

SECTION 6

TROUBLE SHOOTING

TABLE 1 - CAUSES OF NORMAL AND SAFETY SYSTEM SHUTDOWNS IN ACCORDANCE WITH THE MICROCOMPUTER CONTROL CENTER DISPLAY

SHUTDOWN CAUSE CONTROL CENTER DISPLAY				GOVERNING CONTROL FUNCTION		
DAY OF WEEK	TIME OF DAY	CAUSE OF SHUTDOWN	METHOD OF RESTART	DESCRIPTION	OPERATING POINT	
					ON RISE	ON FALL
MON.	10:00 AM	Low Water Temperature	Autostart	Low Water (LWT)	Chilled water setpoint	4°F below chilled water setpoint
MON.	10:00 AM	Low Water Temperature VSD	Autostart	Low Water (LWT)	Chilled water setpoint	4°F below chilled water setpoint
MON.	10:00 AM	Flow Switch	Autostart	Flow Switch		
MON.	10:00 AM	System Cycling	Autostart	A remote command (computer relay contact or manual switch)		
MON.	10:00 AM	Multi-Unit Cycling	Autostart	(Optional) Lead-Lag Sequence Control		
MON.	10:00 AM	Internal Clock	Autostart	Internal Clock		
MON.	10:00 AM	AC Undervoltage	Autostart	<15% FLA for 25 continuous seconds		
MON.	10:00 AM	Power Fault	Autostart	CM-2 Current Module or Solid State Starter		
		Remote Stop		Energy Management System		
MON.		Anti-Recycle, 20 Min. Left		Anti-Recycle Timer		
MON.	10:00 AM	Low Evap. Pressure		Low Evap. Pressure Transducer (LEP)	5.43 PSIA	5.42 PSIA
MON.	10:00 AM	Low Evap. Pressure Brine		LEP external control (Brine units only)	Set to Job Spec.	Set to Job Spec.
MON.	10:00 AM	Low Oil Pressure		Low Oil Press. Transducer (OP) High Oil Press. Transducer (OP)	20 PSID	15 PSID
MON.	10:00 AM	High Pressure		High Pressure Safety Control (HP)	15 PSIG	9 PSIG
MON.	10:00 AM	Evap. Transducer or Probe Error		Evap. Pressure Transducer or Leaving Chilled Water Thermistor (RS1)		
MON.	10:00 AM	Motor Controller - Ext. Reset		CM-2 or Solid State Starter or Variable Speed Drive		
MON.	10:00 AM	High Discharge Temperature		Discharge Temperature Thermistor (RT2)	220°F	219°F
MON.	10:00 AM	High Oil Temperature		Oil Temperature Thermistor (RT3)	180°F	179°F
MON.	10:00 AM	Power Failure	Autostart	Micro Board undervoltage circuit on 5V unregulated supply	8.29 VDC	7.84 VDC
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TABLE 1 - CAUSES OF NORMAL AND SAFETY SYSTEM SHUTDOWNS IN ACCORDANCE WITH THE MICROCOMPUTER CONTROL CENTER DISPLAY - CONTINUED

