KKT Training Series:

ECO Series, Preventative Maintenance

p.m. process

The preventative maintenance is a scheduled event with one hour of downtime.

We must ensure the following procedure is performed:

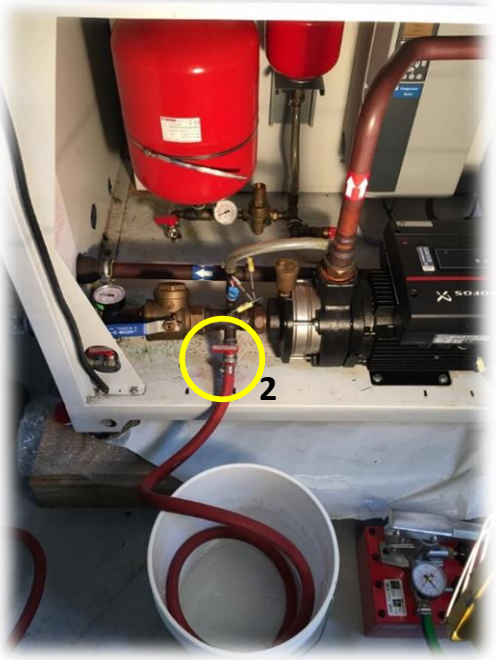
- ❑ Shut down chiller
- ❑ Check buffer tank operation(adjustment of pressure regulator may be needed)
- ❑ Drain glycol mixture into a 5 gallon bucket (should only relieve 3.5 gallons)
- ❑ Check expansion tank nitrogen pressure on both tanks (set according to chiller height from IFP)
- ❑ Clean filter strainers on the chiller/IFP, Glycol check
- ❑ Re-fill system with external pump
- ❑ Top off buffer tank pressure (3-6 Bar)
- ❑ Clean condenser coils with water or non-acidic solution
- ❑ Check for loose wires and prepare wiring for amp / voltage checks
- ❑ Run the chiller, bleed air out of the system
- ❑ Connect KKT Eco Tool
- ❑ Check electrical
  - ❑ Amps draws
  - ❑ Voltages
- ❑ Pressures and temperatures
  - ❑ Water
  - ❑ Refrigeration

After completion of the above, we finalize the checklist and make sure every reading requested is filled out on the checklist.

buffer tank operation

During the scheduled PM, when we are draining the chiller **(chiller off)**. We can check the operation of the Pressure Regulator.

1. Fill the buffer tank, if it isn't between the allowed range **(3.0 to 6.0 Bar)**
2. Drain the main line according to your chiller height from the IFP (for verification of the settings of the Pressure Regulator). If the Pressure Regulator is set correctly the main line should begin to fill and increase the return pressure to the pump.
3. If the main line doesn't begin to fill, follow the procedure on the next slide to adjust main line pressure.



buffer tank operation

Adjusting the Pressure Regulator!

The pressure regulator is set by back seating the valve until it stops. Next, front-seat the valve until the buffer begins to fill the main line of the chiller glycol loop.

NOTE: Buffer tank must be pre-pressurized with 3-4 bar and the main line should be set according to chiller height from the IFP.

1. Remove the cap on the Pressure Regulator.
2. With a flat head screw driver, turn the valve **(Clockwise)** keeping an eye on the buffer tank gauge. When the gauge starts dropping in pressure you will see your return pressure increase.

NOTE: DO NOT continue to rotate the Pressure Regulator.

draining the chiller for expansion tank check

The draining/filling of the chiller is done at the port before the pump.

A five gallon bucket is used to collect the glycol fluid for re-filling. Approx. 3.5 gallons is what is usually recovered.

The red-handle ball valve is opened to drain/fill.

expansion tank

Verify expansion tank nitrogen pressure.

Expansion nitrogen tank pressure should be check with a pressure gauge and set according to chiller height from the IFP.

Note: No glycol should be in the system when checking the nitrogen pressure!

Target: Follow the Chart Below!

