MULTISTACK

MS20C, MS30C, MS50Z, MS50B
MS70R, MS90R

Water Cooled Modules
OPERATION & MAINTENANCE

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1.0 Chiller Identification

The module data plate which contains the model and serial number for all MS modules is located on the "B" side electrical box door of each module

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1.1 Water Cooled Model Number

MS30C5H2W-V

MS 30 C 5 H 2 W -V

MS = Multistack

30 = tons 20,30,50,70,90 = tons

C = Trane Scroll Compressor Z = Copeland Scroll R = Copeland Screw
B = Bristol Recip. T = Turbocor Centrifugal

5 = single condensers, dual evaporators 1 = single cond & evap std. efficiency
2 = single cond & evap high efficiency 3 = shell & tube condensers, single evap
4 = single cond, dual evap std. efficiency 6 = dual cond & evap high efficiency

H = 460V A = 208V L = 230V C = 575V V = special

2 = wired as multiple module 1 = wired as single module

W = water cooled D = condensing unit R= Heat Pump

V = variation (* if noted)

1.3 Serial Number Identification

JC-06-25

J = --0- (decade built)	I = 1990's	J= 2000's	
C = ---3 (year built)	A= '01	B= '02	…….
06 = June (month built)	01 = Jan.	02 = Feb.	…….
25 = 25th module built	01 = 1st	02 = 2nd	……..

2.0 Theory of Operation

The Multistack chiller provides chilled water to an external load based off of the return water temperature to the Multistack master control. When the Entering Chilled Water sensor sends the signal to the master control that cooling is needed, compressors will begin to start and produce chilled water. The point at which the ECHW temperature calls for compressors to start is determined by the Upset-point and the Variable Set-point setting in the system variables menu of the master control.

When the ECHW sensor senses that the chilled water temperature has dropped belwo the set-point, compressors will begin to cycle off.

3.0 Daily Log Sheet

On the back page of this manual is a chiller information log sheet. The log sheet can be used daily, weekly or as desired to record operation characteristics of the chiller. The information recorded on the log sheet can also be very helpful for diagnosing potential problems in the system.

4.0 Pressure Readings

The operating suction and discharge pressures in the system are directly related to water flow, condenser temperatures, chilled water set-points, and the cleanliness of the system.

For a R22 chiller at standard water-cooled conditions of 55º ECHW, 45º LCHW, 85º ECW, 95º LCW the suction pressure should be approximately 64 psig and 210 psig discharge pressure.

All Multistack modules have a high pressure cut out safety device. The HP cut out for water-cooled MS modules is 300 psig for R-22, 320 psig for R-407C, and 185 psig for R-134a.

Each Multistack module also has a low pressure safety device. The LP cut out for MS modules with R-22, R-407C, or R-134a is 25 psig. .

If circuits are faulting on HP the first action to be taken should be checking the condenser water inlet filter cartridge for debris. *See filter strainer cleaning procedure in section 5.0.*

A LP fault is an indication of low refrigerant charge in the system. If a circuit is going out on a LP fault check the static pressure of the system while the circuit is in the off mode. If pressures are low check the circuit for possible leaks. The

circuit can be pressurized to 15 psig with refrigerant and topped to 160 psig with dry Nitrogen.

5.0 Strainer Cleaning

All Multistack modules have a 30 mesh filter cartridge in the condenser and evaporator inlet header. The purpose for the filter cartridge is to keep debris from entering the heat exchanger. An external "Y" or basket type system strainer should also be installed as a pre-filter to the Multistack strainers.

There is no set time for cleaning the filter cartridges. The frequency of this process is dependant on the water quality in the condenser and / or evaporator loop.

Normally, debris in a water loop is going to take the path of least resistance and build up on the last modules to receive water. Multistack modules come with an auto blow down (the DDRS-210A) installed on the condenser side of the last module to receive water flow. The DDRS-210A is controlled by a timer in the master control, it opens once a day to remove debris from the loop. The DDRS-210A does not eliminate the need to pull the filters for cleaning. It is meant however to decrease the frequency.

The effect of debris being built up in the condenser water inlet filter cartridge will be nuisance HP (high pressure) faults. By checking the pressure differential between the inlet and outlet of the condensers, an indication can be determined if the filters are contaminated. *Refer to the Product Data Catalog for correct pressure drop of your model*. To keep HP faults from repeating, the filters will need to be pulled. If HP faults still occur after cleaning the filter cartridges the condenser pump should be checked for proper flow. If flow is not a problem the heat exchangers may need to be cleaned. *Refer to section 11.0 on Heat Exchanger Cleaning.*

Following is the procedure for removing and cleaning the filter cartridges on the condenser side.

