



**MODEL – CYK**

**INSTALLATION AND COMMISSIONING GUIDELINES**

\*TO: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

YORK TEL. NO. \_\_\_\_\_ YORK ORDER NO. \_\_\_\_\_ YORK CONTRACT NO. \_\_\_\_\_

CHILLER \_\_\_\_\_

MODEL NO. \_\_\_\_\_ SERIAL NO. \_\_\_\_\_

The work (as checked below) is in process and will be completed by \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
Month Day Year

**CYK SITE INSPECTION**

The CYK Chiller is a factory assembled 2-stage Compressor unit designed to maximize the unit footprint and operate at elevated discharge pressures.

**INITIAL SITE INSPECTION**

The unit shipment should be checked upon arrival to insure that all of the major components, boxes, and crates have arrived without damage. Any damage **MUST** be reported to the transportation company immediately for their inspection. All boxes should be opened and inventoried with the packing list.

The initial site inspection should include, but not be limited to, the following components. Record and document any deficiencies.

**Compressor Components**

- Compressor Body.....
- Oil System Piping .....
- Oil Return System .....
- Shaft Seal.....
- Transducers, wiring harnesses.....
- PRV Linkages and VGD Linkages.....
- Compressor Oil Cooler Package.....

**Condenser / Evaporator Shell Components**

- Evaporator Relief Valves .....
- Evaporator Transducers .....
- Evaporator Wiring Harnesses.....
- Evaporator Insulation.....
- Evaporator Paint.....
- Evaporator Water Box Shipping Blanks in Place.....

- Condenser Relief Valves .....
- Condenser Transducers .....
- Hot Gas Valve.....
- Condenser Wiring Harnesses.....
- Condenser Insulation.....
- Condenser Paint.....
- Condenser Water Box Shipping Blanks in Place.....
- Nitrogen Pressure in Vessels .....

**Economizer**

- Economizer Bypass Valve (LCV-117).....
- Subcooler Valve (LCV-114) .....
- Economizer Liquid Outlet Valve (LCV-116) .....
- Economizer Flash Gas Valve (PCV-116).....
- Economizer to Low Stage Compressor Vent Line (PCV-117).....
- Economizer Sight Glasses .....

**Control Panel and Components**

- User Interface and Display .....
- Internal Wiring and Components.....
- Is there any evidence of water infiltration? .....
- Panel Mounts and Enclosure.....

Trained personnel should install the CYK in accordance with the installation information. Proper rigging devices (i.e. spreader bars, chains, slings) must be in good repair and positioned properly to avoid damage to the components. Each shell package has (2) lifting holes on each end sheet, which should be used to lift the units. Stacked shells must be separated before installing. Each shell must be lifted and positioned individually when installing.

## GENERAL REQUIREMENTS FOR UNIT INSTALLATION

1. Floor or mounting pads must be level and capable of supporting the unit weight.
2. Clearances for the sides, top and ends must be adequate for Compressor, motor service and tube removal. Verify the piping connections properly oriented.
3. Driveline and shells must be placed on isolators of the correct rating and properly positioned. Rigging should remain in place until the isolators are installed and bolted in place.
4. Insert spacing blocks under each corner of the unit to support the shells while the piping is installed and supported.
5. After all piping is installed, unit charged, and water in the shell tubes, rotate the leveling bolts one at a time to level the unit. (See installation instructions in job manual)
6. All field installed intercooler piping, valves etc should be cleaned prior to installation.
7. All gaskets, flange bolts and studs must be of the proper size and torqued to the value required for the bolt diameter.
8. Do not remove any flange covers until the final piping is ready to be installed.
9. All components should remain sealed and charged with Nitrogen until ready for assembly to reduce the risk of contamination or oxidation
10. All piping must be fitted so that all bolt holes align without any external force applied.
11. Relief valve piping must be installed in accordance with ASHRAE 15 and all local codes.
3. If the unit was shipped form 7 (split shells) assemble shells, and interconnecting economizer liquid line piping and inter-stage vapor piping.
4. Install the refrigerant relief valve piping.
5. Install drain and vent valves in the evaporator and condenser.
6. It is suggested that outlets be provided in the condenser water and chilled water piping for pressure gauges and thermometers.
7. All water piping must be cleaned and flushed prior to being connected to the unit or shells.
8. Strainers are to be installed in the chilled water and condenser water circuits to protect the vessels and pumping equipment.
9. After the evaporator, condenser and refrigerant piping have been pressure tested, the refrigerant suction line, chilled water, oil return piping and evaporator vessel water boxes must be insulated. Evaporator water box insulation should be removable for service.
10. Supply 3 Phase Auxiliary power to the unit for the Compressor oil pump drives.
11. Install and wire flow switches, high-pressure cut-out and any interconnecting control wiring as required.

