

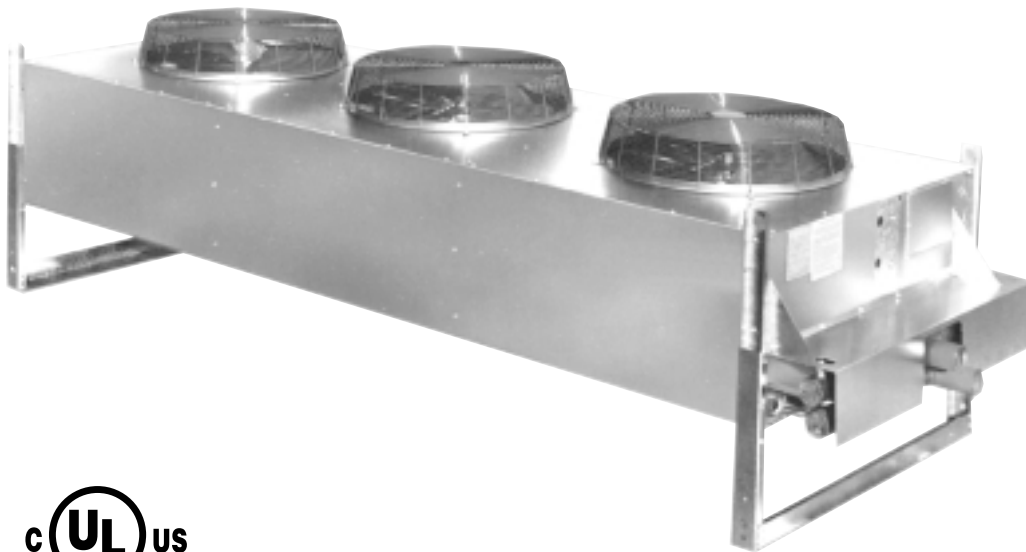


H-IM-76
Part #25005501
September 2000

Replaces: O&I 10107C
I&O Remote Fluid Coolers, #2508404
H-IM-44A, #2500030

FLUID COOLERS

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS



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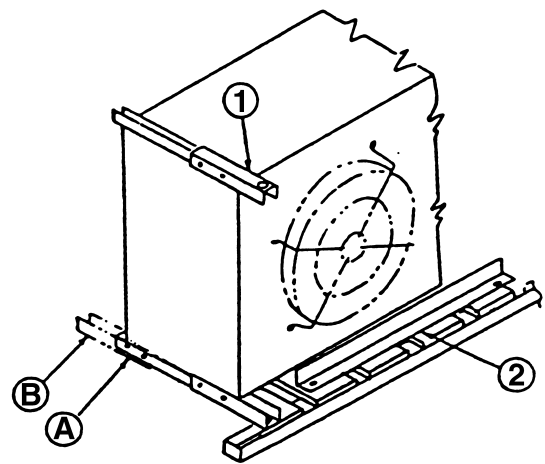
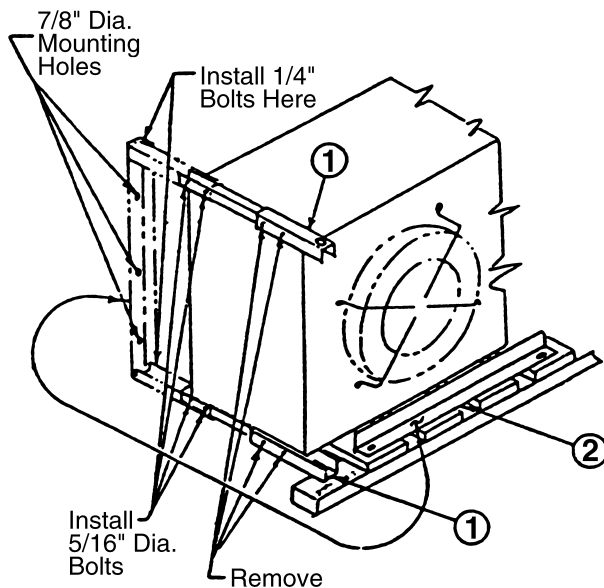
GENERAL DESCRIPTION

The Fluid Cooler units are designed for cooling fluids such as 40% Ethylene Glycol. These units are for remote use and use direct drive, permanently lubricated fan motors. Each module is separated by a baffle to prevent air bypass. The basic unit is completely factory wired to its electrical junction panel. Provisions are provided for terminal block wiring of main power, as well as, optional accessories. Please read the instructions carefully before starting the installation.