1. Turn off the chiller, shut down the condenser pump, and close the butterfly / gate valves to the condenser.
2. Drain the water remaining in the condensers and header pipes. You can do this by opening the drain valve in the supplied pipe stubs or removing the end Victaulic cap on the DDRS-210A.
3. Remove the first filter in the DDRS and remove all remaining filters in the bottom condenser header pipes. You may need to fabricate a tool to hook onto and pull the strainers out through the DDRS end.
4. Slowly open the top butterfly / gate valve and allow water to flow through the condensers and onto the floor for approximately 30 seconds. This will push

out any debris that was trapped in the bottom of the heat exchanger as the filters were removed

5. Clean the filters with hose, power washer, or wire brush as needed and re-install. Slide filters in until you hit the filter stop ring on the first module. Some people like to keep an extra set of strainers for quick re-installation. These filters are available for purchase through your local Multistack Representative.
6. Close the system by installing any Victaulic clamps previously removed.
7. Open the ¼" petcock bleed valves on the pipe stubs.
8. Re-fill the system by opening the bottom butterfly / gate valve and filling from the bottom up. Close the ¼" petcock valves and open the top butterfly / gate valve after the air has been bled from the system.
9. Restart the condenser pump. Bleed any remaining air in the system once the pump has started and re-start the chiller

If circuits are faulting on Low Suction Temperature, or Low Chilled Water Temperature the chilled water inlet filter cartridge should be checked. The strainers are located in the top header on the CHW side so the previous instructions on condenser strainer removal do not have to be exactly followed. If the strainers are clean the fault is most likely being caused by a low flow condition or to low of set-points in the master control. If these possibilities are eliminated the evaporator heat exchangers may need cleaning.

6.0 Compressor Oil Level

All compressors used on MS modules have an oil level sight glass on each compressor. Each module is run tested and has the oil level set at the factory. The compressor crankcase heaters should always be on 24 hrs before a compressor is started to ensure no liquid is present in the oil Following are factory oil level settings and recommendations.

Scroll, and Reciprocating Compressors are all 1 stage and oil level is set at 1/8 – ¼ full sight glass.

Screw compressors have 3 steps of capacity. At 100% the oil level should be 3/4 – 7/8 full.

Factory oil charge volume for each compressor can be found in the *Product Data Catalog.*

7.0 Refrigerant Charge / Evacuation

All MS modules come factory charged with the recommended refrigerant volume. Prior to charging, each circuit is evacuated to a maximum of 150 microns and held 15 minutes. The proper refrigerant charge for each module can be found on the module data plate.

For proper charge on water-cooled machines the circuit should be charged until the sight glass just clears.

8.0 Filter Driers

Multistack modules contain very short piping runs to the major components. Only a micro refrigerant charge (.6 of a lb. per ton) is used, and all circuits are evacuated to 150 microns. For this reason a liquid line filter drier is not factory installed in the unit.

When changing a major component in the system, a replaceable core suction line filter kit can be added to reduce contamination. The suction filter kit can be purchased from Multistack through your local Multistack Representative. Installation instructions and drawings are also available from Multistack.

9.0 Superheat / Subcooling

Multistack uses a mechanical type expansion valve on all modules. By turning the valve adjustment clockwise superheat is increased.

On MS modules, superheat is set at the factory during the run test. Superheat is set for 10 – 12 degrees during the test run.

Subcooling is necessary in the system to prevent flash gas as the refrigerant enters the expansion valve. Multistack condensers are sized so that subcooling of the liquid refrigerant will take place with no separate subcooler being needed. The general range of subcooling seen is 10- 20 degrees.

10.0 Pressure Relief Valve

MS modules do not have pressure relief valves as a standard component. If desired or required by local code, pressure relief can be added as an option.

11.0 Annual Maintenance

Most of the annual maintenance requirements for Multistack Chillers involve proper shut-down of the machine, and cleaning of the heat exchangers. *Preventative Maintenace bulletin #021594PM* and *Heat Exchanger Cleaning Procedures bulletin #091594CP* describe the recommended procedures for both processes. Multistack has available the 151A Cleaning Kit to assist with this process. Please see the *151A Cleaning Kit bulletin # 090195CK* for more details. All of these bulletins are part of the standard O&M manual package.

Other annual checks that should be done:

A check of all electrical components (contactors, fuses, relays, etc..) should be performed once a year for any signs of excessive wear. Checking for tight connections should also be performed at this time.

