phase

Usage pressure : 80.0bar

Step 4 : Vacuuming

- Never use the compressor to evacuate the system.
- Connect a vacuum pump to both the LP & HP sides for quicker and efficient evacuation.
- Pull down the system under a vacuum of 500 $\mu\text{m Hg}$ (0.67 mbar) absolute.
- Do not use a megohmmeter or apply power to the compressor while it is under vacuum as this may cause internal damage.
- After the airtight test, connect the vacuum pump to the low pressure side service port and high pressure side service port, and evacuate.
- Use always a vacuum pump to the equipment.
- Check the low pressure with the gauge manifold or vacuum gauge.
- When there is no power supply to the unit, remove the coil from the medium pressure suction solenoid valve, and open it forcibly using a special magnet.
- When there is a power supply to the unit, ensure this is turn OFF and then turn the dip switch SW5-7 to ON (Up) to turn on the unit's power supply. The electronic expansion valve and solenoid valve in the unit open. The vacuum pump is connected to the low pressure side only at that time.

Step 5 : Nitrogen (N2, oxygen free) /CO₂ charge

- When the unit is not installed, for storage purposes, please charge small amount of N2 (0.1 bar) to the Condensing unit and ensure piping caps are fitted, ensure the Condensing unit is keep dry
- When you are doing that on site, please charge according to the previous commissioning or use the Danfoss calculation charge tool to ensure the right amount of refrigerant and oil charge.

Note:

Ensure that the airtight test report and pressure test report are captured with possible evidences to further Pressure equipment regulations.

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