PROGRAMMED SETPOINTS BY OPERATOR	START-UP OF SYSTEM AFTER SHUTDOWN	PROBABLE CAUSE AND SERVICE REQUIRED
4°F below chilled water setpoint (If set to 40°F would be 36°F.) (36°F minimum)	Automatic Restart when water reaches setpoint. If system is running and setpoint is increased 4°F, system will continue to run, as LWT cutout shifts to a fixed 36°F for 10 minutes.	System load is less than minimum capacity.
4°F below chilled water setpoint (If set to 40°F would be 36°F.) (36°F minimum)	If system is running and setpoint is increased 4°, VSD will Initiate Shutdown. Automatic Restart when water temperature reaches setpoint.	System load is less than minimum capacity.
	Automatic Restart when water flow is restored to close flow switch.	Lack of water flow. Check operation of chilled water pump.
	Automatic Restart upon remote command.	Contact - connected to the Remote/Local cycling input of the Digital Input Board.
	Automatic Restart upon remote command.	Contact - connected to the Multi-Unit cycling input of the Digital Input Board.
Daily Schedule programmed to shut down unit.	Will automatically restart when programmed schedule permits.	Pressing Compressor Start Switch overrides the program.
		Cycling shutdown occurs when motor current is >15% FLA for 25 seconds during chiller operation.
	Will start automatically following coastdown.	Motor Controller contacts opening and closing in less than 3 seconds due to a power fault condition.
	Start up by start signal from remote start switch.	Remote Stop Contact Closure.
Will not start until 30 minute timer is timed out.	Will restart when time left = 00 minutes.	Minimum time between successive compressor starts is 30 minutes.
	To restart, press compressor switch from STOP/RESET to START position.	See OPERATING ANALYSIS, Table 2 Symptom 2.
	To restart, press compressor switch from STOP/RESET to START position.	See OPERATING ANALYSIS, Table 2 Symptom 2.
	Will restart when pressure increases to 20 PSID. To restart, press compressor switch from STOP/RESET to START position.	See OPERATING ANALYSIS, Table 2 Symptom 4, 5, 6, 7, 9, 10, 11.
	Will restart when pressure falls to 9 PSIG. To restart, press compressor switch from STOP/RESET to START position.	See OPERATING ANALYSIS, Table 2 Symptom 1 - High Discharge Pressure.
	To restart, press compressor switch from STOP/RESET to START position.	Defective Evap. Pressure Transducer or Leaving Chiller Water thermistor (RS1). LCWT minus saturation temp. is less than -2.5°F or greater than 25°F Checked every 10 minutes following a 10-min. bypass at start-up.
	Reset the device that caused the shutdown. Chiller will start automatically.	CM-2 or Solid State Starter or Variable Speed Drive has shut down chiller.
	To restart, press compressor switch from STOP/RESET to START position.	Condenser tubes dirty or scaled or high condenser water temperature. See Symptom 1, Table 2.
	To restart, press compressor switch from STOP/RESET to START position.	Dirty oil filter or restricted oil cooler line. Change oil filter. See Symptom 9, Table 2.
Optional AUTO Restart Plug is installed on Micro Board.	Will restart automatically when voltage reaches 8.29VDC. An undervoltage circuit on Micro Board monitors the 5VDC unregulated supply for an undervoltage condition.	Power Failure.
Auto restart plug is removed on Micro Board.	To restart, press compressor switch to STOP/RESET position and then to START position.	Power Failure.

TABLE 1 - CAUSES OF NORMAL AND SAFETY SYSTEM SHUTDOWNS IN ACCORDANCE WITH THE MICROCOMPUTER CONTROL CENTER DISPLAY - CONTINUED

SHUTDOWN CAUSE CONTROL CENTER DISPLAY				GOVERNING CONTROL FUNCTION		
DAY OF WEEK	TIME OF DAY	CAUSE OF SHUTDOWN	METHOD OF RESTART	DESCRIPTION	OPERATING POINT	
					ON RISE	ON FALL
MON.	10:00 AM	Oil Pressure Transducer Error		High Oil Pressure Transducer or Low Oil Pressure Transducer	60 PSID	59 PSID
		Vane Motor Switch Open	Autostart	Vane Motor Switch		
MON.	10:00 AM	Starter Malfunction Detected		Motor Current >15% for 10 seconds with Control Center not calling for motor to run.		
MON.	10:00 AM	Program Initiated Reset	Autostart	Micro Board		
		Replace RTC-IC Chip Reprogram Setpoints		RTC-IC Chip		
MON.	10:00 AM	Low Oil Temperature	Autostart	Oil Temperature Thermistor (RT3)	71.0°F	55°F
MON.	10:00 AM	Faulty Discharge Temperature Sensor		Discharge Temp. Thermistor (RT2) disconnected or faulty (min. system operating temp. = 32°F)	30.0°F	29.9°F
MON.	10:00 AM	Low Line Voltage (SSS units only)		SSS Logic Board	See legend on wiring diagram.	
MON.	10:00 AM	Motor Phase Current Unbalance (SSS units only)		SSS Logic Board	See Section 2.	

