



# MODEL QTC4

## EQUIPMENT PRE-STARTUP AND STARTUP CHECKLIST

CUSTOMER: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_  
 PHONE: \_\_\_\_\_  
 TEL NO: \_\_\_\_\_  
 ORDER NO: \_\_\_\_\_

JOB NAME: \_\_\_\_\_  
 LOCATION: \_\_\_\_\_  
 CUSTOMER ORDER NO: \_\_\_\_\_  
 CONTRACT NO: \_\_\_\_\_

<b>CHILLER</b> MODEL NO: _____	<b>UNIT</b> SERIAL NO: _____
The work (as checked below) is in process and will be completed by: _____ / _____ / _____ <small>Month Day Year</small>	

The following work must be completed in accordance with the installation instructions:

### PRE-STARTUP UNIT CHECKS (NO POWER)

The following basic checks should be made with the customer power to the unit switched OFF.

**WARNING:** Proper electrical lock out and tag procedures must be followed.

Check the system 24 hours prior to initial start:

1. Inspect the unit for shipping or installation damage. Repair as needed.
2. Ensure that all piping has been completed.
3. Ensure there are no refrigerant or water piping leaks. Repair as needed.
4. Open each system liquid shut off valve, economizer shut off valve, discharge shut off valve and oil line ball valve.
5. Adjust spring isolators (if installed) and assure they are not bottomed out.
6. Ensure water pumps are on. Check and adjust water pump flow rate preferably using an ultra sonic flow meter. Otherwise adjust pressure drop across the evaporator.

**CAUTION:** Excessive flow may cause catastrophic damage to the evaporator.

7. Check the control panel to ensure it is free of foreign material (wires, metal chips, tools, documents, etc.). Also check for signs of water or moisture. Ensure door gasket seals are sealing properly and incoming power wiring conduit is caulked.

8. Visually inspect wiring (power and control). Wiring MUST meet N.E.C, CE, and local codes.
9. Check tightness of the incoming power wiring.
10. Verify the field wiring matches the 3-phase power requirements of the chiller (Refer to the chiller nameplate).
11. Assure all control wiring is connected correctly to the user input terminals.
12. Apply power to the chiller and assure the compressor heaters are turned on 24 hours prior to system startup.

**NOTE:** Before proceeding with the following unit checks, verify the heaters have been on for 24 hours prior to starting the unit.

### A. UNIT CHECKS (NO POWER)

The following basic checks should be made with the customer power to the unit switched OFF.

**WARNING:** Proper electrical lock out and tag procedures must be followed.

1. Open each system liquid shut off valve, economizer shut off valve, discharge shut off valve and oil line ball valve. If optional eductor and suction valves are installed, be sure to open them. Failure to open the eductor valve will result in "Eductor Clog" faults.

2. The oil level(s) within the oil separator should be maintained such that the oil level is visible in the sight glass when a compressor is running at full speed for 15 to 30 minutes. An oil level may not be visible in the sight glass when the compressor is OFF or running below fullspeed, and it may be necessary to run the compressor at full speed to obtain a noticeable oil level. During shutdown situations and at some load points, much of the oil may be in the evaporator and oil level in the separator may fall below the bottom sight glass.

Sight glasses will vary in type depending upon the manufacturer. One type will have balls that float in the sight glasses to indicate level. Another type will have a bulls' eye glass. The bulls' eye glass will tend to appear to lose the lines in the bulls' eye when the level is above the glass. Be careful when viewing the sight glass not to confuse a full sight glass with an empty sight glass. Oil level should be visible, but not above the top of the sight glass after operating at full speed for 15 to 30 minutes. In the rare situation where oil levels are high, drain the oil to lower the level until it is visible in the sight glass. This should be done while operating at full speed.

Oil levels in the oil separator above the top of the sight glass should be avoided and may cause excessive oil carryover in the system. High oil concentration in the system may cause nuisance trips resulting from low discharge superheat, low solution pressure and incorrect readings from temperature sensors. Temperature sensor errors may result in poor refrigerant control and liquid overfeed to the compressor. Excessive oil will also reduce evaporator performance.

In the unlikely event it is necessary to add oil, connect a oil pump to the charging valve on the oil separator, but do not tighten the flare nut on the delivery tubing. With the bottom (suction end) of the pump submerged in oil to avoid entrance of air, operate the pump until oil drips from the flare nut joint, allowing the air to be expelled, and tighten the flare nut. Open the compressor oil charging valve and pump in oil until it reaches the proper level as described above.

3. Ensure water pumps are ON. Check and adjust water pump flow rate preferably using an ultra sonic flow meter. Otherwise adjust pressure drop across the evaporator.

