HUSSMANN®

# Pumping Station

## Planning Data, Installation and Service Manual

HUBBMANN®
BRIDGETON REFRIGERATION SYSTEMS

P/N 377590D
April 1, 1998

## Table of Contents



IMPORTANT
KEEP IN STORE FOR FUTURE REFERENCE
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HUSSMANN®
BRIDGETON REFRIGERATION SYSTEMS

12999 St. Charles Rock Road • Bridgeton, MO 63044-2483 USA• (314) 291-2000 • FAX (314) 298-6485

## PLANNING THE WATER SYSTEM

### LOCAL WATER CONDITIONS

Water conditions can vary greatly from one location to another. It is important that the contractor deal with local suppliers of water conditioning agents for both closed loop and evaporative systems. High mineral content in the water will cause internal scaling of the closed loop system, yet de-mineralized or distilled water will aggressively attack the system's metal components.

### CODES AND REGULATIONS

To avoid costly code compliance corrections, the contractor should be familiar with Local, State, and Federal codes before planning begins.

### CLOSED LOOP ISOLATION VALVES

Isolation Valves are recommended up- and down-stream of major components (except the Pumping Station) and for individual branches. Properly placed isolation valves will facilitate leak testing and repair, system maintenance, and future remodeling.

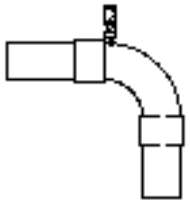
### CLOSED LOOP AIR AND PARTICLE REMOVAL

Regardless of location, closed loop systems need to be planned and installed to deal with air and particle matter to achieve maximum efficiency and system life.

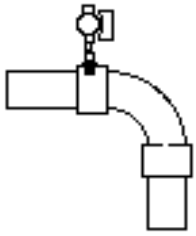
**Closed Loop Air Separator**
Air separators are optional for Protocol™ closed loop systems. Once up and running, the system is essentially hermetic unless it is opened for service or modification.

In a static system, air tends to rise to the highest point. In a circulating system, air travels along the top of the pipes and tends to pocket where pipes turn in a downward direction. As a result, vents are needed at high points when filling the closed loop, and at turndowns during start-up.

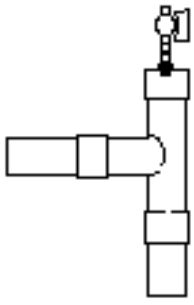
**Air Vent Construction**
Vents will vary with materials and local codes. **Manual vents are recommended.** When copper pipe is used, a Schrader Valve may be brazed into the turndown. Using a Tee instead of an Elbow at the turndown provides a positive air trap.



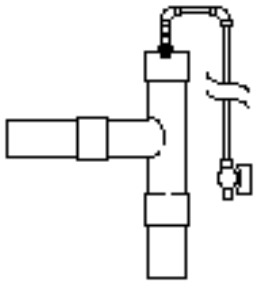
Schrader Valve Air Vent brazed into copper turn-down



In PVC, after the joint is assembled, drill and tap for a threaded ⅜ ID PVC pipe to PVC cemented fitting. Use PVC cement on the threads and do not over-tighten. Install a PVC ball valve on the fitting.



To provide an air trap and assure that pipe cuttings do not get into closed loop, install the ⅜ thread to PVC fitting in a tee plug. Use a tee at the turn-down instead of an elbow. Install the plug and ball valve assembly after the joint is complete.



When a turndown is not going to be accessible, a remote ball valve may be used.

**Closed Loop Particle Removal**

Construction debris and dirt in the closed loop rest on the bottom of the pipes until the pumps are started up. Then the debris is carried through the system until it lodges in a restricted area or settles to a low point. For Protocol™ applications, particles only 0.039 of an inch can be come lodged in the plate heat exchanger. A strainer is required upstream of all such components. Without the strainer, the component acts as the strainer, and over time will become clogged, reducing system efficiency and equipment life.

## EQUIPMENT ORDERING

The proper sequence of securing Hussmann equipment is: first have Hussmann's sales representative detail design conditions with the customer. Second, these equipment selections and preferences are forwarded to Hussmann Bridgeton Engineering, and based on these guidelines, Engineering sizes and selects the best possible equipment for the customer needs. In the third stage for store planning, Hussmann Engineering forwards the legend (factory order) to the sales representative with this planning data attached.

Installing Contractors, Architects and Application Engineers require the level of planning and preinstallation detail that this planning data, the store legend, and the store blueprints provide. For information beyond basic planning, such as installation, operation or maintenance, contact:

**Hussmann Corporation**
**Refrigeration Department**
**Bridgeton, Missouri 63044-2483**
**(314) 291-2000**

## SHIPPING INFORMATION

Unless otherwise directed, Pumping Station units will be shipped F.O.B. St. Louis MO, via common carrier. Specialized common carriers are used because of their knowledge and experience in trucking industrial equipment, and their proven on-time delivery.

