



Compressed Air System Products

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**OPERATING INSTRUCTIONS
INDUSTRIAL CLOSED LOOP FLUID COOLING SYSTEM**

A. GENERAL INFORMATION

Your Closed Loop Fluid Cooling System has been designed to be part of a field assembled closed loop cooling system. Your system design includes provisions for the following system functions.

1. Air control - Eliminates air from water circulated through the package system.
2. Pumping - Provides circulation for system with complete and automatic standby protection.
3. Safety Protection - A relief valve has been installed on the package to prevent over-pressurization of the system.
4. Adjustable Flow Rate - Ball valves have been provided to permit adjustment of fluid flow rates.
5. Fluid Cooling - Air cooled heat exchangers provide for year-round cooling of fluids.

If some of the equipment in this application may be subject to freezing, a glycol solution should be used in lieu of water.

B. INSPECTION

IMPORTANT: *When the crate is removed, carefully inspect the cabinet and finned coil surface for damage. Immediately report any damage or shortages to the transportation company's agent who should make a notation to that effect on the bill of lading. The bill of lading should then be forwarded to the distributor from which the equipment was purchased. If possible, include the invoice number of all orders.*

Thoroughly review the following procedures prior to installation and operation.

C. HANDLING

CAUTION: *During placement and handling, extreme care must be taken to avoid damaging the heat exchanger tubes and fins.*

D. LOCATION & INSTALLATION

1. Install your new system on a level surface in an open area. Adequate structural supports must be provided for the weight of the units. The ambient air flow enters the back of the finned coil and exhausts through the fan guard at the front. (On vertical draft models air enters the bottom and exits through the fan guards at the top.) The clearance between the finned coil inlet and the nearest obstruction (wall, floor, etc.) should be, as a minimum, equal to the diameter of the fan(s). The air discharge must not be obstructed to permit continuous circulation of cool ambient air through the finned coil.
2. For indoor installations, adequate ventilation of the location **MUST** be provided to prevent heat build-up when the system is in operation.
3. Always provide adequate support for piping to and from the system components. Water piping must comply with local codes.
4. Size pipe for two feet per second velocity or greater to a maximum of six FPS to minimize air accumulation at high points.

5. Provide a pressure/temperature access port at the high point of the system and at the inlet and outlet of all system equipment.
6. It is recommended that the system piping be copper with soldered joints or black steel pipe with black iron fittings. Avoid using galvanized pipe and fittings if at all possible.
7. The piping system should be assembled with tightly drawn teflon tape or teflon Loctite on threaded pipe joints. Glycol solutions will leak where water will not, therefore, tight pipe connections are critical. After fluid piping is complete, all joints should be leak tested.
8. Vents are required at all high points in the piping to bleed air when filling the system. Vent ports are provided as standard on each cooling coil. Other vent ports should be installed as needed by the installer.
9. It is recommended that each system component be installed with full line size isolation valves. For the pump station, the isolation valves are provided. One of the valves is a combination shut-off/balancing valve.
10. Set all valves to deliver the proper flow rate. Valves are not preset at the factory.
11. Provide drain plugs or valves at all low points.
12. The connecting piping to the heat transfer package should be in accordance with accepted hydronic piping practices and local code requirements.
13. Do not permanently connect a water make-up line to an Ethylene Glycol System. Addition of water to the system would dilute the anti-freeze solution, causing a possible freeze-up. Local plumbing codes may also prohibit such a connection.
14. The outlet discharge of the relief valve should be piped full size to a Glycol storage tank to save the expensive anti-freeze solution. Be aware that the discharging fluid may be at elevated temperatures.

E. HOW TO CLEAN SYSTEM

1. Prior to filling the system with Glycol, the piping system must be cleaned.
2. Cleaning a system (either steel or copper piping) is neither difficult or expensive. The materials for cleaning are readily available. Trisodium phosphate, sodium carbonate, and sodium hydroxide (lye), are the most common materials used for cleaning. They are available at all paint and hardware stores.

The preference is in the order named and should be used in the following proportions: Trisodium phosphate, one pound for each fifty gallons in the system; Sodium carbonate, one pound for every thirty gallons in the system; Sodium hydroxide (lye), one pound for each fifty gallons in the system. Only one type of solution should be used in the system.
3. Fill, vent, and circulate the system with this solution, allowing it to reach design or operating temperature if possible. After circulating a few hours, the system should be drained completely.
4. Prior to filling the system with Glycol, the piping should be pressure tested for a period of at least four hours. Test pressure should be 1½ times the relief valve setting. The contractor will be responsible for having a representative of the owner witness this test.