INSPECTION

Inspect the unit to make sure there is no shipping damage before beginning the installation. If damages are found it should be reported to the carrier.

FIGURE 1



LEG ASSEMBLY FOR VERTICAL AIR FLOW INSTALLATION

1. Remove bolts securing condenser skid.
2. Remove leg extensions (#1) by removing four 5/16" x 3-1/2" bolts.
3. Install as shown in dotted lines with same four bolts.
4. Install mounting angle (#2) as shown (dotted lines) with four 1-20 x 3/4" bolts provided.
5. Condenser can be hoisted by the 1-1/2" holes in leg assemblies.
6. Attach condenser to base using 7/8" diameter holes in the base angle.

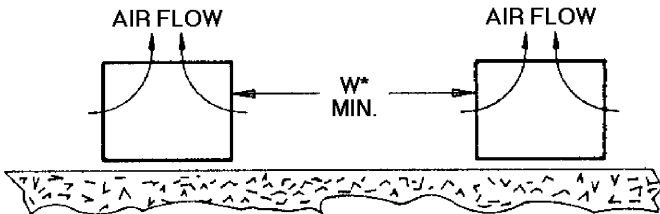
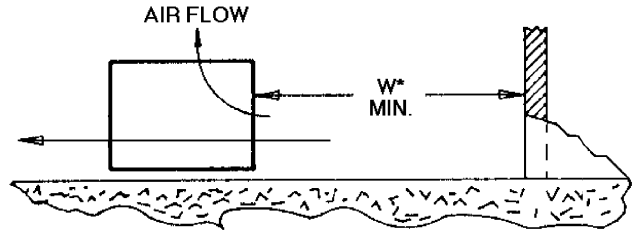
LEG ASSEMBLY FOR HORIZONTAL AIR FLOW INSTALLATION

1. Remove bolts securing condenser skid.
2. Remove piece (#1) and attach to rear of bottom leg at "A" to complete mounting base. Piece (#2) is not required in the horizontal discharge application and may be discarded.
3. Condenser can be hoisted by the 1-1/2" holes in leg assemblies.
4. Attach unit to base using mounting holes on leg extensions at "B".

SPACE & LOCATION REQUIREMENTS

Walls or Obstructions

The unit should be located so that air may circulate freely and not be recirculated. For proper air flow and access all sides of the unit should be a minimum of "W" away from any wall or obstruction. It is preferred that this distance be increased whenever possible. Care should be taken to see that ample room is left for maintenance work through access doors and panels. Overhead obstructions are not permitted. When the unit is in an area where it is enclosed by three walls the unit must be installed as indicated for units in a pit.



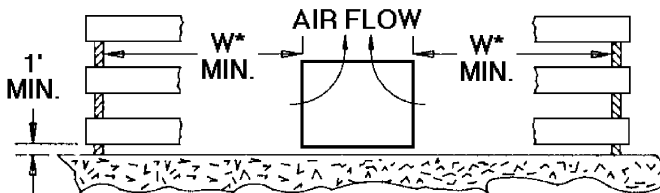
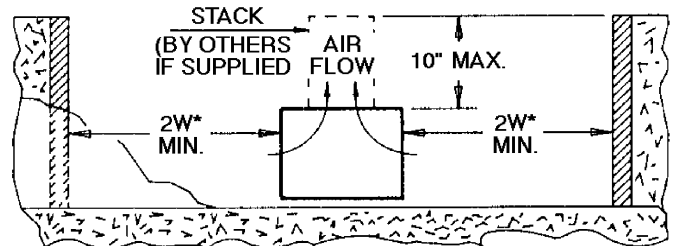
Multiple Units

For units placed side by side, the minimum distance between units is the width of the largest unit. If units are placed end to end, the minimum distance between units is 4 feet.