## SHIPPING DAMAGE

All equipment should be thoroughly examined for shipping damage before and while unloading.

This equipment has been carefully inspected at our factory and the carrier has assumed responsibility for safe arrival. If damaged, either apparent or concealed, claim must be made to the carrier.

### APPARENT LOSS OR DAMAGE

If there is an obvious loss or damage, it must be noted on the freight bill or express receipt and signed by the carrier's agent; otherwise, carrier may refuse claim. The carrier will supply the necessary claim forms.

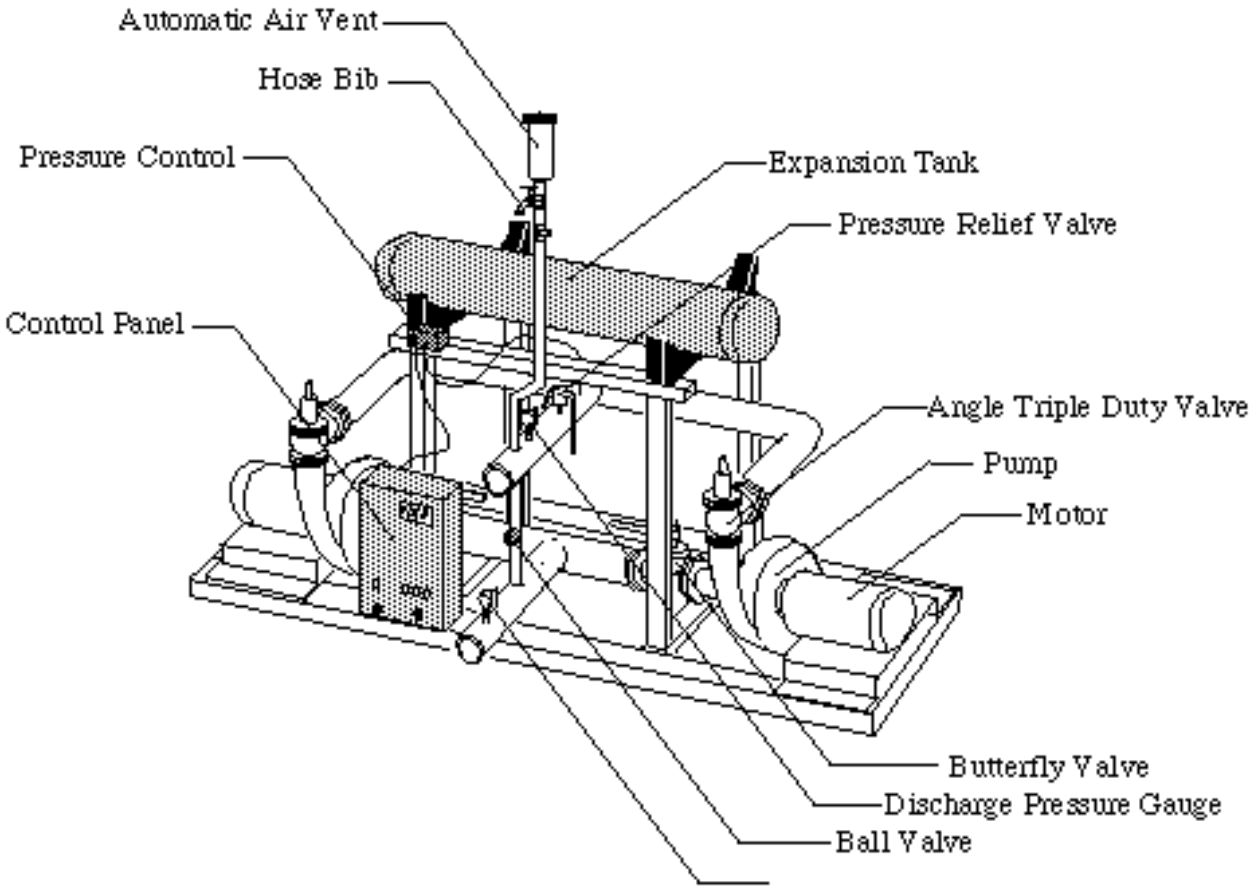
### CONCEALED LOSS OR DAMAGE

When loss or damage is not apparent until after equipment is uncrated, a claim for concealed damage is made. Upon discovering damage, make request in writing to carrier for inspection within 15 days and retain all packing. The carrier will supply inspection report and required claim forms.