## ELECTRICAL INSTALLATION

1. All electrical wiring must conform to all National and local electrical codes.
2. Qualified personnel regularly engaged in this type of work must perform all wiring.
3. All wiring must be of adequate size and insulation quality and in accordance with the YORK drawings.
4. Field wiring includes but may not limited to the motor starter fault / contacts, motor starter run interlocks, remote hard wired start/stop, flow controls and, building automation systems.

## INSTALLATION

The following lists of tasks are the minimum requirements that must be completed prior to starting the unit. See the job manual for more detailed installation instructions.

1. Install the unit shells, economizer, driveline and isolators if required. All components should be properly aligned and leveled prior to bolting in place.
2. Install the chilled water and condenser water piping. Support all piping as necessary to reduce the risk of stress on the unit components. Piping supports should not be spaced any greater than 10 feet apart.

**START UP GUIDELINE FOR THE REFRIGERANT SYSTEM**

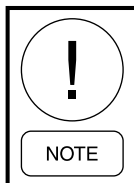
The steps listed below should be performed in the order in which they appear. The liquid refrigerant is not charged into the system until the control check out is completed. This should allow for minimal refrigerant recovery processes if a component requires removal for repair.



**Do not energize panel until Step 19 in checklist.**

1. Assemble all shipped loose piping, valves and intercooler connections.....
2. Based on the P and I diagram. Verify the flow direction arrows (→) on the
  - Subcooler control valve (LCV-114).....
  - Economizer bypass valve (LCV-117).....
  - Economizer liquid level valve (LCV-116) .....
  - Economizer vapor outlet valve (PCV-116).....
  - Economizer to low stage vent Sol. (PCV-117) .....
  - Hot gas valve TCV-100.....
  - High Stage Discharge check valve.....
  - Low Stage Discharge check valve.....
  - Oil return check valves. ....

3. Open all isolation valves in the refrigerant circuit including the vapor returns from the oil sumps located at the rear of the oil sumps.....

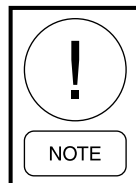


**Do not open valves that will open to the atmosphere.**

4. Check all the Relief Valves that they are the correct pressure settings and in the correct position on the chiller. ....
5. Charge the system with oxygen free dry nitrogen and trace refrigerant to 80% of the lowest relief valve setting.....

6. Leak test the entire refrigerant system, reduce the system pressure and repair any leaks. Re-test with nitrogen and trace refrigerant to 80% of the relief valve setting.....

7. Disconnect the Compressor high discharge pressure switch and verify calibration to site conditions. ....



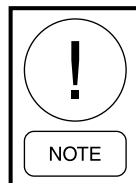
**This control cannot be calibrated after the system is charged with refrigerant.**

8. Evacuate and dehydrate the system to 1mm Mercury. ....
9. Charge the high and low stage oil sumps (approx 20 gal per sump).....



**Do not run the oil pumps while the unit is under a vacuum.**

10. Charge the refrigerant system with vapor only to above 34 degree saturation temperature for the refrigerant in use. ....



**Do not charge liquid refrigerant at this time. Control panel check out should be performed before charging liquid refrigerant.**

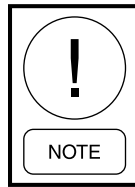
11. Confirm that the control panel is free of metal shavings and debris. ....
12. Remove the Compressor couplings before proceeding.....
13. Confirm that all the field wiring has been completed .....



**Ensure high and low stage current transformers (IT160A, IT160B) are wired to control panel. Reference wiring diagram in job manual.**

14. Verify all panel wire connections for tightness on terminal connections. ....

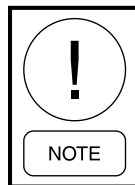
- 15. Confirm that the power supply voltage to control power transformer (T1) is correct, and is of the proper capacity and voltage. Reference wiring diagram in job manual. ....
- 16. Verify the fluids are in the Compressor oil sump. (1/4" wide red line is full, 1/8" red line is empty) .....
- 17. Remove coupling hubs from high and low stage Compressor .....
- 18. Open all circuit breakers in the panel. ....
- 19. Energize Main Power Disconnect.....
- 20. Close CB1 and check for 120VAC at terminal 6.  
DC Power Supply  
Check the out puts from Power Supply.  
**Terminal**
- 1000 0 VDC .....
- 1001 5 VDC .....
- 1002 12 VDC .....
- 1004 24 VDC .....
- 21. Close CB-2 and check for 120VAC at terminal 33 for Low Stage PRV and VGD Power supply.....
- 22. Close CB-3 and check for 120VAC at terminal 34 for High Stage PRV and VGD Power supply.....
- 23. Close CB-4 and check for 120VAC at terminal 9 of Relay R8. ....
- 24. Close CB-5 and check for 120VAC at terminal 47.....
- 25. Confirm oil heater operation with an ammeter at contactor M1A and M1B. The panel will cycle the heater from 90 –120°F (48.8°C). Heater internal thermostat setpoint is 150°F (65.5°C). ....
- 26. Ensure all the valves in the Lubrication System are open.....
- 27. Log in to the service mode (Select User 2 and Code 1380) .....
- 28. Start both oil pumps one at a time, with the manual auto station to verify oil pressure. Use the "Lubrication Lock" feature to run both pumps automatically at 36 PSID.....