Units in Pits

The top of the unit should be level with the top of the pit, and side distance increased to "2W".

If the top of the unit is not level with the top of pit, discharge cones or stacks must be used to raise discharge air to the top of the pit. This is a minimum requirement.



* "W" = Total width of the fluid cooler.

Decorative Fences

Fences must have 50% free area, with 1 foot undercut, a "W" minimum clearance, and must not exceed the top of unit. If these requirements are not met, unit must be installed as indicated for "Units in pits".

SYSTEM INSTALLATION

NOTE: All installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.

CAUTION: Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

General

1. Structure supporting unit must be designed to support both the unit and the fluid. Table 1 provides weight of fluid per gallon. Table 5 provides unit weight and volume data. Provide suitable flashing of the roof, if this is a roof installation. For ground level mounting, a concrete pad is recommended. Mounting holes permit the unit to be bolted down to withstand wind pressures. Provide adequate clearance for unobstructed air flow to coils. Also see "Space and Location Requirements".

Table 1. Fluid Weight Per Gallon

| Percent Glycol | Pounds Per Gallon |
|----------------|-------------------|
| 0 (Water) | 8.345 |
| 10 | 8.395 |
| 20 | 8.495 |
| 30 | 8.604 |
| 40 | 8.712 |
| 50 | 8.804 |

2. Level mounting is necessary to assure proper fluid distribution through the coil as well as flooded suction for the pump.
3. Water piping must comply with local codes. Correct pipe sizing will help reduce pumping power and operating costs.
4. In case of doubt, consult the manufacturer for the dry cooler fluid pressure drop at the specific conditions on your job.
5. Provide sufficient valves and unions to permit easy access to parts subject to wear and possible repair or replacement.
6. After fluid piping is completed, all joints should be leak tested.
7. Where city water makeup is required, follow local codes, making certain that disconnecting provisions are provided.
8. Select wire in accordance with nameplate data and local codes.

Piping Installation

The piping system should provide maximum leak prevention. Weld or sweat joints should be used where possible or tightly drawn Teflon tape threaded pipe joints should be made if needed. The fact that glycol solutions or other heat transfer fluids will leak where water will not, must be taken into account.

The glycol system should not employ a pressure reducing valve. This is because a slight leak would lead to dilution of the mixture. Any refill should be controlled so as to maintain the proper glycol-to-water ratio.

Table 2 shows pressure drops for various pipe sizes at flow rates commonly used with a typical dry cooler. These pipe sizes are not necessarily always correct for the run from the condenser to the dry cooler. Proper pipe size will depend on available pump head. This can be determined by subtracting from the total available pump head at design flow, the condenser pressure drop (Table 3) and the dry cooler pressure drop. Allow some safety factor for last minute pipe fittings added to the system and for eventual fouling of the system.

- a. Glycol piping requires no insulation except when fluid temperature will be below ambient dewpoint temperatures. Dry coolers normally produce about 70° or higher fluid temperatures.
- b. Vents are required at all high points in the piping to bleed air when filling the system. If fluid coolers are at high points, vent valves should be installed at each fluid cooler.
- c. It is recommended that gate valves be installed on both sides of the pump to prevent loss of fluid in the event the pump should require repair or replacement. Shut-off valves are also recommended at water cooled condensers in case the condensing unit is to be moved or requires maintenance involving the coolant system.