## PUMPING STATION COMPONENTS

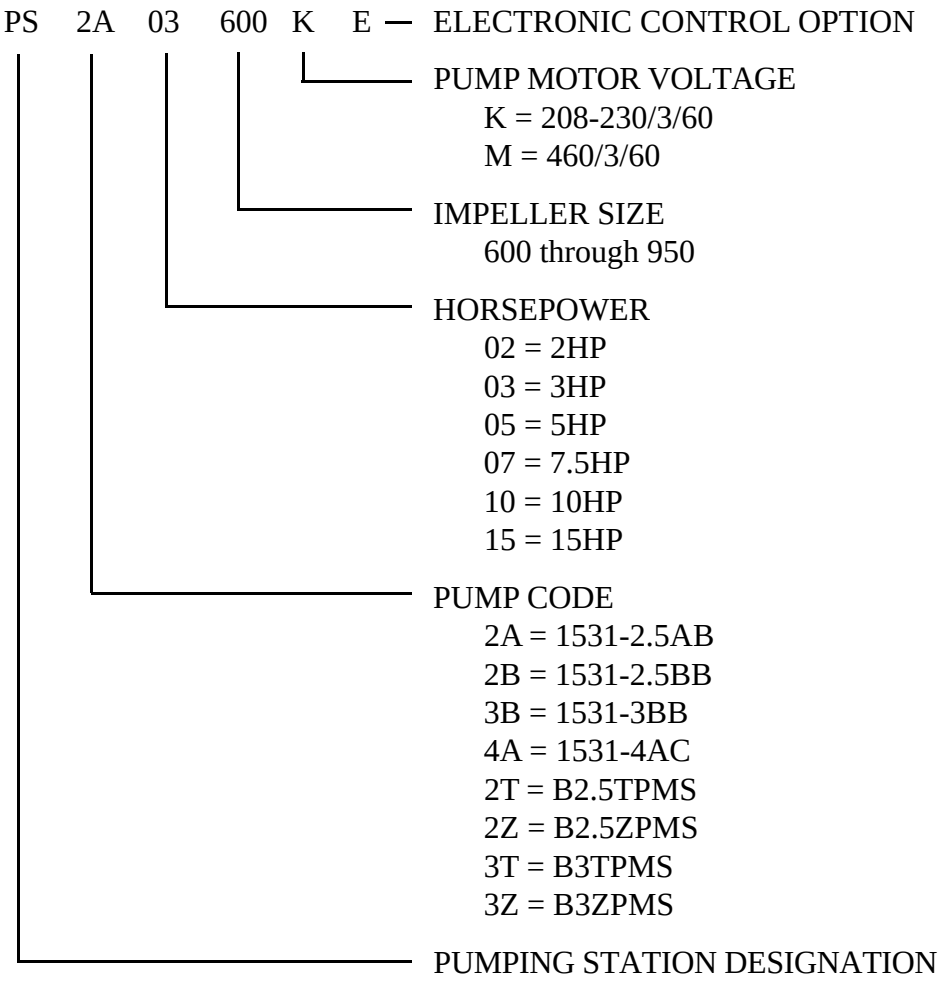
Each Pumping Station contains the following:

1. Two Pump and Motor Assemblies with
   a. Butterfly valves upstream
   b. Triple duty valves downstream
2. Factory piping with
   a. Common Suction and Discharge Lines
   b. ¾ inch Hose Bib
   c. Automatic Air Vent
   d. Expansion Tank
   e. Pressure Relief Valve
   f. Pressure Gauges
3. Factory-wired control panel with
   a. Circuit Breakers and Contactors
   b. Main Disconnect
   c. 84 Hour Timer
   d. Manual Interface Modules
   e. Manual Reset
   f. High Pressure Controls
   g. One unit mounted Alarm Light (Red)
4. Items supplied separately for field installation
   a. Vibration Isolation Pads (4)
   b. Optional Components if ordered



## PUMPING STATION NOMENCLATURE

All Pumping Stations are shown in the legend in modular nomenclature form.




## EQUIPMENT PLANNING

| PUMPING STATION HORSEPOWER | DIMENSIONS Length (in.) | Height (in.) | Depth (in.) | WEIGHTS (Shipping) (lbs) |
|---|---|---|---|---|
| 2 | 95 ½ | 61 | 28 | 625 |
| 3 | 95 ½ | 61 | 28 | 725 |
| 5 | 95 ½ | 61 | 28 | 800 |
| 7.5 | 95 ½ | 61 | 28 | 875 |
| 10 | 95 ½ | 61 | 28 | 900 |
| 15 | 95 ½ | 61 | 28 | 1050 |

## ACCESSIBILITY

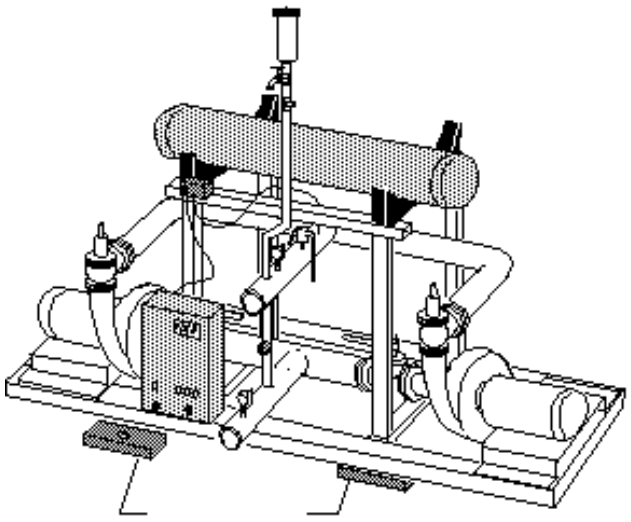
For 208V units, a minimum of 36 inches clearance is recommended in front of the control panel. For 460V units a minimum of 42 inches is recommended. Follow NEC guidelines.