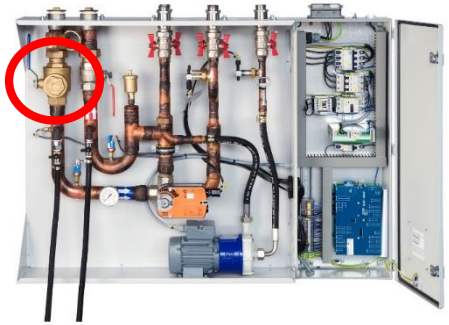
Chiller Location Limitation: 17m below IFP	25 L (Buffer Tank) Nitrogen Fill	5 L (Expansion Tank) Nitrogen Fill
2.5 Meters **(8.2 Feet)**	1.3 Bar **(18.8 PSI)**	1 Bar **(14.5 PSI)**
5 Meters **(16.4 Feet)**	1.5 Bar **(21.7 PSI)**	1.2 Bar **(17.4 PSI)**
7.5 Meters **(24.6 Feet)**	1.8 Bar **(26.1 PSI)**	1.5 Bar **(21.75 PSI)**
10 Meters **(32.8 Feet)**	2 Bar **(29 PSI)**	1.7 Bar **(24.6 PSI)**
12.5 Meters **(41 Feet)**	2.2 Bar **(31.9 PSI)**	1.9 Bar **(27.5 PSI)**
15 Meters **(49.2 Feet)**	2.4 Bar **(34.8 PSI)**	2.1 Bar **(30.4 PSI)**
17 Meters **(55.7 Feet)**	2.6 Bar **(37.7 PSI)**	2.3 Bar **(33.3 PSI)**

Chiller Location Limitation: 8m above IFP	25 L (Buffer Tank) Nitrogen Fill	5 L (Expansion Tank) Nitrogen Fill
Same Level as IFP	1.4 Bar **(20.3 PSI)**	1.1 Bar **(15.9 PSI)**
8 Meters **(26.2 Feet)**	0.7 Bar **(10.1 PSI)**	0.4 Bar **(5.8 PSI)**
6 Meters **(19.6 Feet)**	0.8 Bar **(11.6 PSI)**	0.5 Bar **(7.2 PSI)**
4 Meters **(13.1 Feet)**	1 Bar **(14.5 PSI)**	0.7 Bar **(10.1 PSI)**
2 Meters **(6.5 Feet)**	1.3 Bar **(18.8 PSI)**	1 Bar **(14.5 PSI)**

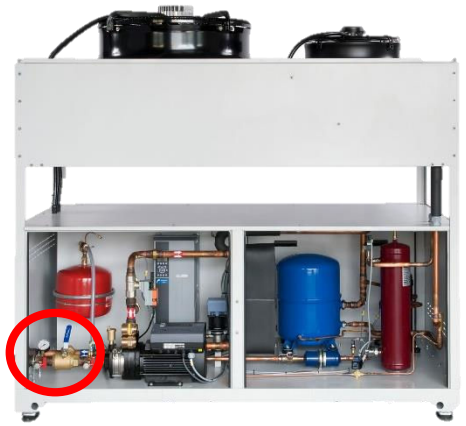
strainers

The filter strainers on the chiller and IFP are isolated from the system when it is in the closed position. Only a cup of glycol mixture is loss during the cleaning of the filter strainer.

Snap ring pliers are required for the removal of the strainer basket in the ball valve.



Reminder: Chiller must be in the off position to avoid “dead-head” of the pump!



glycol, rule of thumb

After the strainer is cleaned, the glycol we have collected is tested for concentration with a refractometer.

35-38% Ethylene Glycol	In range	No samples needed
21-34% Ethylene Glycol	Out of range	No samples needed. Top-off immediately or at the next scheduled event. **Note**: glycol may be mixed with other brand(s) when glycol percentage is 29% or higher to top-off, same type must be used (ethylene).
20% or lower Ethylene Glycol	Critical	Sample needed

chiller filling

The filling of the chiller is done at the port before the pump.

We will re-use the recovered glycol mixture to put back into the system.

The red-handle ball valve is opened to fill.

Verify static pressure of the system based on chiller height from IFP.