Table 2. Pressure Loss in Feet of Water

| Flow GPM | Pipe Size Steel | Type "L" Copper | Schedule 40 Steel Head Ft./100 Ft. Equiv. Length | Copper Tube Head Head Ft./100 Ft. Equiv. Length |
|----------|-----------------|-----------------|--|---|
| 15 | 1 | 1 1/8 | 17.6 | 15.0 |
| 20 | 1 | 1 1/8 | 30.2 | 23.1 |
| 25 | 1 | 1 1/8 | - | 34.6 |
| 25 | 1 1/4 | 1 3/8 | 11.5 | 12.6 |
| 30 | 1 1/4 | 1 3/8 | 16.3 | 17.4 |
| 35 | 1 1/4 | 1 3/8 | 21.8 | 23.0 |
| 40 | - | 1 3/8 | - | 26.3 |
| 40 | 1 1/2 | 1 5/8 | 13.0 | 12.9 |
| 45 | 1 1/2 | 1 5/8 | 16.5 | 15.7 |
| 60 | - | 1 5/8 | - | 26.3 |
| 60 | 2 | 2 1/8 | 7.9 | 7.0 |
| 80 | 2 | 2 1/8 | 13.7 | 12.0 |
| 100 | 2 1/2 | 2 5/8 | 8.5 | 6.1 |
| 150 | 2 1/2 | 2 5/8 | 18.6 | 12.9 |
| 200 | 3 | 3 1/8 | 10.7 | 9.1 |
| 250 | 3 | 3 1/8 | 16.5 | 13.7 |
| 300 | 3 1/2 | 3 5/8 | 11.1 | 9.2 |
| 300 | 4 | 4 1/8 | 5.9 | 4.9 |
| 350 | 4 | 4 1/8 | 7.9 | 6.5 |
| 400 | 4 | 4 1/8 | 10.2 | 8.2 |

SYSTEM INSTALLATION

Table 3.

| Model | CFM | BTUH | | GPM | Pressure Loss Ft. H ₂ O ¹ |
|-------|-------|--------------------|--------------------|-----|--|
| | | 30°TD ¹ | 20°TD ² | | |
| 5 | 5050 | 74200 | 49000 | 15 | 4.6 |
| 8 | 6450 | 121500 | 80200 | 25 | 8.5 |
| 10 | 10100 | 162200 | 107100 | 35 | 11.1 |
| 12 | 12400 | 186800 | 123300 | 40 | 14.0 |
| 14 | 13700 | 223100 | 147200 | 45 | 21.3 |
| 16 | 12900 | 250300 | 165200 | 50 | 15.4 |
| 21 | 20500 | 319900 | 211100 | 65 | 8.9 |
| 23 | 19900 | 340800 | 224900 | 70 | 10.1 |
| 26 | 19400 | 389400 | 259600 | 100 | 11.2 |

¹ At 130° entering liquid, 100° entering air

² At 115° entering liquid, 95° entering air

Glycol Charge

The amount of ethylene glycol required depends upon the following:

- The holding volume of the system which includes the holding capacity of the condenser, the holding capacity of the interconnecting piping and the holding capacity of the dry cooler.
- Percentage of glycol required by volume to provide protection at the design minimum outside temperature (see Table 4).

Table 4. Percentage of Ethylene Glycol to be Added by Volume

| Percent % | 20% | 30% | 40% | 45% | 50% |
|---------------------------------------|-----|-----|-----|-----|-----|
| Minimum Outside Design Temperature °F | +15 | -3 | -14 | -23 | -38 |

Table 4 is intended to be used as a guide only. Proper precautions need to be taken to prevent freeze damage during low ambients. Consult glycol vendor recommendations for specific freeze protection for your location.

Glycol Sludge Prevention

Glycol systems may be subject to sludge formation in coils, due to one or more of the following causes:

- Reaction of the corrosion inhibitor with galvanized piping (zinc).
- Reaction of the glycol with chromate type water additives.
- Reaction of the glycol with pipe dope, cutting oils, solder flux, and other system dirt.

Glycol manufacturers offer a specially inhibited glycol (formulated for snow melting systems) which does not react with zinc. This glycol is also suitable for heat transfer systems. Glycol manufacturers also provide inhibitor check services on a regular basis.