## SETTING THE UNIT

The installer is responsible to see that equipment used to move the unit is operated within its limits. Under no circumstances should the control panel or suction and discharge lines be used for lifting or moving the unit. The unit is sized to fit through standard doorways. Johnny bars and dollies may be used. The unit may be hoisted by the frame under the expansion tank.

## VIBRATION PADS

Vibration Isolation Pads are supplied with each Pumping Station. To adjust for slightly uneven floors, place 16 gauge galvanized steel shims between the vibration pads and the floor. (Shims must be field supplied.) One vibration pad is installed under each upright channel. A ½ inch hole through the skid base (just inside the uprights) is provide for fastening the unit to the floor.



## PLANNING FIELD WIRING

**IMPORTANT NOTE**
**HUSSMANN**
**REFRIGERATION PRODUCTS**
Overcurrent Protection Devices
factory mounted on the unit provide
protection for that unit's components,
or if indicated,
may act as the unit's main disconnect.

**BRANCH CIRCUITS**
providing unit power must be protected by
**PROPERLY SIZED**
**FIELD SUPPLIED AND INSTALLED**
**OVERCURRENT PROTECTION.**
Refer to product Serial Plate for specific unit
Maximum Overcurrent Protection Device data.
**FOLLOW NEC GUIDELINES.**

**Maximum Field Wire Size**
Wire size is based on minimum circuit ampacity listed on the serial plate.

REFER TO NEC FOR
TEMPERATURE DERATING FACTORS.

**Sizing Wire and Overcurrent Protectors**
Check the Legend for Minimum Circuit Ampacity (MCA), Maximum Overcurrent Protective Devices (MOPD), and total RLA's. **FOLLOW NEC GUIDELINES.**

Pumping Station components are wired as completely as possible at the factory with all work completed in accordance with the National Electrical Code (NEC). All deviations required by governing electrical codes will be the responsibility of the installer.

The lugs on the circuit breaker package in the compressor control panel are sized for copper wire only, with 75˚ C THW insulation. All wiring must be in compliance with governing codes.

**For 208-230/3/60 Pumping Stations**
To each unit provide
one 208-230/3/60 branch circuit
one 120/1/60 branch circuit
one ground wire to earth ground

**For 440-460/3/60 Pumping Stations**
To each unit provide
one 440-460/3/60 branch circuit
one 120/1/60 branch circuit
one ground wire to earth ground

**For 120V Remote Alarm Bell**
Wire Remote Alarm Bell between terminals A1 and A2 (Max 2 Amps).

**For Hussnet™ Alarm Wiring**
When electronic control is not applied, use the closest available Protocol™ with an open AUXILIARY INPUT for connecting the Pumping Station Alarm output to Hussnet™. Wire A6 Terminal Block on the Pumping Station to the A6 Input on the Protocol™.

**Note:** All Temperature and Pressure Inputs to the Protocol™ Control Board ARE LOW VOLTAGE INPUTS ONLY.

Use shielded and grounded Belden Cable #8762, or equivalent, between Pumping Station and Protocol™ unit.

## MANUAL SWITCHES AND CIRCUIT BREAKERS

The Control Circuit Switch only opens and closes the automatic pump cycling and alarm circuits. It does not remove 120V power from the control panel.

The Pump 1 and Pump 2 Motor Circuit Breakers protect the Control Panel's 3-Phase wiring.

The Pump 1 and Pump 2 Manual Interface Modules allow field personnel to force on one of the pumps while servicing the control circuits for the other pump. The Manual Interface does not open any of the standard control circuits, and requires 120V power supply to keep its motor contactor closed.

The Control Circuit Breakers protect the 120V Control Panel wiring.

The Alarm Circuit Reset opens the alarm lockout circuit.

The Alarm Bell Shutoff opens the alarm bell circuit. It must be manually turned back to the normal operating position once an alarm condition is corrected or the next alarm will not activate the bell.

The Rotor Switch provides manual selection of the control board function. Either pump may be forced on while the other is being serviced.

