UNITED CoolAir
All-Indoor Solutions

# Water-Cooled Unit

## *Start-Up Procedures* (R-410a Systems)

1. Start up must be performed by a qualified HVAC Technician.
2. Make certain that all power is disconnected at the main power circuit breaker or service disconnect before starting any of this procedure.
3. Check all electrical screw terminals and wiring lugs for tightness internal to the equipment. Components may have loosened due to vibration during transit or handling. Verify that the main power block lug connections made in the field are tight and secure.
4. Confirm that the voltage rating of the equipment data tag coincides with the power that will be delivered to the unit.
5. Verify that the circuit protection for the unit satisfies Local and National Codes according to the unit data tag Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS).
6. Locate the unit thermostat and check all electrical terminations against the unit electrical diagram and for the unit thermostat.

**Note:** *If using a digital thermostat with a "C" (Common) terminal, this terminal MUST be terminated to the "C" terminal in the unit. Failure to do so will result in the thermostat shorting out and being destroyed.*

7. Leak check the refrigerant system. While the unit was leak checked at the factory, leaks can develop during transit and / or handling.
8. Confirm that the unit condensate has been adequately trapped and taken to a suitable point for disposal.
9. Verify that the filters are in place, clean and usable.
10. Switch the unit thermostat to the "OFF" position.
11. Apply power to the unit. Switch the circuit breaker or field supplied electrical service disconnect switch to the on position.

**Note:** *If the unit has crankcase heaters and the surrounding ambient is 70˚ F or lower, let the compressors sit for approximately 24 hours before proceeding.*

12. Record the voltage at the unit terminals.
13. If possible with the thermostat provided, switch the evaporator blower to the RUN or ON position. Verify that the evaporator blower is activated.
14. Verify that the evaporator blower is rotating in the correct direction (three phase units only).

**Note:** *If the evaporator blower motor runs backwards, shut off all power to the unit. Switch any two of the incoming power leads at the unit main power terminal block. The unit has been wired and phased properly at the factory. DO NOT change any factory wiring to correct for a phase problem.*

**Note:** *Before conducting the following start up sections connect a suitable refrigerant gauge set to the unit Schrader connections. Install temperature sensors to record the appropriate refrigerant line temperatures.*

15. Set the thermostat switch to a temperature set point approximately 5˚ lower than the space temperature. Set the thermostat fan switch to the AUTO position. Set the thermostat operating mode to the COOL position. This should energize the compressor(s) and evaporator blower.

**Note**: *Dependent upon the options and/or the thermostat, there may be a delay for the compressor(s) operation.*

16. While waiting for the compressor(s) to stabilize, record the External Static Pressure (ESP) for the evaporator blower.

**Note:** *Make sure all the unit access panels are in place when taking these readings.*

17. Verify that the incoming water / fluid pressure does not exceed the rating for the water / fluid control valves.
18. Verify that the unit piping and heat exchangers will not be subjected to freezing conditions.
19. Confirm that no joints are leaking in the cooling fluid circuit(s).
20. Document the type of fluid being used as the cooling medium. If glycol is being used, make sure the mixture is adequate for any low ambient conditions that may be possible.

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**21.** If possible, record the fluid flow rate (GPM).

- **a.** Make sure the flow rate is within the proper limits:
  - **i.** Minimum 2.5 GPM / Ton
  - **ii.** Maximum 3.5 GPM / Ton

**22.** Record the entering and leaving fluid temperatures.

- **a.** Make sure the leaving fluid temperature is within the proper limits:
  - **i.** Minimum 60˚ F
  - **ii.** Maximum 115˚ F

**23.** Record the pressure drop of the water / fluid across the unit.

**24.** Verify that all valves on each fluid circuit function properly.

**25.** Check the head pressure adjustment, DO NOT assume that this has been set at the factory. Typically this value is to be 360 psi when 85˚ F water is supplied to the unit at 3 GPM/Ton.

**26.** Record the return air temperature to the evaporator coil along with the supply air temperature. (The unit should have operated for at least 15 minutes before taking these readings).

**27.** Record the suction line pressure and the suction line temperature for each circuit near the compressor.

**28.** Using an appropriate pressure / temperature chart for R-410a refrigerant, look up and record the saturation temperature corresponding to the suction pressure.

**29.** Calculate and record the suction superheat for each circuit by taking the difference between the suction line temperature and the saturation temperature corresponding to the suction pressure.

**30.** Record the liquid line pressure and the liquid line temperature for each circuit near the condenser heat exchanger outlet.

**31.** Using an appropriate pressure / temperature chart for R-410a refrigerant, look up and record the saturation temperature corresponding to the liquid line pressure.

**32.** Calculate and record the liquid subcooling for each circuit by taking the difference between the liquid line temperature and the saturation temperature corresponding to the liquid line pressure.

**33.** Record the Amps for the evaporator blower motor and each compressor. If the system is single phase, use L1 and L2 only.

- **a.** Make sure the pressures on each compressor circuit are within the proper limits:
  - **i.** 290 – 550 Discharge
  - **ii.** 100 – 140 psig Suction
- **b.** Compressor Amperage is below the RLA Amps listed on the unit data tag.
  - **i.** The maximum compressor operating current (amps) at start up depends a lot on the system loading. The lowerthe load, the less the current. The higher the load, thehigher the current.
- **c.** The blower motor FLA value should never be exceeded.
  - **i.** If the FLA value is exceeded, shut the unit off and check the duct design, sheave turns open or make sure there is no blockage / obstruction in the duct or filters.