**CAUTION:** Excessive flow may cause catastrophic damage to the evaporator.

4. Check status of condenser fans. Blades should rotate freely and not hit shield. Refer to Fan information in *Section 6 - Commissioning of the Form QTC4-NM1*.

5. Check tightness of the incoming power wiring inside the power panel and inside the motor terminal boxes.

6. Check for proper size fuses in control circuits.

7. Verify that field wiring matches the 3-phase power requirements of the chiller. (Refer to chiller nameplate)

8. Be certain all water temperature sensors are inserted completely in their respective wells and are coated with heat conductive compound.

9. Ensure the liquid line temperature sensor is tightly strapped on the liquid line and insulated.

10. Ensure the glycol level in the VSD cooling system is 9 to 15 inches (23 to 28 cm) from the top of the fill tube. This check should be performed prior to running the pump.

**CAUTION:** Never run the glycol pump without coolant! Running the glycol pump without coolant may damage the pump seals.

Always fill the system with approved coolant (P/N 013-03344-000) to avoid damage to the pump, cooling system heat sinks and the chiller. Overheating of the heat sinks and power panel will also occur.

11. Ensure the remote start/stop for Sys #1 on Terminals 2 to 15 and Sys #2 on Terminals 2 to 16 are closed on the User Terminal Block 1TB to allow the systems to run. If remote cycling devices are not utilized, place a wire jumper between these terminals.

12. Ensure that the CLK jumper JP2 is in the ON position.

13. Ensure a flow switch is connected between Terminals 2 and 13 on the User Terminal Block 1TB in the panel. Throttle back flow to ensure the flow switch opens with a loss of flow at the minimum recommended flow. It is recommended that auxiliary pump contacts be placed in series with the flow switch for additional protection, if the pump is turned OFF during chiller operation. Whenever the pump contacts are used, the coil of the pump starter must be suppressed with an RC suppressor (031-00808-000).

**B. STARTUP**

**PANEL CHECKS  
 (POWER ON – BOTH SYSTEM SWITCHES OFF)**

**WARNING:** You are about to turn power on to this machine. SAFETY IS NUMBER ONE! Only qualified individuals are permitted to service this product. The qualified individual furthermore is to be knowledgeable of, and adhere to, all safe work practices as required by NEC, OSHA, and NFPA 70E. Proper personal protection is to be used where and when required.

1. Ensure the chiller OFF/ON UNIT switch at the bottom of the keypad is OFF.

**CAUTION:** DO NOT apply power to the chiller unless the system is filled with water or glycol. If the chiller is equipped with the -20°F option, applying power to an empty chilled liquid system will cause the evaporator immersion heaters to fail.

2. Apply 3-phase power to the chiller. Turn ON the optional panel circuit breaker, if supplied.
3. Verify the control panel display is illuminated.
4. To prevent the compressors from starting, ensure that the system switches under the SYSTEM SWITCHES key are in the OFF position.
5. Verify that the voltage supply corresponds to the unit requirement and is within the limits given in *Refer to Section 5 - Technical Data in QTC4-NM1*.
6. Ensure the heaters on each compressor are ON using a clamp-on ammeter. Heater current draw is approximately 3A.
7. Verify the "Factory Set" overload potentiometers on the VSD Logic Board are set correctly. Press the VSD DATA key and use the arrow keys to scroll through the compressor overload settings. In the unlikely event that they are not set correctly, adjust the potentiometers until the desired values are achieved.

**WARNING:** The VSD is powered up and live. High voltage exists in the area of the circuit board on the bus bars, VSD Pole Assemblies, and wiring to the input inductor.

Adjust the potentiometers, if needed, using *Table 27 Compressor Motor Overload Settings* in the IOM (*Form QTC4-NM1*). The potentiometers are System 1=R19 and System 2=R64.

Record the Overload Potentiometer settings below:  
 (R19) System 1 = \_\_\_\_\_ Amps  
 (R64) System 2 = \_\_\_\_\_ Amps

**CAUTION:** Incorrect settings of the potentiometers may cause damage to the equipment.

8. Press the STATUS key. If the following message appears, immediately contact Quantech Product Technical Support. The message indicates the chiller has lost important factory programmed information (serial number, etc.) and may need to be reprogrammed.

**UNIT WARNING: INVALID SERIAL NUMBER**  
**ENTER UNIT SERIAL NUMBER**

**NOTE:** Changing the programming of this feature requires the date and time to be set on the chiller prior to programming. Additional information regarding this message and how to enter the serial number with the factory provided password is outlined in the Serial Number Programming.