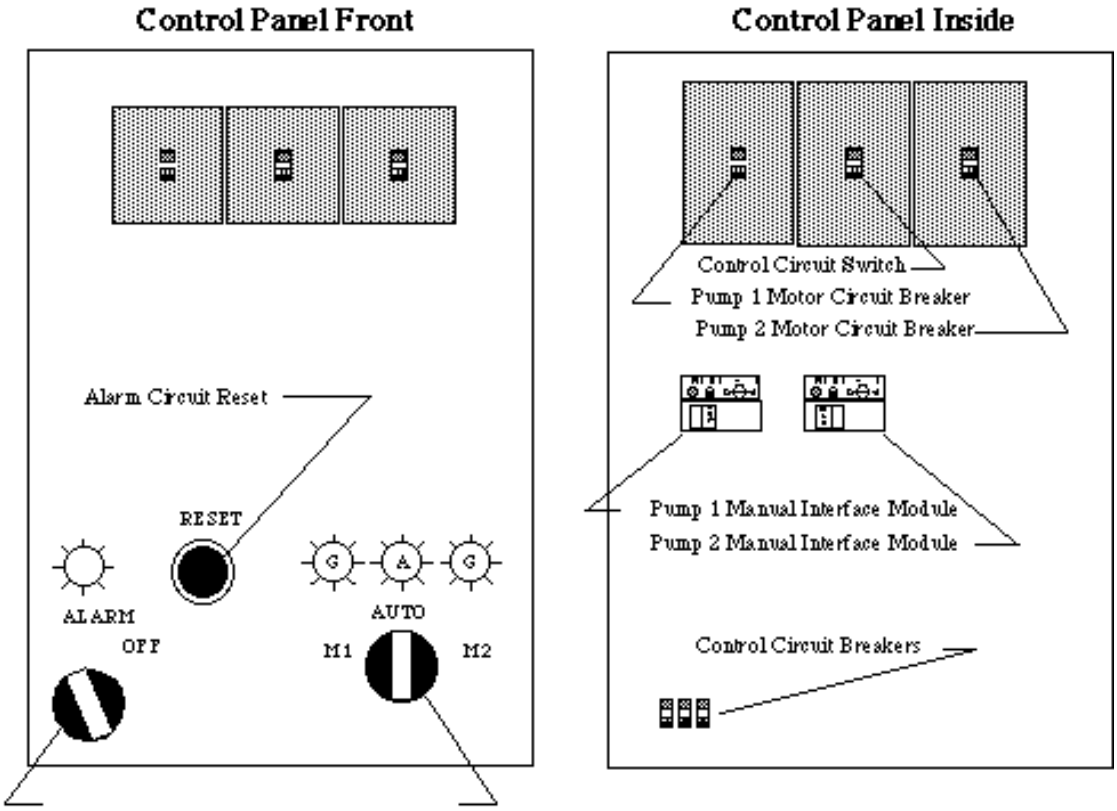
**LIGHTS**

| **Color** | **Lit Indicates** |
|---|---|
| Amber | 120V power |
| Green | Motor Contactor Closed |
| Red | Alarm Condition |

## OPERATION

**M1-Auto-M2 Rotor Switch**
In Auto mode the pumps should cycle based upon RE4 timer and alternating circuit. M1 or M2 is a manual forcing of either pump on. The timer and alternating circuit is inoperable at this time.

**Manual Switches and Circuit Breakers**
**208V 3-Phase Motors**



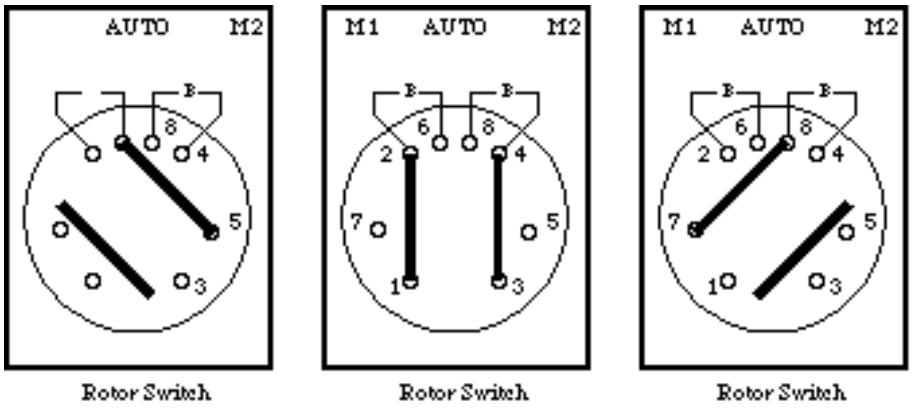

**Manual Interface Module**
In normal operation this should be in the auto position. If it is desired to bypass the normal control circuit, a 5 amp breaker supplies voltage to the manual contacts. By switching to the manual mode, the pump will come on.
***Do not switch both pumps on at the same time.***

**Overload Protection**
The dial should be turned to the required RLA of the pump it is protecting. A test slot is located on the device to force an overload condition and check for proper pump switching.

