TURMOIL

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INSTALLATION, MAINTENANCE and OPERATION MANUAL

MODEL OC-750 R

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WARNING

DO NOT ATTEMPT TO START UP THIS COOLER UNTIL YOU HAVE READ THROUGH THE INSTRUCTIONS COMPLETELY. IMPROPER START-UP WILL VOID THE COOLER WARRANTY AND DAMAGE THE MACHINE.

UNCRATING & INSPECTION

Rough handling during shipment may cause obvious and/or concealed damage. Upon arrival, the cooler should be inspected carefully and claims for damage must be filed immediately with the trucker.

When uncrating the cooler, inspect it thoroughly for signs of concealed damage. Coolers that have been dropped or shipped on their side may not show external damage. If damages are found, a claim must be filed with the carrier within 30 days of delivery.

The cooler is shipped fully charged with refrigerant and ready for operation. The cooler has been run for at least 4 hours under full load conditions before shipment. The Refrigerant DISCHARGE and SUCTION pressure gauges on the front panel should show a pressure reading of approximately 100 PSIG. If the pressure gauges show no pressure reading then the cooler most likely has *concealed damage* and has lost its charge of refrigerant. A qualified refrigeration mechanic should be called in to check for leaks.

COOLER PLACEMENT

Place the cooler in a level location where it is accessible from the front and with enough room to make electrical and hose connections.

The cooler will draw air in through the vents on the upper left and right side panels and will exhale air through the top. It is imperative that these vents remain open to permit the free movement of air (minimum two feet of open space on air intake and discharge sides).

DESCRIPTION

The OC-750 R cooler is designed to provide a continuously circulating supply of clean, water based coolant. This unit is a completely self-contained circulating cooler consisting of a reservoir, digital temperature controller, circulating pump and air cooled refrigeration system. After the cooler is filled with coolant and the proper electrical and plumbing connections are made, the OC-750 R will operate virtually maintenance free, supplying cooling fluid at constant temperature and pressure.

This cooler is designed for use indoors in a clean industrial environment where ambient temperatures may vary from 50°F to 100°F. The OC-750 R is capable of removing heat at the rate of 90,000 BTU/Hr while cooling water glycol to 60° F in an ambient of 90°F.

PLUMBING HOOK-UP

Make your plumbing connections to the 1 1/4" MPT fittings on the front panel tagged DISCHARGE and RETURN. Flow will be out the DISCHARGE connection.

COOLANT
The cooler is designed to cool a clean water based coolant. A coolant conditioner is required to protect the coolant system from freezing and mineral scale deposits. A mixture of 50% ethylene glycol and 50% distilled water is suggested. The coolant reservoir capacity is 45 gallons.

SYSTEM FILLING
To fill the tank with coolant, locate the fill port on the lower left front panel. Untwist and remove the fill port cap and fill the reservoir with clean cooling fluid. Fill the tank to the top of the level gauge. Do not over fill. After the cooler has operated for a few minutes, add more coolant as necessary to fill the tank.

ELECTRICAL HOOK-UP
See Electrical diagram attached. Check name plate tag for proper voltage, hertz and phase. The supply voltage must be within 10% of the rated voltage on the tag. Make power connections to the terminals provided on the disconnect switch in the NEMA-12 electrical enclosure. Connect ground to the grounding terminals provided on the terminal strip. Make connections for HIGH TEMPERATURE interlock (open on fault) to terminals #20 and #21. Make connections for LOW FLOW fault (open on fault) to terminals #22 and #23. Make connections for REMOTE START to terminals #24 and #25. Check for loose wires.

TEMPERATURE CONTROLLER
This cooler is supplied with a digital temperature controller (CTC-106) mounted on the door of the electrical enclosure. See the attached instruction sheet for operating this controller. The controller maintains the coolant temperature within ±0.5° F of the adjustable set-point. The temperature sensor is installed in the DISCHARGE line. The controller will alternate flashing the set point temperature (S) and the actual temperature (F).