Consequently, good glycol system design requires the following precautions:

- No galvanized piping is to be used.
- System piping must be thoroughly cleaned and flushed with a heated trisodium phosphate solution before filling with the water/glycol mixture.
- No chromate inhibitor treatment must be used.
- The glycol manufacturer should provide inhibitor check service and supply additional inhibitor as required.

Fluid Circulating Pump

Mechanical seal type pumps must be used for glycol systems. Gland type pumps would cause glycol waste and, if used with a pressure reducing valve, will lead to dilution of the glycol mixture and eventual freeze-up.

Pump is selected for piping friction loss plus fluid pressure drop through the dry cooler coil, plus pressure drop through the heat source. *No allowance for vertical lift* is made since in a closed system a counterhead acts on the pump suction.

With glycol solution the pump performance curve will drift to the right from its design point, due to differences in circuit design, control valve application, pressure drop calculations, etc. The pump should be selected high on the curve so as to provide for the "drift". The pump curve should be "flat" so that the pump will compensate for our inability to exactly predict the final operating system flow condition and to provide sufficient flow for satisfactory heat transfer and maximum protection against freezing at the far end of the circuit. The pump motor should have sufficient power for operating over the entire pump curve to prevent motor overload at reduced voltages. Paralleled pumps can also be used for good power economy and continuous and automatic standby operation. Properly applied parallel pumps will guard against system breakdown caused by a simple pump failure. Certain older systems have nonoperating standby pumps of equal capacity to the operating unit. We recommend parallel pumps in continuous operation because they provide practically the same type of standby, in addition to being completely automatic, at lower initial and operating cost.

START-UP

1. Prestart:

Check for correct dry cooler fan rotation. This can be done by quickly jogging the fan contactor. Be sure that the fans run freely. The same check is recommended for pumps.

Mixing Glycol and Water

Regardless of the strength of the mixture, you **MUST** pre-mix the glycol and water prior to adding it to the system. The chemical reaction between the two will release oxygen, which is extremely undesirable in a close-loop system.

WARNING: For dry coolers operating without glycol mixture, adequate freeze protection is necessary during ambients below 32° F.

2. Filling and Purging the System

The system should be pressure tested before adding glycol. The system can be tested with air or water, however if the ambient temperature is at or below freezing the use of air is recommended. Test pressure should not exceed 60 PSIG.

a. Roof Mounted Fluid Cooler

To fill the system pour the premixed water and glycol into the expansion tank. Fill the system until the expansion tank is half full, then purge the air from ALL vents. Operate the system for a minute, then purge ALL vents again, and add glycol as required. Repeat the purging of all vents after the first hour of operation and again after several hours of operation.

b. Ground Mounted Fluid Cooler

The fluid cooler may be lowest point in the system, consequently the premixed water and glycol will have to be pumped into the system. Close the shut off valve and open the two hose bibbs installed in the piping run on the leaving side of the pump, see Piping Diagram 1.

Connect a pump and hose to the hose bibb away from the pump and a hose to the hose bibb closest to the pump. Begin pumping the glycol mixture into the system at FULL PRESSURE. For the return hose you should close the hose bibb so that you get only a small flow of fluid or air. This is necessary so you will build a head of fluid which will force the air from the system. Once all the air is out you will have a steady flow of only fluid. At this joint you should close off the two hose bibbs and open the shut off valve. See Diagram 1.