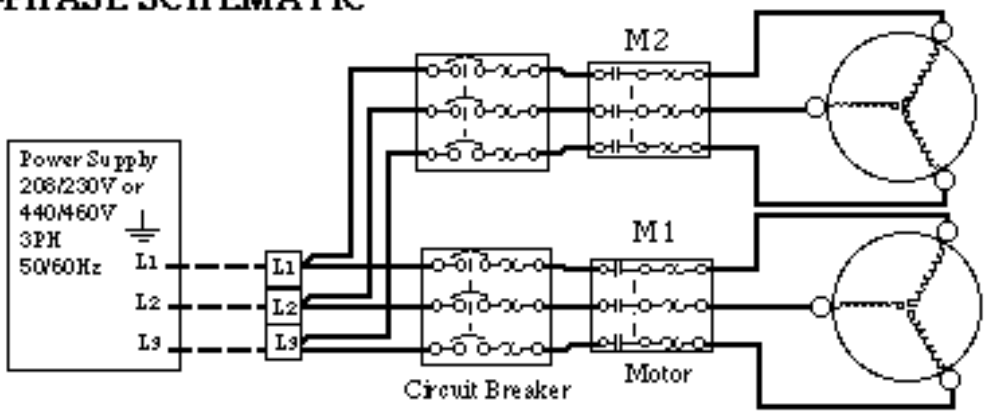
**High Pressure Control**
This device opens on rise of pressure. When discharge pressure is developed the control should open. If the discharge pressure is to drop, the control will activate the alarm circuit which will switch pumps and disable the automatic switching of pumps.

**RE4 Timer**
This device is used to allow equal run time for the two pumps. The settings should be 300h, 28, and a square with an X in it. This alternates the pumps 28% of 300 hours or every 84 hours. If an alarm condition occurs, a pump will be switched and the timer is taken out of the circuit.

**460 Volt Integrals**
This is the motor starter used in place of a breaker and contactor typical of a 208V system. The Integral has built in overload protection and can be tested using a screwdriver in the test slot. The overload value must be dialed in based on the pump RLA it is protecting.




## 3-PHASE SCHEMATIC




## CONTROL CIRCUIT OPERATION NOTES

**NOTE 1 –** RE4 time delays for 84 hours from the beginning of control circuit power up. After 84 hours RE4 contacts 15-16 open the CR1 and ALT circuits.

• CR1 contacts 13-14 open the RE4 circuit.

• RE4 contacts 15-16 close the DR1 and ALT circuits.

• CR1 contacts 13-14 close the RE4 circuit.

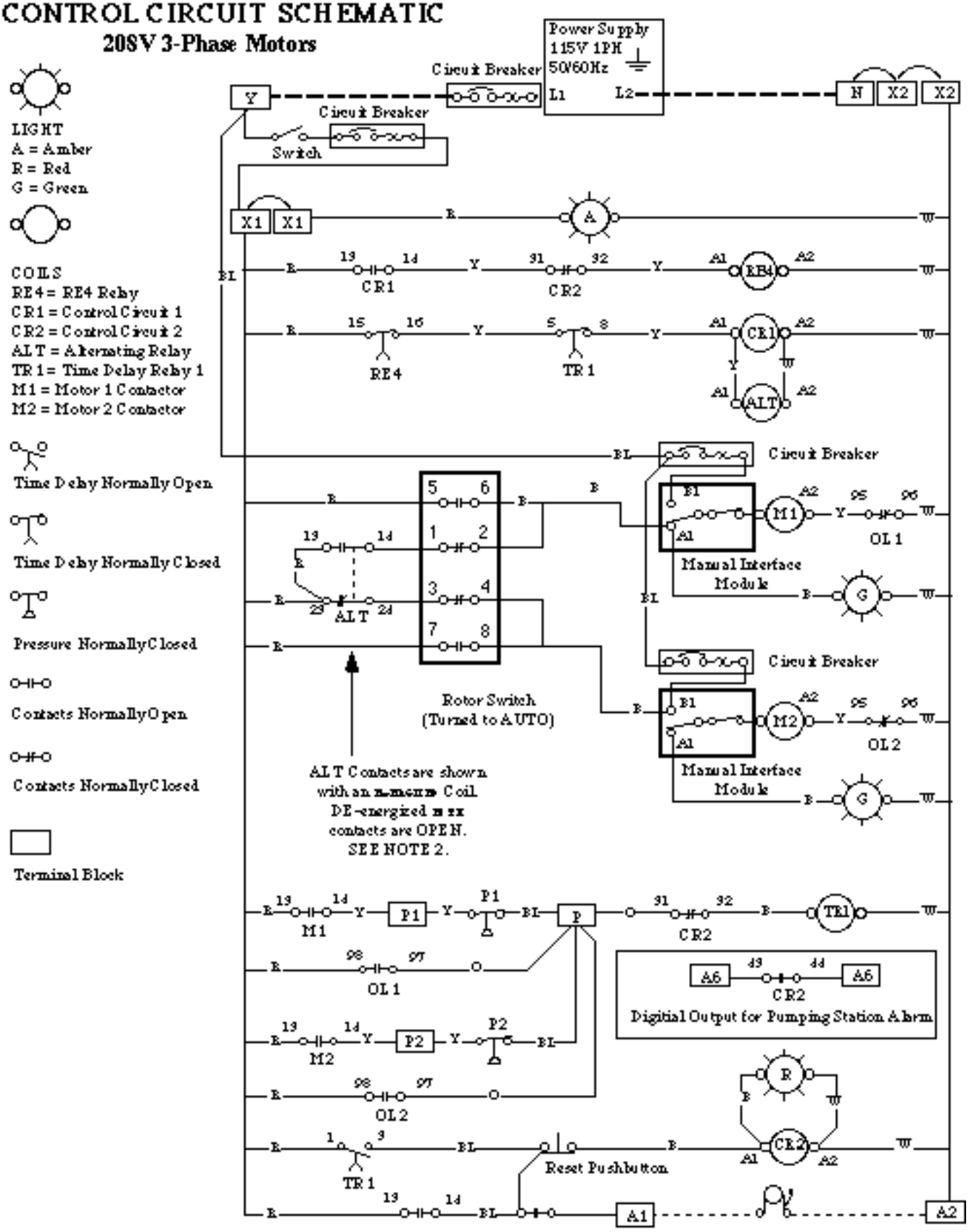
• RE4 begins timing for 84 hours.