START-UP
Once the cooler is installed and the proper plumbing and electrical connections have been made, the disconnect switch can be turned to the ON position. A white POWER ON light on the electrical enclosure door will energize as will the display on the temperature controller. **Let the crankcase heater warm up the compressor for at least 4 hours before starting the cooler.**

Upon start-up the stainless steel circulating pump may need to be initially primed by loosening the priming plug on the top of the pump housing and bleeding out any entrapped air. Once coolant starts dripping out the port, retighten the plug.

To start the cooler, turn the OFF/ON/REMOTE switch to the ON position. The circulating pump will start and the green PUMP ON light will come on. The red LOW FLOW light will also come on but should go out as soon as the pump starts pumping coolant through the coolant loop and back to the cooler. If the red LOW FLOW light does not go out, **Check immediately for proper pump rotation and prime.** The pump motor should turn in a clockwise rotation when viewed from the motor end of the pump. The lower left side panel can be removed to check the motor's rotation. If the pump motor is rotating in the wrong

direction, turn off the power supply and exchange any two of the power leads to the cooler. **Do not run the pump for more than 15 seconds with incorrect rotation or without flow.**

All motors on the cooler were synchronized at the factory thus if the pump is rotating in the proper direction, the compressor and fan motors should also be rotating correctly.

The compressor is protected from short cycling by a 2 minute ON-DELAY relay and does not start for two minutes after the pump is turned on and coolant is being pumped through the evaporator causing the red LOW FLOW light to go out.

OPERATION

When power is supplied to the cooler and the rotary disconnect is turned to the ON position, the white POWER ON light comes on as does the display on the temperature controller. The cooler is started by turning the OFF/ON /REMOTE switch to the ON position. (The cooler can also be started by turning the ON/OFF/REMOTE switch to the REMOTE position and supplying 24VDC power to terminals #24 and #24 and energizing the REMOTE START RELAY). When the cooler is started, the pump starts and runs continuously. The green PUMP ON light comes on. If there is coolant flow through the coolant loop, the red LOW FLOW light goes out and the green REFRIGERATION light comes on indicating that the refrigeration system is OK to run. The compressor is protected from short cycling by a 2 minute on-delay relay and will not come on for at least two minutes after the green REFRIGERATION light comes on. Once the On-Delay relay has timed out, the compressor and at least one fan come on and run continuously. The second fan is controlled by a pressure switch (FPS) and will come on once the Head Pressure has built up to about 250 psi. This pressure switch cycles the second fan to maintain a fairly constant head pressure under varying load and ambient conditions.

When the controller calls for cooling, the liquid line solenoid opens and refrigerant flows through the expansion valve to absorb heat from the recirculating coolant as the refrigerant evaporates in the evaporator/heat exchanger. When the coolant temperature drops below the setting on the controller, the liquid line solenoid closes stopping the flow of liquid refrigerant to the expansion valve. The compressor continues to run, pumping refrigerant out of the evaporator, causing the suction pressure to drop. Once the suction pressure drops to about 50 psi, the hot gas bypass valve (HGBV) opens allowing hot refrigerant gas to bypass the condenser and the receiver and enter directly into the evaporator where it is cooled by the circulating coolant. When the coolant temperature rises above the set point on the controller, the liquid line solenoid (SOL1) opens allowing refrigerant to pass through the expansion valve where it evaporates in the evaporator, causing the suction pressure to rise and the hot gas bypass valve to close.

If there is loss of coolant flow or the coolant temperature is below the set-point on the Low Temp thermostat (TAS), both the liquid line (SOL1) and hot gas (SOL2) solenoids will close and the compressor will pump down and shut off on the Low Pressure switch (H/LPS). When the flow is restored and/or the coolant temperature rises above the Low Temp setting, the solenoid valves open causing the suction pressure to rise. When the suction pressure rises above the CUT IN setting on the High/Low Pressure Switch (H/L PS) the compressor will come on after the 2 minute on delay relay (ODR) times out.

Adjust the temperature controller to the desired setting. Check all plumbing connections for leaks. The cooler is now ready for continuous operation.