9. Program the required options into the panel for the desired operating requirements (Refer to *Section 8 of QTC4-NM1*). Record the values below:

Display Language = \_\_\_\_\_  
 Chilled Liquid Mode = \_\_\_\_\_  
 Local/Remote Mode = \_\_\_\_\_  
 Display Units = \_\_\_\_\_  
 Lead/Lag Control = \_\_\_\_\_  
 Remote Temperature Reset = \_\_\_\_\_  
 Remote Current Reset = \_\_\_\_\_  
 Remote Sound Limit \_\_\_\_\_  
 Low Ambient Cutout \_\_\_\_\_

**CAUTION:** Damage to the chiller could result, if the options are improperly programmed.

**C. PROGRAMMED VALUES**

1. Program the required operating values into the microprocessor for cutouts, safeties, etc. and record them below (*Refer to Section 8 in Form QTC4-NM1*).

Suction Pressure Cutout = \_\_\_\_\_ PSIG (kPa)  
 Low Ambient Cutout = \_\_\_\_\_ °F  
 Leaving Chilled Liquid Temperature Cutout = \_\_\_\_\_ °F  
 Motor Current Limit = \_\_\_\_\_ % FLA  
 Pulldown Current Limit = \_\_\_\_\_ % FLA  
 Pulldown Current Limit Time = \_\_\_\_\_ MIN  
 Subcooling Setpoint = \_\_\_\_\_ °F  
 Remote Unit ID # = \_\_\_\_\_  
 Sound Limit Setpoint = \_\_\_\_\_ %  
 Eductor Differential = \_\_\_\_\_ °F  
 Eductor Safety Time = \_\_\_\_\_ MIN  
 Motor Temp Unload = \_\_\_\_\_ °F

**D. CHILLED LIQUID SETPOINT**

Program the Chilled Liquid Setpoint/Range and record:.....

Local Cooling Setpoint = \_\_\_\_\_ °F

Local Cooling Range = \_\_\_\_\_ to \_\_\_\_\_ °F

Maximum Remote Temperature Reset = \_\_\_\_\_ to \_\_\_\_\_ °F

**E. DATE/TIME, DAILY SCHEDULE, AND CLOCK JUMPER**

1. Set the date and time.....
2. Program the Daily Schedule start and stop times. ....
3. Place the panel in Service Mode and turn on each fan stage one by one. Ensure the fans rotate in the correct direction, so air flow exits the top of the chiller. ....
4. Ensure the data logging feature is enabled. ....
5. Ensure that the glycol level in the VSD cooling system is 9 to 15 inches (23 to 28 cm) from the top of the fill tube while running. To do this, remove the cap on the fill tube, place the chiller in Service Mode, and start the pump. Ensure to re-install the cap before stopping the glycol pump to avoid overflowing the fill tube when the glycol pump is turned OFF. The glycol system holds about 3.5 to 5.5 gallons of coolant (P/N 013-03344-000) ...
6. Check the optional fan VSD programming (if equipped). ....

**F. INITIAL STARTUP**

After the control panel has been programmed and the compressor heaters have been energized for at least 8 hours (ambient temperature more than 96°F or 24 hours (ambient temperature less than 86°F, the chiller may be placed into operation.

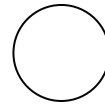
1. Turn on the UNIT switch and program the system switches on the keypad to the ON position.....
2. If cooling demand permits, the compressor(s) will start and a flow of refrigerant will be noted in the sight glass, after the anti recycle timer times out and the precharge of the DC Bus is completed. After several minutes of operation, the bubbles in the liquid line sight glass will disappear and there will be a solid column of liquid when the Condenser Drain (Flash Tank Feed) Valves stabilize. ....
3. Allow the compressor to run a short time, being ready to stop it immediately if any unusual noise or adverse conditions develop. Immediately at startup, the compressor may make sounds different from its normal high-pitched sound. This is due to the compressor coming up to speed and the initial lack of an oil

filmsealing the clearances in the rotors. This should be of no concern and lasts for only a short time. ....

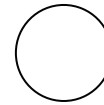
4. Check the system operating parameters. ....

**G. REFRIGERANT CHARGE**

1. Record the level of refrigerant in the evaporator sight glass with each system operating at full speed for 15 to 30 minutes. A refrigerant level should be visible in each evaporator sight glass. ....



System #1



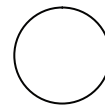
System #2

LD15053

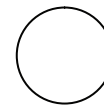
2. Remove charge, if the level is above the sight glass. Add charge, if the level is below the sight glass. ....