**NOTE 2** – The contactor assembly of the alternating relay rides on a spring-loaded pivot. When the ALT Coil is energized, **either** contacts 13-14 **or** 23-24 will close. When the coil circuit is opened, the contact assembly opens and tilts on the pivot. The next time the ALT coil is energized, the **opposing** contacts close.

**NOTE 3 –** It is important to have the rotor switch turned to the M1 or M2 position during initial startup, so that the motor coming on line can be controlled. The rotor switch must be set to M1 or M2 **before** closing the control circuit switch.

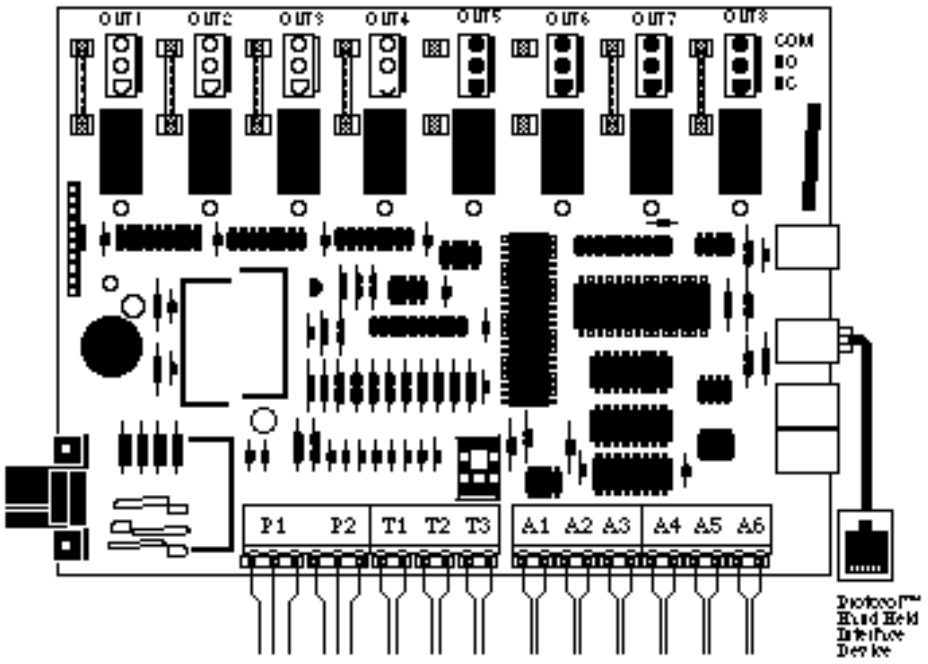
# CONTROL CIRCUIT SCHEMATIC

## 208V 3-Phase Motors



## PUMPING STATION CONTROL

Control Circuit Panel




| OUTPUT | DEFINITIONS | LOCATION/FUNCTION |
|---|---|---|
| OUT1 | Motor #1 / Motor #2 | Pump Station - Used to cycle operation of water pumps |
| OUT2 * | High Speed Fan Motor | Fluid Cooler - Used to control glycol temperature leaving fluid cooler |
| OUT3 * | Low Speed Fan Motor | Fluid Cooler - Used to control glycol temperature leaving fluid cooler |
| OUT4 | Not Used | |
| OUT5 | Not Used | |
| OUT6 * | Spray Pump | Fluid Cooler - Used to control glycol temperature leaving fluid cooler |
| OUT7 | Alarm Output | Pump Station - Used to indicate an alarm condition for both the Pump Station and Fluid Cooler |
| OUT8 * | Fluid Cooler Switchback | Fluid Cooler - Used to switch operation of the fluid cooler away from the electronic control and to a mechanical thermostat. |