TABLE 1 - CAUSES OF NORMAL AND SAFETY SYSTEM SHUTDOWNS IN ACCORDANCE WITH THE MICROCOMPUTER CONTROL CENTER DISPLAY - CONTINUED

PROGRAMMED SETPOINTS BY OPERATOR	START-UP OF SYSTEM AFTER SHUTDOWN	PROBABLE CAUSE AND SERVICE REQUIRED
	Will start at 59 PSID when compressor switch is placed to STOP/RESET and then START.	This Shutdown is provided to check on Oil pressure Transducers for failure in the high state. Replace Oil Pressure Transducer in oil sump or compressor.
	Restart automatically after Vane Motor arm linkage is set properly. Press STOP/RESET and then START switch.	Vanes are set improperly. Reset vane linkage, check vane positions using the Service key switch and proper keys on the MicroComputer Control Center or switch of capacity board of Variable Speed Drive.
	Press compressor STOP/RESET switch and then START switch.	Check motor starter operation. Motor current value greater than 15%.
		Watchdog timer circuit has reset software program. Chiller will automatically restart.
	Reprogram the Control Center Setpoints and proceed with Normal Start-up.	Weak Battery. Replace RTC-IC chip U16.
	Press STOP/RESET switch and then START switch.	Oil Temperature Thermistor disconnected from Analog Input Board. Reconnect or replace open sensor.
	Press STOP/START switch and then START switch.	Faulty Discharge Temperature Thermistor (RT2) or disconnected from Analog Input Board. Connect or replace open sensor.
	Chiller will automatically restart when all phases of line voltage increase to the minimum required starting level.	Low AC Line Voltage
	Press STOP/RESET switch and then START switch.	Motor Phase Current Unbalance

TABLE 2 - OPERATING ANALYSIS CHART

RESULTS	POSSIBLE CAUSE	REMEDY
1. SYMPTOM: ABNORMALLY HIGH DISCHARGE PRESSURE		
Temperature difference between liquid refrigerant out and water off condenser higher than normal.	Air in condenser.	Purge unit operates automatically to take care of this condition. Test for air leaks if display reads: WARNING – EXCESS PURGE
High discharge pressure.	Condenser tubes dirty or scaled.	Clean condenser tubes. Check water conditioning.
	High condenser water temperature.	Reduce condenser water inlet temperature. (Check cooling tower and water circulation.)
Temperature difference between condenser water on and water off higher than normal, with normal cooler pressure.	Insufficient condensing water flow.	Increase the quantity of water through the condenser to proper value.
2. SYMPTOM: ABNORMALLY LOW SUCTION PRESSURE		
Temperature difference between leaving chilled water and refrigerant in cooler greater than normal with high discharge temperature.	Insufficient charge of refrigerant.	Check for leaks and charge refrigerant into system.
	Flow orifice blocked.	Remove obstruction.
Temperature difference between leaving chilled water and refrigerant in the cooler greater than normal with normal discharge temperature.	Cooler tubes dirty or restricted.	Clean cooler tubes.
Temperature of chilled water too low with low motor amperes.	Insufficient load for system capacity.	Check prerotation vane motor operation and setting of low water temperature cutout.
3. SYMPTOM: HIGH COOLER PRESSURE		
High chilled water temperature.	Prerotation vanes fail to open.	Check the prerotation vane motor positioning circuit.
	System overloaded.	Be sure the vanes are wide open (without overloading the motor) until the load decreases.
4. SYMPTOM: NO OIL PRESSURE WHEN SYSTEM START BUTTON PUSHED		
Low oil pressure displayed on control center; compressor will not start.	Oil pump running in wrong direction.	Check rotation of oil pump. (Electrical Connections)
	Oil pump not running.	Check electrical connections to oil pump and press manual reset on oil pump starter (on condenser shell in front of purge unit).
5. SYMPTOM: COMPRESSOR STARTS, NORMAL OIL PRESSURE DEVELOPS, FLUCTUATES FOR SHORT WHILE, THEN COMPRESSOR STOPS ON OIL PRESSURE CUTOUT		
Oil pressure normal, fluctuates, then compressor stops on Oil Pressure Cutout. Display reading: LOW OIL PRESSURE	Unusual starting conditions exist, i.e., oil foaming in reservoir and piping due to lowered system pressure.	Drain the oil from the compressor and charge new oil into the compressor. (See "Oil Charging Procedure", page 44.)
	Burned out oil heater.	Replace oil heater.