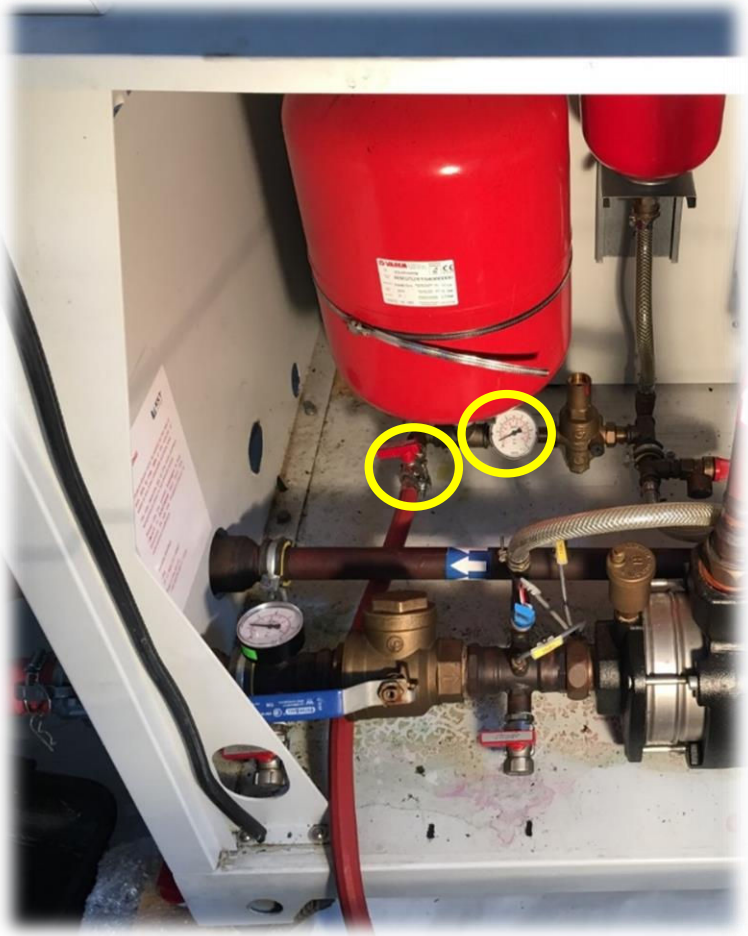
Chiller Location Limitation: 17m below IFP	Chiller Static Fill
2.5 Meters **(8.2 Feet)**	1.5 Bar **(21.7 PSI)**
5 Meters **(16.4 Feet)**	1.7 Bar **(24.6 PSI)**
7.5 Meters **(24.6 Feet)**	2 Bar **(29 PSI)**
10 Meters **(32.8 Feet)**	2.2 Bar **(31.9 PSI)**
12.5 Meters **(41 Feet)**	2.4 Bar **(34.8 PSI)**
15 Meters **(49.2 Feet)**	2.6 Bar **(37.7 PSI)**
17 Meters **(55.7 Feet)**	2.8 Bar **(40.6 PSI)**

Chiller Location Limitation: 8m above IFP	Chiller Static Fill
Same Level as IFP	1.6 Bar **(23.2 PSI)**
8 Meters **(26.2 Feet)**	0.9 Bar **(13 PSI)**
6 Meters **(19.6 Feet)**	1 Bar **(14.5 PSI)**
4 Meters **(13.1 Feet)**	1.2 Bar **(17.4 PSI)**
2 Meters **(6.5 Feet)**	1.5 Bar **(21.7 PSI)**

buffer tank filling

The filling of the buffer tank is done at the port near the pressure gauge.

The buffer tank glycol pressure must be 3 - 6 Bar.



condenser coil cleaning

Clean the condenser coil with water or non-acidic solution. The unit should be powered off, be sure to use non-acidic solution when cleaning the coil. On condenser coils with excessive dirt build up you may have to use a brush. If a water source isn't available, you may use a shop vacuum or compressed air.

CAUTION: High pressure water flow may damage/bend fins when cleaning!

system start-up and air bleeding

- Allow the pump to run for 15 seconds and turn it off again
- Open the air vents, purge the remaining air
- If the pressure drops. Fill again until the pressure with the pump OFF reaches the desired static fill at the IFP.
- Clean the filter strainer during the next-to last pass

If the pressure remains constant for 60 – 90 minutes of operation, proceed with chiller operation.

chiller operation

Operating Pressures (Glycol Circuit)

Chiller 1 - 1.5 Bar

(Day Mode) IFP 5 - 6 Bar

(Night Mode) IFP 4 - 5 Bar

Operating Pressures (Refrigeration Circuit)

Low Pressure: 7-11 Bar

High Pressure: 19-22 Bar

Chiller Set Point

(Day Mode) 20 C

(Night Mode) 26 C (compressor on); 19 C (compressor off)

amperage

Amperage checks are done at the electrical cabinet (please use wiring diagram to identify the circuit).