**Testing of the pumps has to be done before any Proximity Probe Check.**

- 29. Press the HOME key and select LOW STAGE COMPRESSOR Screen. Press PRV Cal to start the calibration. When complete press End Calibration .....
- 30. Select the VGD key and calibrate the Low Stage VGD .....
- 31. Press the HOME key and select the HIGH STAGE COMPRESSOR Screen. Press PRV Cal to start the calibration. When complete press End Calibration. ....
- 32. Select the VGD key and calibrate the High Stage VGD. ....
- 33. Perform Proximity Probe calibration for both high stage and low stage Compressors (Home \ X Stage Compressor \ XS Prox Calibration). When the calibration is complete press the key to end the calibration.

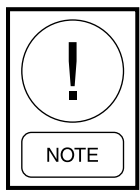
Verify reference value agrees with reference value on label inside panel noted on the inside of the Panel Door.



**If the Compressor is pressurized the shaft will have to be rotated by hand in the normal rotation direction to seat the thrust bearing position.**

- 34. Press the HOME key then the CONDENSER Screen key and select the SUBCOOLER Screen. Manually operate the Subcooler level valve (LCV-114) and the economizer Bypass valve LCV-117 to insure they open and close correctly.  
Check the Valve Positioner against the Panel Display at 25, 50, 75 and 100% to ensure that the valve and the panel correspond to Linear Operation .....
- 35. Return to the CONDENSER Screen and select the HOT GAS VALVE Screen. Manually operate the hot gas valve (TCV-100C) insuring the valve opens and fully closes. Check the Valve Positioner against the Panel Display at 25, 50, 75 and 100% to ensure that the valve and the panel correspond to Linear Operation .....

- 36. Return to the CONDENSER Screen and select the ECONOMIZER Screen. Manually operate the economizer level valve LCV-116 to ensure the valve opens and closes correctly. Check the Valve Positioner against the Panel Display at 25, 50, 75 and 100% to ensure that the valve and the panel correspond to Linear Operation.....
- 37. Press the HOME key and select the SET-UP Screen. Select the TEST OUTPUTS button and manually test
  - LS Liquid injection FCV 113A .....
  - HS Liquid injection FCV 113B .....
  - Economizer bleed valve PCV 117 .....
  - LS oil return solenoid operation.....
- 38. Press the HOME key and select the CAPACITY CONTROLS \ PID Tuning, then OVERRIDES Screen. Verify that the set points are adequate for the system design.....
- 39. Press the HOME key and select the CAPACITY CONTROLS Screen \ ANTI - SURGE Screen. Verify the set points for the anti-surge operation. (PD1 - PD2 - MVP1 - MVP2).....



**Reference Surge Control Setpoints Calculation in this document.**



**Both high stage and low stage coupling hubs must be removed before proceeding with compressor motor checks.**

- 40. Verify the HIGH STAGE Compressor motor rotation. Coupling center hubs must be removed before proceeding!  
  
 This must be done by using a MOMENTARY START switch. De-energize the control panel and install the momentary switch between terminal 3 and terminal 77.  
  
 Re-energize the control panel and momentarily press the start switch to verify proper motor rotation.  
  
 After High Stage Motor rotation is verified, de-energize the control panel and remove the momentary start switch.....

- 41. Verify the LOW STAGE Compressor motor rotation. Coupling center hubs must be removed before proceeding!

This must be done by using a MOMENTARY START switch. De-energize the control panel and install the momentary switch between terminal 3 and terminal 24.

Re-energize the control panel and momentarily press the start switch to verify proper motor rotation.

After Low Stage Motor rotation is verified, de-energize the control panel and remove the momentary start switch.....

- 42. Check all relays and terminal strips for excessive heating with IR thermometer. Excessive heating can be defined as a 20°F (-6.6°C) rise above ambient. ....
- 43. Verify that the pressure sensors, level sensors, and temperature sensors are reading correctly.....  
  