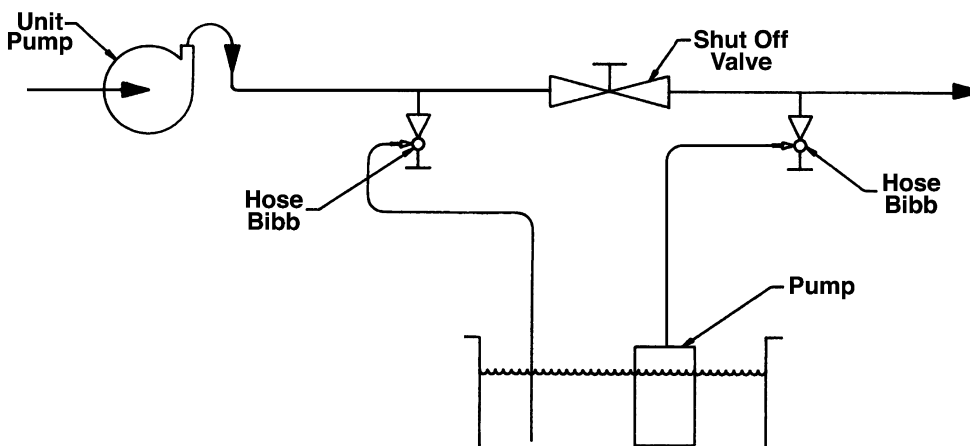
3. Flow Adjustment Procedure:

Once the system is completely full of fluid, start the fluid circulating pump. To assure proper fluid flow, adjust the shut-off valve for required GPM by checking pump curve and observing gauge pressure, or by using an in-line flow meter.

4. Instruction Envelope:

Keep wiring diagrams, instructions, list of spare parts, in an envelope within easy reach of the installed dry cooler.

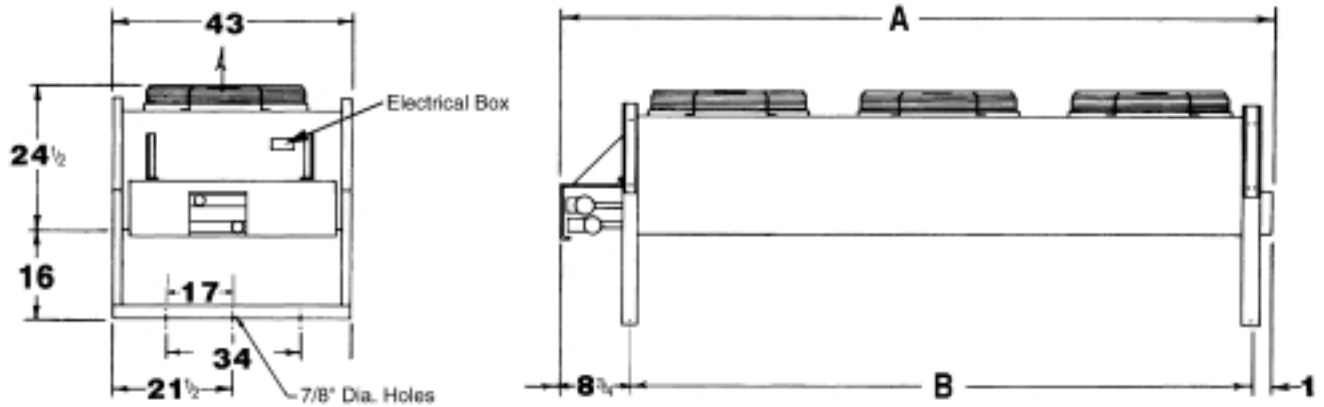
Diagram 1.