F. ANTI-FREEZE SOLUTIONS

1. Careful selection and concentration of the amount of anti-freeze solution used in the cooling circuit is important since it affects the capacity of the system and its resistance to corrosive attack.
2. Due to the many different types of metals used in the system, some anti-freeze brands are not suitable for this application. This is particularly true for some automobile brands. Check with the anti-freeze manufacturer to determine if a particular product is suitable for heat transfer application. The product must contain proper corrosion inhibitors.
3. Since the primary function of the addition of anti-freeze to the water is to prevent costly freeze-up, the proper concentration should be determined by the lowest expected temperature at the installation.

Higher concentrations than required will be more costly and will also reduce the heat transfer capabilities of the cooling coils and heat exchangers. Generally, it is not necessary to protect the system beyond the lowest temperature recorded by the weather bureau for that area. New low temperature records may occur but usually for just a short duration.

Anti-freeze solutions in systems should be tested from year to year as recommended by the manufacturers of the anti-freeze used.

4. The amount of Ethylene Glycol required depends on the following:
 - a. The holding volume of the system (which includes the holding capacity of the equipment being cooled), the internal volume of the interconnecting piping (Chart 1), and the cooling coil (Chart 3).
 - b. Calculate the percentage of Glycol required by volume to provide protection at the design ambient temperature (Chart 2).

Chart 1. Internal Volume of Pipe

Sch. 40 Steel Pipe		Type L Copper Piping	
Pipe Size	Gal./Ft.	Pipe Size	Gal./Ft.
3/4"	0.028	3/4"	0.025
1"	0.045	1"	0.043
1 1/4"	0.078	1 1/4"	0.065
1 1/2"	0.106	1 1/2"	0.092
2"	0.170	2"	0.161
2 1/2"	0.250	2 1/2"	0.248
3"	0.380	3"	0.354
4"	0.660	4"	0.622

Chart 2. % Of Ethylene Glycol By Volume

% By Volume	Ambient Temp.
20	+15°F
30	+03°F
40	-14°F
45	-23°F
50	-38°F

Chart 3. Internal Volume

COIL	CUBIC FEET	GALLONS
ATFV-10	.531	3.95
ATFV-15	.531	3.95
ATFV-18	.708	5.30
ATFV-23	1.154	8.63
ATFV-40	1.594	11.92
ATFV-46	2.07	15.48
ATFV-55	2.56	19.90
ATFV-84	3.97	29.69
ATFV-112	5.11	38.22
ATFV-130	6.25	46.75

G. FILLING AND PRESSURIZING THE SYSTEM

1. Ensure that the following valves are open:
 - system isolating valves at each component being cooled.
 - main system isolating valves (for package units).
 - pump discharge valves.
 - pump suction valves.
2. Open the petcock on the side of the expansion tank prior to filling the system. Leave it open until a solid stream of fluid begins to flow; then close the petcock.
3. During filling, all vent valves should be open until a steady stream of fluid, with no bursts of air, is emitted from each. Close the vent valves and re-check for air after the system is full.
4. Continue to pump fluid into the system until the pressure gauge at the pump station indicates the calculated pressure from the formula below.

The formula for determining your fill pressure is:

$$[(\text{height of piping in feet}) \times .43] + 4 = \text{fill pressure in PSIG}$$

NOTE: If calculated pressure exceeds the relief valve pressure setting, the relief valve will need to be changed out for another relief valve with a higher set point before filling.

H. ELECTRICAL INSTALLATION AND OPERATION

COIL ELECTRICAL INSTALLATION:

1. Using appropriate gauge wire, connect the like terminals from the pump station control box to the terminals in the coil control box.
2. Check to make certain that the phasing of the electricity to the motors is correct. The fans **MUST** be checked for proper rotation.

COIL OPERATION:

1. The fan motors are cycled by a thermostat and control modules. The thermostat senses the fluid temperature in the outlet manifold of the coil. When the fluid temperature rises to the set point, the "A350A" control module contact closes and energizes a magnetic starter coil. The coil pulls in and energizes the first fan motor. Subsequent motors are controlled by corresponding "S350A" modules. The "S350A" modules settings should be offset for best results. Fan rotation must direct air properly across the coil (see Section D).

PUMP STATION ELECTRICAL INSTALLATION:

1. Connect proper electrical voltage to the terminal blocks in the electrical box from an appropriately sized fused disconnect. The pumps **MUST** be checked for proper rotation.