Superheat, pressure gauges, oil levels, master control condition, and sensor accuracy should also be checked.

12.0 Compressors

With any chiller system there is always the chance of a compressor failure. In the event of a failure, proper steps should be taken to determine the cause of the failure.

A motor burn due to a fault in the motor insulation is quite rare. Most burnouts are actually caused by a mechanical condition or lubrication problems. In the event of a burnout, proper clean up procedures should be followed.

1. Check all electrical components of the circuit (contactors, fuses, wires, etc.)
2. If necessary do a system clean up. Nu-Calgon RX-11 flush, or Sporlan System Cleaner work well.
3. Install a suction filter drier with burnout core. *See section 7 on filter driers.*
4. Evacuate the system to a minimum of 500 microns and hold for 20 minutes.
5. Charge the circuit with virgin refrigerant. Charge with liquid into the discharge side. *See refrigerant charge on nameplate data of unit.*
6. Run the system 2-3 weeks with burnout filter core. Replace with standard core drier.

13.0 Heat Exchangers

Multistack uses brazed plate stainless steel heat exchangers for all condensers and evaporators.

Without proper water treatment or due to abuse, heat exchangers, especially condensers can corrode over time and eventually develop an internal leak. In such an event it would become necessary to replace the heat exchanger.

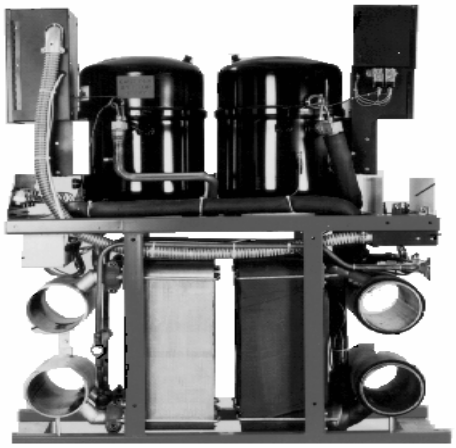
Following are the step's for field replacement of a failed condenser or evaporator heat exchanger.

1. If the refrigerant has not been lost on the failed circuit, you should first do a standard refrigerant recovery.
2. Begin by isolating the chiller and draining water from the side to be worked on.
3. Remove the 6" water header pipes by unbolting the victaulic couplings.
4. Support the underneath of the defective heat exchanger and the other circuit heat exchanger if applicable. A 2x4 and 1x4 should fit perfectly underneath.
5. Using a saws all you can now cut the refrigerant piping to remove the heat exchanger. Cut on the bottom side of the elbow and sweat off remaining portion of old elbow.
6. Remove the red support brace that holds both heat exchangers in place. Once this is removed you can remove the defective exchanger.
7. Set the new heat exchanger in place and re-install the support brace.
8. Fit the couplings and refrigerant piping into the heat exchanger. You may need to loosen the rotolock at the compressor at this time.
9. Braze in the new exchanger while purging with a low pressure of nitrogen.
10. After brazing leak check and evacuate to a maximum of 500 microns. Charge the circuit according to the name plate charge.

If the heat exchanger failure has caused water to enter into the refrigerant side, the compressor and opposite side heat exchanger should also be checked for possible contamination. If water has entered into the compressor it is recommended the compressor be replaced, as removing all the moisture from the oil is very difficult. Replacement of the other contaminated heat exchanger, the expansion valve, and installation of a suction drier with a water core cartridge is also recommended. Evacuate the circuit to a maximum of 500 microns and let stand for 20 minutes. Charge the circuit and run 2-3 weeks with the high water core cartridge and then replace with a standard core.

14.0 Troubleshooting Water Cooled Modules

For MS modules, please see the Troubleshooting Guide on page 15 of the Comput 25 User Manual located in section 6 of the O&M package.



III MULTISTACK CHILLER DAILY LOG SHEET

	DATE					
	Status	Suct. Press	Head Press	Suct. Temp	LoChw Temp	Fault (if any)
Comp #1						
Comp #2						
Comp #3						
Comp #4						
Comp #5						
Comp #6						
Comp #7						
Comp #8						
Comp #9						
Comp #10						
Comp # 11						
Comp #12						
	Ent. Chw	Lvg. Chw	Ent CW	Lvg. CW	Demand	Capacity
System						
	Upset	Loset	VSP	Load Limit	Tdiff	Index
System						
COMMENTS:	CHW P Drop_____. CW P Drop _____.					