TABLE 2 - OPERATING ANALYSIS CHART - CONTINUED

RESULTS	POSSIBLE CAUSE	REMEDY
6. SYMPTOM: UNUSUALLY HIGH OIL PRESSURE DEVELOPS WHEN OIL PUMP RUNS		
Unusually high oil pressure is displayed when the oil pressure display key is pressed when the oil pump is running.	High oil pressure. Transducer defective. Relief valve is misadjusted.	Replace low or high oil pressure transducer. Adjust external relief valve.
7. SYMPTOM: OIL PUMP VIBRATES OR IS NOISY		
Oil pump vibrates or is extremely noisy with some oil pressure when pressing "Oil Pressure" display key.	Misalignment of pump or piping. Mounting bolts loose. Bent shaft. Worn pump parts.	Correct condition or replace faulty part.
<i>NOTE: When oil pump is run without an oil supply it will vibrate and become extremely noisy.</i>	Oil not reaching pump suction inlet in sufficient quantity.	Check oil supply and oil piping.
8. SYMPTOM: OIL PRESSURE GRADUALLY DECREASES (NOTED BY OBSERVATION OF DAILY LOG SHEETS)		
Oil pressure (noted when pressing "Oil Pressure" display key) drops to 70% of oil pressure when compressor was originally started.	Oil filter is dirty.	Change oil filter.
	Extreme bearing wear.	Inspect compressor.
9. SYMPTOM: OIL RETURN SYSTEM CEASES TO RETURN AN OIL/REFRIGERANT SAMPLE		
Oil refrigerant return not functioning.	Filter-drier in oil return system dirty.	Replace oil filter-drier with new.
	Jet or orifice of oil return jet clogged.	Remove jet, inspect for dirt. Remove dirt using solvent and replace.
10. SYMPTOM: OIL PUMP FAILS TO DELIVER OIL PRESSURE		
No oil pressure registers when pressing "Oil Pressure" display key when oil pump runs.	Faulty oil pressure transducer. Faulty wiring/connectors.	Replace oil pressure transducer.
11. SYMPTOM: REDUCED OIL PUMP CAPACITY		
Oil pump pumping capacity low.	Excessive end clearance in pump. Other worn pump parts.	Inspect and replace worn parts.
	Partially blocked oil supply inlet.	Check oil inlet for blockage.
12. SYMPTOM: IMPROPER PURGE UNIT OPERATION		
Purge unit not purging and air is present in the unit.	1. Faulty float switch assembly. 2. Faulty three-way oil solenoid valve. 3. Faulty exhaust solenoid valve. 4. Faulty pressure transducer.	Check these components and replace where necessary.
Purge unit purging air and refrigerant	1. Faulty exhaust solenoid valve. 2. Faulty pressure transducer. 3. Lack of cooling.	Restore refrigerant liquid cooling supply.