SPECIFICATIONS

Models 005-026

VERTICAL AIR FLOW



HORIZONTAL AIR FLOW

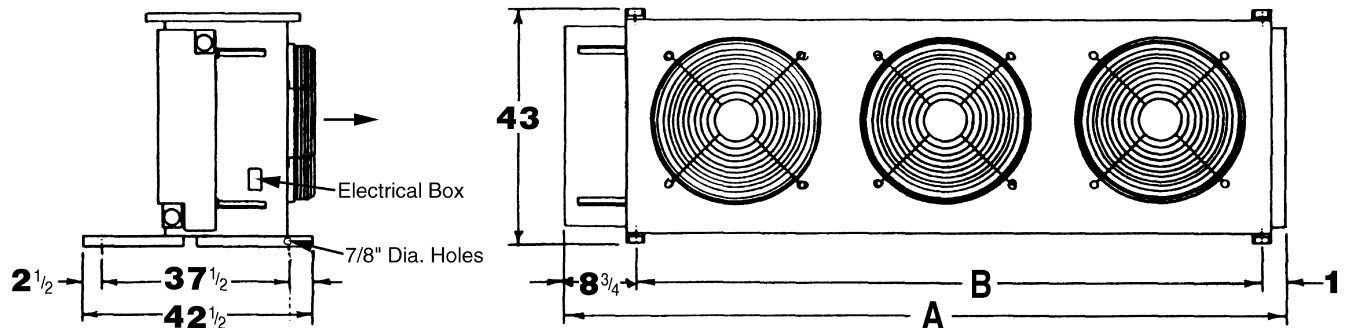


Table 5.

| Model No. | A | B | CFM | Fan | | Maximum Circuits Available | Motor Data | | | | Connections ODS | | Approx. Net Wt. (Lbs.) | Internal Volume (Gal.) |
|-----------|---------|-----|--------|-----|------|----------------------------|-----------------|------------------|-----------------|------------------|-----------------|--------|------------------------|------------------------|
| | | | | No. | Dia. | | HP ¹ | FLA ¹ | HP ² | FLA ² | Inlet | Outlet | | |
| 5 | 39-3/4 | 30 | 5,050 | 1 | 24 | 8 | 1/3 | 3.5 | 1/3 | 2.6/1.3 | 1-3/8 | 1-3/8 | 180 | 2.7 |
| 8 | 49-3/4 | 40 | 6,450 | 1 | 26 | 16 | 1/2 | 4.1 | 1/3 | 2.6/1.3 | 1-5/8 | 1-5/8 | 260 | 3.8 |
| 10 | 69-3/4 | 60 | 10,100 | 2 | 24 | 16 | 1/3 | 7.0 | 1/3 | 5.2/2.6 | 2-1/8 | 2-1/8 | 450 | 4.0 |
| 12 | 69-3/4 | 60 | 12,400 | 2 | 26 | 16 | 1/2 | 8.2 | 1/3 | 5.2/2.6 | 2-1/8 | 2-1/8 | 470 | 4.0 |
| 14 | 89-3/4 | 80 | 13,700 | 2 | 26 | 16 | 1/2 | 8.2 | 1/3 | 5.2/2.6 | 2-1/8 | 2-1/8 | 510 | 4.9 |
| 16 | 89-3/4 | 80 | 12,900 | 2 | 26 | 32 | 1/2 | 8.2 | 1/3 | 5.2/2.6 | 2-1/8 | 2-1/8 | 530 | 6.1 |
| 21 | 129-3/4 | 120 | 20,500 | 3 | 26 | 24 | 1/2 | 12.3 | 1/3 | 7.8/3.9 | 2-5/8 | 2-5/8 | 550 | 6.6 |
| 23 | 129-3/4 | 120 | 19,900 | 3 | 26 | 24 | 1/2 | 12.3 | 1/3 | 7.8/3.9 | 2-5/8 | 2-5/8 | 580 | 6.6 |
| 26 | 129-3/4 | 120 | 19,400 | 3 | 26 | 32 | 1/2 | 12.3 | 1/3 | 7.8/3.9 | 2-5/8 | 2-5/8 | 625 | 8.4 |