 After all the controls have been tested and confirmed that they operate correctly the unit can be charged with liquid refrigerant. ....
- 44. Start the condenser water pumps and the evaporator water pumps to establish flow in both vessels. ....  
  
 Check the BAS System for their flow readings of the chiller / or use a Pressure Gauge to obtain the Differential Pressure across the Evaporator and Condenser Inlet Outlet water boxes. Check these pressures against the Design Specifications.....  
  
 Verify Cooling Tower / Condenser entering water temperature conditions. ....

The unit can now be started and tested for proper operation.

**SURGE CONTROL SETPOINTS CALCULATION**

Use this form to estimate the initial surge control points PD1 and PD2. These points will be required for the 2 stage and single stage unit operation. The unit design entering and leaving condenser and evaporator tem-

peratures are required for this calculation. This information can be found on the sales order or engineering data sheet.

**STEP ONE**

**Two Stage Operation PD 1 = High Head**

1. Enter the design leaving condenser water temperature 1.
- A. Convert the design leaving condenser water temperature to pressure A.
2. Enter the design leaving evaporator water temperature 2.
- B. Convert the design leaving evaporator temperature to pressure B.
3. **Subtract**  
Evaporator pressure B from  
Condenser pressure A  
(A – B) = PD1 PD1.

The result is programmed into 2 stage PD1

**STEP TWO**

**Two Stage Operation PD2 = Low Head**

1. Enter the lowest expected leaving condenser water temperature (Most two stage operations will be 95°F (35°C)) 1.
- A. Convert the lowest expected leaving condenser water temperature to pressure A.
2. Enter the design leaving evaporator water temperature 2.
- B. Convert the design leaving evaporator temperature to pressure B.
3. **Subtract**  
Evaporator pressure B from  
Condenser pressure A  
(A – B) = PD2 PD2.

The result is programmed into 2 stage PD2

**Single Stage Operation PD1 = High Head**

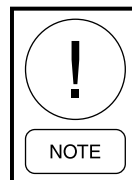
1. Enter 95°F (35°C) or the single stage design leaving condenser water temperature 1.
- A. Convert the leaving condenser water temperature to pressure A.
2. Enter the design leaving evaporator water temperature 2.
- B. Convert the design leaving evaporator temperature to pressure B.
3. **Subtract**  
Evaporator pressure B from  
Condenser pressure A  
(A – B) = PD1 PD1.

The result is programmed into single stage PD1

**Single Stage Operation PD2 = Low Head**

1. Enter the lowest expected leaving condenser water temperature (Most single stage operations will be 60°F (15.5°C)) 1.
- A. Convert the lowest expected leaving condenser water temperature to pressure A.
2. Enter the design leaving evaporator water temperature 2.
- B. Convert the design leaving evaporator temperature to pressure B.
3. **Subtract**  
Evaporator pressure B from  
condenser pressure A  
(A – B) = PD2 PD2.

The result is programmed into single stage PD2



*In most applications PD1 and PD2 as calculated above will allow for smooth operation throughout the entire operating range and will not require further adjustment.*

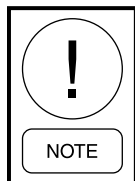
**STEP THREE****Calculate MVP1 and MVP2**

The initial setpoint for **Two Stage** MVP1 should be **40**

The initial setpoint for **Two Stage** MVP2 should be **20**

The initial setpoint for **Single Stage** MVP1 should be **20**

The initial setpoint for **Single Stage** MVP2 should be **10**



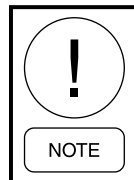
***Start the chiller in the two stage mode and monitor the system head as displayed on the system screen.***

Raise the system head to the setpoint in the two stage PD1. With the hot gas valve closed (hot gas can be placed in manual for this test) the compressor should not surge. If surge does occur increase the MVP1 by 5 % or until surge stops.

If the compressor does not surge then lower the MVP1 by 5% increments until the unit surges. When the surge point is found increase the MVP1 by 5% or until surge stops.

Lower the system head to the setpoint in the two stage PD2. With the hot gas valve closed (hot gas valve can be placed in manual for this test) the compressor should not surge. If surge does occur increase the MVP2 by 5% or until surge stops.

If the compressor does not surge then lower the MVP2 by 5% increments until the unit surges. When the surge point is found increase the MVP2 by 5% or until surge stops.



***If the compressor vanes are open above 70% and the unit surges the entering condenser water temperature may be above design or the leaving chilled water is below design. In these conditions changing MVP1 or MVP2 will not stop the surging.***

Operate the chiller in the single stage mode and adjust MVP1 and MVP2 in the same manner as in the two stage mode.



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