

Pre-Start-Up Checks

- Yes ___ No ___ Is there any visible damage to the machine? If yes, describe damage: _____
- Yes ___ No ___ Is the machine installed outdoors?
If outdoors, is the machine on the roof? _____
- Yes ___ No ___ Is the cooling tower at a different level from the chiller?
If yes, what is the height difference? _____
- Yes ___ No ___ Are all minimum clearances maintained around the chiller per Yazaki specifications?
If no, which side(s) does not conform to specified clearances? _____
- Yes ___ No ___ Is the machine level both in longitudinal and transverse directions, in accordance to the reference bar on the upper vessel section?
- Yes ___ No ___ Has the Changeover Valve Servo Assembly been installed? (for WFC-SH units only)
[shipped with the chiller.]
- Yes ___ No ___ Are all Flow Switch fluid connections made properly?

Water Side Pre-Start Checks

- Yes ___ No ___ Have all fluid circuits to the machine been flushed, refilled, and stabilized with pumps running and air removed?
- Yes ___ No ___ Is the water piping to the chiller in accordance to Yazaki specifications and connections correct per the installation manual?
- Yes ___ No ___ Are balance valves present?
- Yes ___ No ___ Are isolation valves present?
- Yes ___ No ___ Is there a Heat Medium Bypass Valve in place and able to function properly?
- Yes ___ No ___ Are drain valves present?
- Yes ___ No ___ Are all appropriate check valves present?
- Yes ___ No ___ Are provisions made for chemical treatment as is considered appropriate for all water loops?
- Yes ___ No ___ Have the pressure drop through all water loops been adjusted and finalized?
- Yes ___ No ___ Is the pressure in any water loop in excess of 85 PSI?
If Yes, which loop(s)? _____

Electrical Pre-Start Checks

- Yes ___ No ___ Have all electrical terminal connections in the Yazaki unit been checked to be tight? This includes terminal blocks, relay sub-bases, and junction boxes.
- Yes ___ No ___ Are all Molex plugs in the Yazaki unit properly seated?
- Yes ___ No ___ Are all field wiring connections made properly in the Junction Box?
- Yes ___ No ___ Is an electrical disconnect within sight of the unit and readily accessible per section 440-14 of the National Electrical Code?
- Yes ___ No ___ Is the voltage appropriate for the machine?
- Yes ___ No ___ Is the high leg of 3-phase power connected to L2?
- Yes ___ No ___ Is the over-current protection sized properly? **Record Breaker/Fuse Size on Data Sheet.**
- Yes ___ No ___ Is the electrical wire size correct? **Record Wire Size on Data Sheet.**
- Yes ___ No ___ Are there any aluminum conductors used?

Tools Required for Chiller-Heater Start-Up

10' Latex Vacuum Tubing (3/8" ID)
ACT-3 Diagnostic Tool ----- [shipped with the chiller]
Phase Meter ----- {Yazaki P/N Hioki 3126}
Pressure Gauge for Water Test Manifold [0-100 PSI] ----- {Yazaki P/N N7630}
Spirit Level ----- {Yazaki P/N N7519}
Standard Hand Tools [Screw Drivers, Pliers, Wire-Cutters, Pipe Wrenches, etc.]
Torque Wrench [200 kgf-cm or 14.4 ft-lb] ----- {Yazaki P/N N7510}
Vacuum Hose Fitting Adapter ----- {Yazaki P/N N7512}
Vacuum Manometer [0-100 mmHg Vac (mmHg = torr)]
Vacuum Pump [Welch 1402B or equivalent (5-7cfm is adequate)]
Volt-Ohm Meter (should also be capable of reading DC volts)
Water Pressure Test Manifold ----- {Yazaki P/N N7559}

Other Recommended Tools

4mm Hexagon Allen Wrench
Calculator
Tape Measure

Yazaki Literature Required

WFC-S Start-Up Procedure [this document]
WFC-S Installation Instructions [shipped with the chiller]
WFC-S Operating Instructions [shipped with the chiller]
Yazaki Warranty Registration Card [shipped with the chiller]

Other Yazaki Support Literature

WFC-S Service Manual
WFC-S Start-Up & Maintenance Data Sheet

Start-Up Procedures

Please read this complete procedure before beginning the Start-Up Procedure. The steps outlined here are intended to help provide the shortest possible time investment in a proper startup of a Yazaki WFC-SC Chiller or a WFC-SH Chiller/Heater. There are other methods and procedures for start-up that are equally valid, but do not mix procedures. If a different valid start-up procedure is chosen, follow only the steps of that procedure.