**H. OIL LEVELS**

Record the oil level in the oil separator sight glass with each system operating at full speed for 15 to 30 minutes. An oil level should be visible in the sight glass, but not above the sight glass.



System #1



System #2

Sight Glass

LD15054

**I. LIQUID LINE SUBCOOLING**

Record the liquid Line Subcooling from the panel display after operating at full speed for 15 to 30 minutes.

Sys 1 Liquid Subcooling \_\_\_\_\_ °F

Sys 2 Liquid Subcooling \_\_\_\_\_ °F

**J. LOG READINGS**

Record the following temperatures and pressures from the panel display:

Chilled Liquid Temperature: \_\_\_\_\_ °F

VSD Frequency: \_\_\_\_\_ Hz

Sys 1 Oil Pressure: \_\_\_\_\_ PSI

Sys 1 Discharge Pressure: \_\_\_\_\_ PSIG

Sys 1 Suction Pressure: \_\_\_\_\_ PSIG

Sys 1 Condenser Liquid Pressure: \_\_\_\_\_ PSIG

**J. LOG READINGS (CONT'D)**

Sys 1 Oil Temperature: \_\_\_\_\_ °F  
 Sys 1 Eductor Temperature: \_\_\_\_\_ °F  
 Sys 1 Condenser Liquid Temp: \_\_\_\_\_ °F  
 Sys 1 Subcooling: \_\_\_\_\_ °F  
 Sys 1 Saturated Liquid Temp: \_\_\_\_\_ °F  
 Sys 1 Discharge Temp: \_\_\_\_\_ °F  
 Sys 1 Discharge Superheat: \_\_\_\_\_ °F  
 Sys 1 SAT Discharge Temp: \_\_\_\_\_ °  
 Sys 1 Flash Tank Level: \_\_\_\_\_ %  
 Sys 1 Economizer Valve: \_\_\_\_\_ %  
 Sys 1 Condenser Subcooling: \_\_\_\_\_ °F  
 Sys 1 Condenser Drain Valve: \_\_\_\_\_ %  
 (Flash Tank Feed Valve)  
 Sys 1 Condenser Fans # ON: \_\_\_\_\_  
 SYS 1 VSD Fan Speed: \_\_\_\_\_ %  
 Sys 1 VI Step Solenoid 1: \_\_\_\_\_  
 Sys 1 VI Step Solenoid 2: \_\_\_\_\_  
 Sys 1 Run Time: \_\_\_D\_\_\_HR\_\_\_MIN\_\_\_SEC  
 Sys 2 Oil Pressure: \_\_\_\_\_ PSIG  
 Sys 2 Discharge Pressure: \_\_\_\_\_ PSIG  
 Sys 2 Suction Pressure: \_\_\_\_\_ PSIG  
 Sys 2 Condenser Liquid Pressure: \_\_\_\_\_ PSIG  
 Sys 2 Oil Temperature: \_\_\_\_\_ °F

Sys 2 Eductor Temperature: \_\_\_\_\_ °F  
 Sys 2 Condenser Liquid Temp: \_\_\_\_\_ °F  
 Sys 2 Subcooling: \_\_\_\_\_ °F  
 Sys 2 Saturated Liquid Temp: \_\_\_\_\_ °F  
 Sys 2 Discharge Temp: \_\_\_\_\_ °  
 Sys 2 Discharge Superheat: \_\_\_\_\_ °F  
 Sys 2 SAT Discharge Temp: \_\_\_\_\_ °F  
 Sys 2 Superheat: \_\_\_\_\_ °F  
 Sys 2 SAT Discharge Temp: \_\_\_\_\_ °F  
 Sys 2 Flash Tank Level: \_\_\_\_\_ %  
 Sys 2 Economizer Valve: \_\_\_\_\_ %  
 Sys 2 Condenser Subcooling: \_\_\_\_\_ °F  
 Sys 2 Condenser Drain Valve: \_\_\_\_\_ %  
 (Flash Tank Feed Valve)  
 Sys 2 Condenser Fans # ON: \_\_\_\_\_  
 SYS 2 VSD Fan Speed: \_\_\_\_\_ %  
 Sys 2 VI Step Solenoid 1: \_\_\_\_\_  
 Sys 2 VI Step Solenoid 2: \_\_\_\_\_  
 Sys 2 Run Time: \_\_\_D\_\_\_HR\_\_\_MIN\_\_\_SEC

**K. LEAK CHECKING**

Leak check compressors, fittings, and piping to ensure there are no leaks.....

If the chiller is functioning satisfactorily during the initial operating period with no safety trips; and the chiller controls chilled liquid temperature; the chiller is now ready to be placed into service.