¹ Motor voltage 208/230/1/60; 1075 RPM

² Motor voltage 208/230/460/3/60; 1140 RPM

Diagram 2. Typical Wiring Diagram for 208-230/1/60

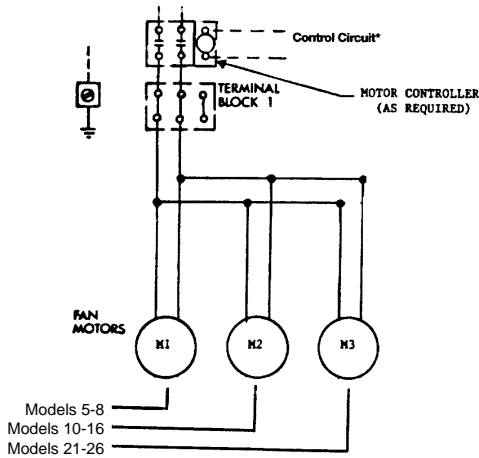


Diagram 3. Typical Wiring Diagram for 208-230-460/3/60

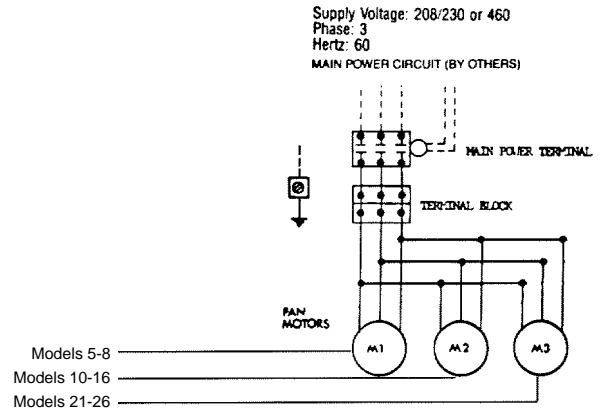


Diagram 4. Typical Wiring Diagram for 208-230/1/60 with Fan Cycling.

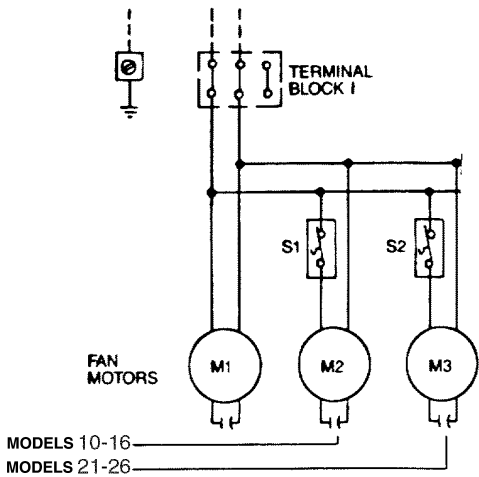
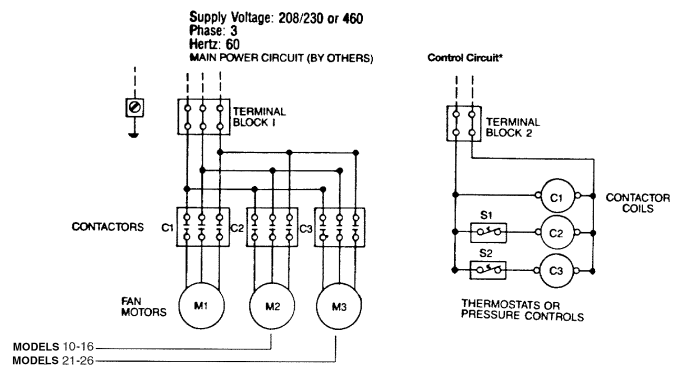


Diagram 5. Typical Wiring Diagram for 208-230-460/3/60 with Fan Cycling.



*** CONTROL CIRCUIT: May be 24 volt, 120 volt, or 230 volt (as specified).**

WIRING

All electrical wiring must be done in accordance with National Electrical code and local codes. See unit data plate for FLA and Maximum Overcurrent Protection Rating. Electrical knockouts are provided for ease of wiring to the main power terminal block of the unit, as well as, any optional accessories that may be part of your unit. For the wiring of your specific model refer to the wiring diagram located inside the electrical junction box.

The Fluid Coolers are available with 208/230 volt, single phase or 208/230/460 volt three phase fan motors. Refer to the unit data plate for the operating voltage of your specific unit.

We reserve the right to make changes in specifications or design, at any time, without notice and without liability to purchasers or owners of previously sold equipment.