Some steps below are listed as "Optional." While this data is neither critical nor required for a proper startup, more complete data often assists with future inquiries in regard to maintenance and troubleshooting.

1. Make certain the rocker switch on the control panel is in the "Stop" position.
2. **Record Project, ASP information, and machine data into the proper spaces at the top of the Data Sheet.**
3. **Indicate this work as a Start-Up by checking the box under Type of Service on the Data Sheet.**

4. **Record whether or not a connection has been made in the Junction Box in the appropriate section on the Data Sheet.**

5. Perform initial evacuation.

- a. Refer to documentation for proper procedures of evacuation.
- b. **Record final vacuum level achieved on the Data Sheet.** (optional)
- c. **Record amount of non-condensable gases removed on the Data Sheet.** (optional)
- d. Check for presence of hydrogen gas (optional at commissioning start-up).
 - i. **Record whether or not hydrogen gas was present on the Data Sheet.**

NOTE: Irreparable damage can occur if oil from a vacuum pump gets into the machine. Always close the service valve and remove the bubble tube from the water BEFORE shutting off the vacuum pump. Do not leave a vacuum pump unattended. Evacuations on initial startup should take very little time.

NOTE: Do not leave service valve open if not actively pulling a vacuum or taking a solution sample.

NOTE: If machine is found to be at atmospheric pressure, contact Yazaki Energy Systems at (469) 229-5443 for further instructions.

6. Set up the Flow Switch.

- a. Set flow for chilled water circuit to 65% of required flow.
- b. Adjust the flow switch until it opens.

7. Set pressure drops to normal operating conditions for all fluid circuits.

- a. **Record all requested data from the water circuits on the Data Sheet.**

8. Calculate water flow and **record the information on the Data Sheet.**

9. Turn power on to the Yazaki machine (no power should have been on to this machine until this point).

10. Plug the ACT-3 tool into the control board.

11. **Record all data points from the ACT-3 and Dip Switch Positions as requested by the Data Sheet.** (optional).

12. Measure voltage to ground for each power leg of the Solution Pump. This can be done at the Solution Pump Starter in the control box.

- a. **Record voltage readings to the Solution Pump on the Data Sheet.**

13. Verify correct phase rotation for the Solution Pump.

- a. **Record SP Rotation as Checked on the Data Sheet.**

i. If phase rotation meter is not available, it will be necessary to use dilute solution pressure to determine correct rotation.

1. Attach a pressure gauge to the dilute solution sampling valve by the solution pump.
2. Engage the solution pump and observe the pressure reading.
3. Swap L1 and L3 at the Junction Box.
4. Engage the solution pump and observe the pressure reading again.
5. Use the L1 and L3 configuration that provided the highest pressure reading. (Pressure readings will typically be less than 0 psi)

14. Set TC and TH points (optional).
 - a. TC is the chilled water set point.
 - i. The value of this point is found on the ACT-3 under Temperature Readings as one of the last two data points in the menu.
 - ii. The value typically reads 0.00, which is “zero degrees adjusted from standard set point.” Standard set point is 43.7F, the temperature at which the chiller shuts down as it has satisfied the chilled water loop temperature requirements. Set this number to whatever number you want to add to 43.7F in order to get your new set point. Bear in mind, the dead band is 7.2F and is not adjustable.
 - iii. Unit staging can be accomplished by simply setting this number to slightly different values from unit to unit. Typical recommendation is to set TC on the lead unit to -1.00, second unit to 0.00, third to 1.00, etc.
 - b. TH is the hot water set point. (While this adjustment is still present, it does nothing on WFC-SC machines.)
 - i. The value of this point is also found on the ACT-3 under Temperature Readings as one of the last two data points in the menu.
 - ii. The value also typically reads 0.00 for the same reasons as TC. However, the standard set point for TH is 135.5F.
 - iii. All the same rules for adjustment and use for TC apply as well for TH.
15. Set rocker switch on the front panel to “Run.”
16. **Record Solution Pump amp draw readings on all legs in the appropriate section of the Data Sheet.**
17. **Fill in all remaining blanks as is possible with the tools and data you have at hand.**
18. Set the rocker switch on the front panel to the proper position for your control scheme.
 - a. “Stop” should be used if no operation is desired at time of the start-up.
 - b. “Run” should be used if operation is desired and the machine will be left to control itself.
 - c. “Remote” should be used if building management or other forms of energy management controls will be used to control operation of the machine.

Please send a copy of all paperwork to:

Yazaki Energy Systems, Inc.
701 E. Plano Pkwy, Suite 305
Plano, TX, 75074

or FAX it to (469) 229-5448

or EMAIL it to yazaki@yazakienergy.com or cmccord@yazakienergy.com