SAFETY INTERLOCKS

HIGH/LOW PRESSURE SWITCH

The compressor is protected from excessively high discharge pressure or low suction pressure by a HIGH and LOW pressure switch (H/L PS) mounted inside the cabinet. High head pressure can be caused by a dirty condenser or by too little air flow through the condenser. High head pressure can also be caused by a faulty solenoid valve. Low suction pressure can be caused by loss of refrigerant charge, operating at too low an outlet temperature (below 45° F), a faulty solenoid valve, or to little flow of oil through the evaporator.

The High/Low Pressure Switch (H/L PS)is factory set as follows:

Head Pressure - Cut Out	350 psi
Low Pressure - Cut In	60 psi
Differential	35 psi
Cut Out is Cut In less Differential	25 psi

The Low Pressure Switch (LPS) is factory set as follows:

Low Pressure - Cut In	60 psi
Differential	25 psi
Cut Out is Cut In less Differential	35 psi

FAN PRESSURE SWITCH

The fan pressure switches cycle the fan motors to maintain a relatively constant head pressure.

The fan pressure switch (FPS) is factory set as follows:

Cut In:	260 psi
Differential:	50 psi

LOW FLOW INTERLOCK

The cooler is supplied with a low flow switch mounted in the RETURN line. If the coolant flow returning to the cooler drops below 5 GPM, the red LOW FLOW light comes on, the contacts across terminals #22 and #23 open and the refrigeration system pumps down and shuts off.

HIGH TEMPERATURE INTERLOCK

The cooler has a high temperature interlock (K2) built into the temperature controller. See the controller instructions attached. If the coolant temperature entering is higher than the high temperature setting, the contacts across terminals #20 and #21 will open.

LOW TEMPERATURE INTERLOCK
The cooler has a low temperature thermostat (TAS) that will shut down the refrigeration system if the coolant temperature drops below the setting. The factory setting is 55°F. This thermostat is mounted inside the cabinet behind the upper front panel.

MAINTENANCE
Every Turmoil cooler is carefully assembled from the finest components by skilled craftsmen. Each cooler is thoroughly tested and inspected before it leaves the factory. However, in order to obtain efficient service and long life from this cooler, it must be given proper care as with any other piece of mechanical equipment.

AIR FILTER: Keep Clean.
CONDENSER: Condenser fins should be cleaned of dust and dirt regularly.
PUMP: See manufacturers instructions attached.
COMPRESSOR: See manufacturers instructions attached.

TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
Cooler operative but not cooling	A. Dirty Air Filter B. Blocked Air Flow C. Condenser Clogged D. Low Coolant Flow Through Cooler E. Faulty Controller F. Cooler Undersized G. Low Refrigerant Charge H. Faulty Compressor I. Faulty Solenoid Valve/Coil G. Incorrect Expansion Valve setting	Clean Remove Blockage Clean Check rotation and prime of internal pump Repair/Replace Check Heat Load Repair* Repair/Replace* Replace* Adjust Expansion Valve to proper setting*
Cooler inoperative	A. Faulty Power Source B. Faulty ON or OFF switch C. Pump contactor overload tripped D. Blown fuse	Check and correct Replace Reset & check amps Check amps and correct
Internal pump runs but compressor and fan do not come on or short cycle.	A. Faulty Controller B. Cooler OFF on High Head Pressure C. Cooler OFF on Low Suction Pressure D. No internal coolant flow	Repair/Replace Check for: Dirty Air Filter, Dirty Condenser Bad Fan Motor or Fan Pressure Switch Incorrect Expansion Valve Setting* Check for: No or Low Oil Flow, Low Ambient or Wrong Setting on Pressure Switch* Low or Lost Refrigerant Charge* Incorrect Expansion Valve Setting* Check that internal pump is primed and rotating in the proper direction
No external Coolant Flow	A. Faulty Pump B. Obstruction in line C. Pump overload tripped D. Pump not primed E.	Repair or replace Repair Check pump to find cause of overload Bleed air out of pump housing. Check pump rotation.

Incorrect Rotation

Actions designated with ***** should only be done by a ***Qualified Refrigeration Service Person.*** Check with factory for proper settings.