PUMP STATION OPERATION:

1. The pump station is equipped with a three position switch and a low pressure shutdown switch. Dual pump stations also include a pump differential switches.

Low pressure shutdown switch:

This switch will de-energize the operating pump and turn on a red warning light & optional bell when system pressure falls to a dangerously low level. The alarm bell, when provided, is equipped with a toggle switch to turn the bell "off".

Pump differential switches:

This switch is used to measure pressure differential between the suction and discharge lines of the pumps. The pressure difference is field adjustable. The controller's internal timers are used to bypass the switch for 15 seconds upon start-up. The time delay allows the pump to establish fluid flow.

If a differential pressure is not established within the time period, the controller will shut down the operating pump and turn on the stand-by pump .

If the stand-by pump fails to develop a pressure differential, it will also shut down in 15 seconds.

Press the reset switch to restart the unit.

Each pump station is supplied with pump and fan run lights.

I. PRE-START-UP CHECKS

1. Before starting the unit, check the fan(s) for free rotation. If the fan blades bind, adjust the motor or bearing mount as required. The fan motor and fan blade must be aligned properly. Blade rotation must be smooth and vibration free, otherwise premature wear to the fan motor and/or fan blade may result.
2. Check that all valves are open to flow.

PUMP PACKAGE UNIT:

a. Pump Station:

1. Ensure that the pump power switch on the control panel is in the "off" position.
2. If a remote control panel was furnished, ensure that all safety switches are closed.
3. Adjust the flow rate with the shut-off/balancing valve located at the discharge of the pump.

b. Cooling Coils:

1. Momentarily energize cooling coil fan motors and note the rotation of each fan and direction of air flow. All units are designed to draw air through the coil. To reverse the fan rotation, open the control panel, reverse any two of the three electrical leads at the contactor.
2. Adjust the control modules to the desired set point(s).

J. MAINTENANCE

1. Each package is designed to require a minimum of maintenance.
2. Check coil and fins for cleanliness. If build-up of dry dust occurs, blow off with compressed air. Clean off with steam if build-up is oily.
3. Inspect and listen to pump(s) and motors for abnormal noises to detect any misalignment or other cause of excessive wear.
4. Check the Ethylene Glycol and water solution concentration every Fall and with each addition of make-up solution.

REPLACEMENT PARTS:

When contacting the factory for information or replacement parts, state the model and serial number of the package unit and a description of the parts required.

AIR/TAK WARRANTY POLICY

Air/Tak products will be warranted to be free from defects in materials and workmanship for a period of one year from date of shipment or up to one year from the verified date of installation not to exceed 15 months. Date of installation will be verified upon receipt of the completed Warranty Registration Card. All Air/Tak refrigerated dryers will additionally be warranted on parts only (excluding fan motors and drain valves) for a period of two years from the date of shipment. Also, deliquescent and regenerative air dryer pressure vessels and refrigerated air dryer heat exchangers have a 5-year prorated warranty.

All damaged pressure vessels and heat exchangers returned to AIR/TAK for warranty consideration must be returned freight prepaid. Warranty will be determined after factory inspection. Failure to return a damaged heat exchanger or pressure vessel will result in warranty denial.

Repairs, adjustments, parts, etc. are limited to actual labor cost provided that such defects are promptly reported and approved following AIR/TAK's warranty procedures. In no event shall the cost of repairs exceed the actual cost of materials and labor.

AIR/TAK or its representatives reserve the right to decide which warranty items are authorized. AIR/TAK shall not be liable for incidental or consequential damages which may result from a breach of the warranty described above.

For more information on warranty policies and procedures, contact your authorized AIR/TAK Distributor.

AIR/TAK's line of quality compressed air system products includes:

**COMPRESSED AIR SYSTEM FILTERS * AIR-COOLED AFTERCOOLERS
REFRIGERATED AIR DRYERS * CAD COMBINATION AFTERCOOLER DRYER SYSTEMS
RAD-PAK REFRIGERATED AIR DRYER/FILTER PACKAGES * HEATLESS REGENERATIVE AIR DRYERS
HLD-PAK HEATLESS REGENERATIVE AIR DRYER/FILTER PACKAGES
BLOWER PURGE REGENERATIVE AIR DRYERS * EXTERNALLY HEATED REGENERATIVE AIR DRYERS
AIR CHILLERS * FLUID CHILLERS**

**For an authorized distributor near you, contact Air/Tak at: Air/Tak Inc. 107 W Main Street, Worthington, PA 16262
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