Tip: For checking the second compressor during day mode, please remove the fuses on 18F1 (compressor 1) while the unit is off and power on chiller to check operation!

Note any noises, excessive vibrations or leaks!

Pump Amperage Average

(Day Mode) 2.8 - 3.5 A

(Night Mode) 0.5 - 1.0 A

Big Compressor Amperage Average

13.0 - 27.0 A

Small Compressor Amperage Average

10.0 - 17.0 A

Big Fan Amperage Average

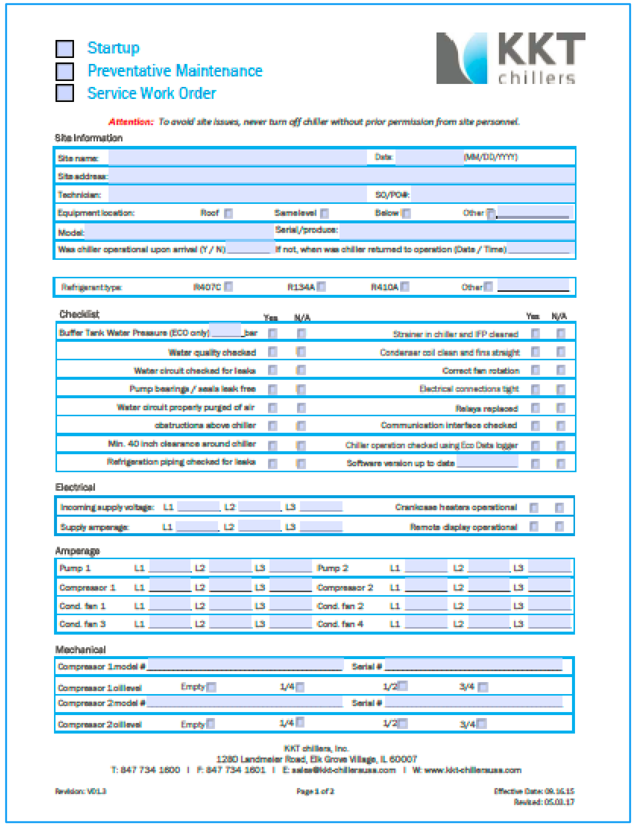
1.0 - 4.0 A

Small Fan Amperage Average

1.7 - 2.2 A

checklist

After verifying chiller operation, a checklist is completed (Checklist are available at www.kkt-chillersusa.com/siemens).



☐ Startup
☐ Preventative Maintenance
☐ Service Work Order

Attention: To avoid site issues, never turn off chiller without prior permission from site personnel.

Site Information

Site name: Date: (MM/DD/YYYY)
Site address:
Technician: SO/PO#:
Equipment location: Roof ☐ Samelevel ☐ Below ☐ Other ☐
Model: Serial/produce:
Was chiller operational upon arrival (Y / N) If not, when was chiller returned to operation (Date / Time)

Refrigerant type: R407C ☐ R134A ☐ R410A ☐ Other ☐

Checklist	Yes	N/A		Yes	N/A
Buffer Tank Water Pressure (ECO only) ____ bar	☐	☐	Strainer in chiller and IFP cleaned	☐	☐
Water quality checked	☐	☐	Condenser coil clean and fins straight	☐	☐
Water circuit checked for leaks	☐	☐	Correct fan rotation	☐	☐
Pump bearings / seals leak free	☐	☐	Electrical connections tight	☐	☐
Water circuit properly purged of air	☐	☐	Relays replaced	☐	☐
obstructions above chiller	☐	☐	Communication interface checked	☐	☐
Min. 40 inch clearance around chiller	☐	☐	Chiller operation checked using Eco Data logger	☐	☐
Refrigeration piping checked for leaks	☐	☐	Software version up to date	☐	☐

Electrical

Incoming supply voltage: L1 L2 L3 Crankcase heaters operational ☐ ☐
Supply amperage: L1 L2 L3 Remote display operational ☐ ☐

Amperage

Pump 1	L1	L2	L3	Pump 2	L1	L2	L3
Compressor 1	L1	L2	L3	Compressor 2	L1	L2	L3
Cond. fan 1	L1	L2	L3	Cond. fan 2	L1	L2	L3
Cond. fan 3	L1	L2	L3	Cond. fan 4	L1	L2	L3

Mechanical

Compressor 1model # Serial #
Compressor 1oillevel Empty ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐
Compressor 2model # Serial #
Compressor 2oillevel Empty ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐

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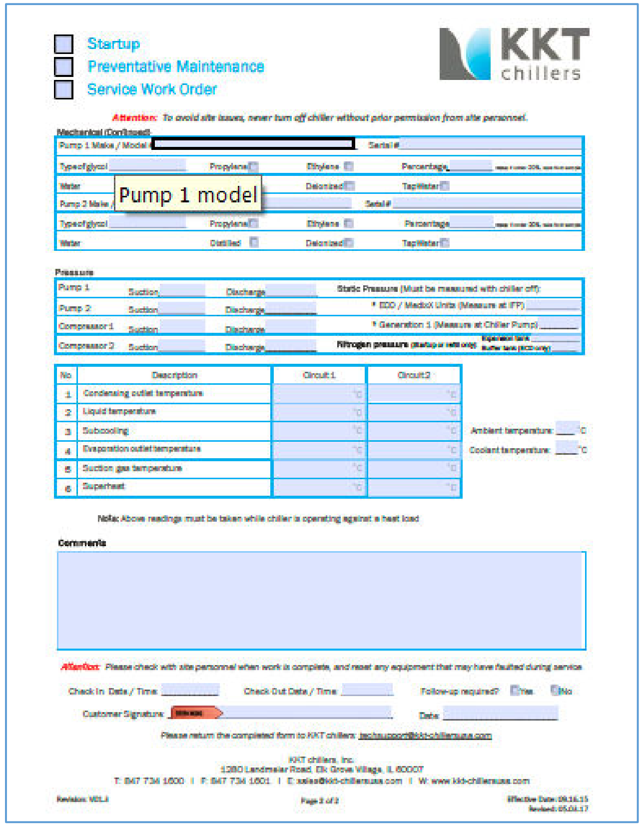
Revision: V01.3 Page 1 of 2 Effective Date: 09.16.15 Revised: 05.03.17



☐ Startup
☐ Preventative Maintenance
☐ Service Work Order

Attention: To avoid site issues, never turn off chiller without prior permission from site personnel.

Mechanical (Continued)

Pump 1 Make / Model # Serial #
Typeofglycol Propylene ☐ Ethylene ☐ Percentage
Water Deionized ☐ TapWater ☐
Pump 2 Make / Serial #
Typeofglycol Propylene ☐ Ethylene ☐ Percentage
Water Distilled ☐ Deionized ☐ TapWater ☐

Pressure

Pump 1 Suction Discharge Static Pressure (Must be measured with chiller off):
Pump 2 Suction Discharge * ECO / MedixX Units (Measure at IFP)
Compressor 1 Suction Discharge * Generation 1 (Measure at Chiller Pump)
Compressor 2 Suction Discharge Nitrogen pressure

No.	Description	Circuit 1	Circuit 2
1	Condensing outlet temperature	°C	°C
2	Liquid temperature	°C	°C
3	Subcooling	°C	°C
4	Evaporation outlet temperature	°C	°C
5	Suction gas temperature	°C	°C
6	Superheat	°C	°C

Ambient temperature: ____ °C
Coolant temperature: ____ °C

Note: Above readings must be taken while chiller is operating against a heat load

Comments

Attention: Please check with site personnel when work is complete, and reset any equipment that may have faulted during service

Check In Date / Time Check Out Date / Time Follow-up required? ☐ Yes ☐ No
Customer Signature: Date:

Please return the completed form to KKT chillers: techsupport@kkt-chillersusa.com

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average expectations

Mode	Variable Speed Pump Amperage	Variable Speed Compressor Amperage	Scroll Compressor Amperage (ECO 133L only)	Variable Speed Fan Amperage	Standard Fan Amperage (ECO 133L only)	Expansion Tank Fill (Nitrogen)	Pump (off) Static Fill	Refrigeration Pressure (Low, High)	Superheat
Day Mode	2.8 – 3.5A	13.0 – 27.0A	10.0 – 17.0A	1.0 – 4.0A	1.7 – 2.2A	.6 Bar	Follow Chart	7-11 Bar Low 19-22 Bar High	6
Night Mode	0.5 – 1.0A	13.0 – 27.0A	10.0 – 17.0A	1.0 – 4.0A	1.7 – 2.2A	.6 Bar	Follow Chart	7-11 Bar Low 19-22 Bar High	6