**34.** Document any additional information deemed appropriate for the specific application or installation.

**35.** Shut the system down and remove all test instruments and test sensors.

**36.** Leave the system in the operating mode as appropriate for the customer and the application

**Optional Heating Start Up:**

**37.** If the system has any optional heat, set the room thermostat approximately 5˚ higher than the actual room temperature. Set the thermostat operating mode to the HEAT position.

**38.** Dependent upon the heating source the heating valve or switch / contactor should be activated.

**39.** After several minutes of operation, record the return air temperature and the supply air temperature.

**40.** Based on the heating source, document the appropriate temperatures, pressures, voltage or amp values.

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## Water-Cooled Unit
### Start-Up Procedures

Complete the form by listing your name, company name, phone and fax number. Sign and date the form and provide a copy as required to all interested parties.

**Job Name:** _____ **Date:** _____

**Address:** _____

**City:** _____ **State:** _____ **ZIP** _____

**Country:** _____

**Unit Model No.:** _____

**Unit Serial No.:** _____

1. Screw Lugs & Terminals OK? .....Yes _____ No _____
   Describe any loose connections and action(s) taken:

2. Power Supply Correct Voltage and Phase?.....Yes _____ No _____
   If not in agreement with unit data tag contact the Distributor.

3. Is the Circuit Protection the correct type and does it meet the unit data tag requirements? .....Yes _____ No _____
   If not correct describe what action(s) have been taken to correct:

4. Unit controller wiring verified?.....Yes _____ No _____
   On digital thermostat applications, “C” Terminal hooked up if necessary .....Yes _____ No _____

5. Unit leak checked OK? .....Yes _____ No _____
   If leak was located describe where and how repaired:

6. Condensate properly trapped & run to a suitable disposal point? .....Yes _____ No _____

7. Air filters are in place, clean & usable?.....Yes _____ No _____

8. Single Phase Unit
   Measured Voltage .....L1-L2 _____ L1-GND _____ L2-GND _____

   Three Phase
   Measured Voltage .....L1-L2 _____ L1-L3 _____ L2-L3 _____

9. Evaporator Blower Motor Rotation OK? .....Yes _____ No _____
   If three phase power and rotation is not correct describe action(s) taken to correct:

***Continued on Next Page***

10. Evaporator External Static Pressure.....Return “w.g._____Supply “w.g _____Total ESP “w.g. _____

11. Verify that incoming fluid pressure does not exceed rating for the fluid control valves. .....Yes _____ No _____

12. Has unit been supplied/ordered with localized water freezestats .....Yes _____ No _____

13. Verify that unit piping and heat exchangers will not be subject to freezing conditions.....Yes _____ No _____

14. No cooling fluid leaks ..... Circuit 1_____Circuit 2 _____

15. Cooling Fluid Type
If Glycol what percentage of mix:.....Good to a temperature of _____

16. Water / Fluid flow rate ..... GPM _____

17. Entering Water Temperature (EFT):.....F° heatpump mode°F _____
Leaving Water Temperature (LFT): .....F° heatpump mode°F _____

18. Water / Fluid Pressure Drop across unit .....PSI _____ strainer installed Y/N Mesh size_____

19. Verify that all valves on each circuit are functioning properly .....Yes _____ No _____

20. Verify water/fluid discharge pressure set point .....Yes _____ No _____

## Cooling Mode

21. No cooling fluid leaks ..... Return: °F_____ Supply: °F _____

| | Compressor 1 | Compressor 2 |
|---|---|---|
| 22. Suction Pressure: | psi _____ | psi _____ |
| Suction Line Temperature: | °F_____ | °F_____ |
| 23. Saturation Temperature: | °F_____ | °F_____ |
| 24. Suction Superheat: | °F_____ | °F_____ |
| 25. Liquid Line Pressure: | psi _____ | psi _____ |
| 26. Saturation Temperature: | °F_____ | °F_____ |
| Liquid Line Temperature: | °F_____ | °F_____ |
| 27. Subcooling | °F_____ | °F_____ |

28. **Electrical**

Evap. Motor Amps .....L1 _____ L2_____ L3_____

Compressor 1 Amps.....L1 _____ L2_____ L3_____

Compressor 2 Amps.....L1 _____ L2_____ L3_____

***Continued on Next Page***

## "Heat Pump" Heating Mode

29. No cooling fluid leaks ..... Return: °F_____ Supply: °F _____

| | Compressor 1 | Compressor 2 |
|---|---|---|
| 30. Suction Pressure: | psi _____ | psi _____ |
| Suction Line Temperature: | °F_____ | °F_____ |
| 31. Saturation Temperature: | °F_____ | °F_____ |
| 32. Suction Superheat: | °F_____ | °F_____ |
| 33. Liquid Line Pressure: | psi _____ | psi _____ |
| 34. Saturation Temperature: | °F_____ | °F_____ |
| Liquid Line Temperature: | °F_____ | °F_____ |
| 35. Subcooling | °F_____ | °F_____ |

36. **Electrical**

Evap. Motor Amps .....L1 _____ L2_____ L3_____

Compressor 1 Amps .....L1 _____ L2_____ L3_____

Compressor 2 Amps .....L1 _____ L2_____ L3_____

## Heating Mode (Optional) -specifiy hot water/elec heating)

37. System Air Temperatures ..... Return: °F _____ Supply: °F _____

38. Entering Water Temperature: _____ F° Steam Pressure: psi _____

Leaving Water Temperature:_____ F° _____

Electric kW: _____

Voltage: _____

Amps .....Stage 1 _____ L1 _____ L2_____L3 _____

Stage 2 _____ L1 _____ L2_____ L3_____

Misc.

_____

_____

Technician (print name): _____

Company _____

Phone: _____Fax: _____

Signiture: _____ Date: _____

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