| SENSOR | DEFINITIONS | RANGE | LOCATION |
|---|---|---|---|
| P1 | Pressure Transducer | 200 PSI | PUMP STATION - Water Discharge Line |
| P2 | Auxiliary Pressure Transducer | 200 PSI | PUMP STATION/FLUID COOLER - Spare Pressure Input |
| T1 * | Glycol Temperature In | -40 to 120 F | FLUID COOLER - Water line entering fluid cooler |
| T2 * | Glycol Temperature Out | -40 to 120 F | FLUID COOLER - Water line leaving fluid cooler |
| T3 * | Ambient Temperature | -40 to 120 F | FLUID COOLER - On or near roof of building |
| A1 | Pump #1 Proofing | Open/Closed | PUMP STATION - Auxiliary contacts from Motor Integrals contained within Pump Station Control Panel |
| A2 | Pump #2 Proofing | Open/Closed | PUMP STATION - Auxiliary contacts from Motor Integrals contained within Pump Station Control Panel |
| A3 * | High Speed Fan Proofing | Open/Closed | FLUID COOLER - Auxiliary contacts from Motor Integrals contained within Fluid Cooler Control Panel |
| A4 * | Low Speed Fan Proofing | Open/Closed | FLUID COOLER - Auxiliary contacts from Motor Integrals contained within Fluid Cooler Control Panel |
| A5 * | Spray Pump Proofing | Open/Closed | FLUID COOLER - Auxiliary contacts from Motor Integrals contained within Fluid Cooler Control Panel |
| A6 | Not Used | Open/Closed | |

* Field wiring required from fluid cooler to Pump Station control panel.

The Pumping Station Electronic Control was designed to operate Hussmann's Pumping Station in conjunction with the Protocol™ Refrigeration system. The main function of this control is to operate the two pumps on an even run time (typically every 84 hours). The control also monitors and proofs the operation of these pumps as well as water pressure and outputs an alarm should a fault condition occur.

One additional feature implemented within the Pumping Station control are provisions for operating a fluid cooler. The main function of this feature is to control glycol temperature leaving the fluid cooler. Control of glycol temperature is accomplished by the cycling of a high and low speed fan motor and a spray water pump. The control will also monitor and proof the fan motor and water pump outputs to ensure proper operation. High glycol temperature alarms are engaged should the water temperature leaving the fluid cooler becomes too high.

# Pumping Station

The Pumping Station / Fluid Cooler control provides the end user a method of monitoring and controlling the water loop system for a Protocol™ installation and connecting the alarming function through HUSSNET™ (a software program developed by Hussmann to provide historical data logging, alarm scanning and remote accessibility).

## FLUID COOLER SPECIFICATIONS

The control algorithm is designed to operate a two-speed fan motor and discrete spray pump located in the fluid cooler. The algorithm contains a deadband, or 'cutin' and 'cutout,' method of control. Glycol temperature leaving the fluid cooler is maintained to a setpoint by cycling the fan motor and spray pump. Additional features implemented by the control are:

- Winter mode of operation to lockout the spray pump during low ambient conditions.
- Maximum glycol temperature override feature forces on water pump during the winter mode of operation.
- Contact proofing of the fan motors and spray pump.
- Remote monitoring and data logging through Hussnet™.

## PLANNED FIELD WIRING

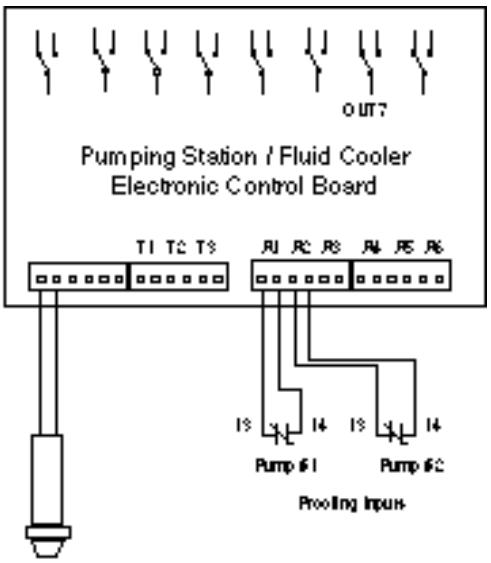
**For Fluid Cooler connections**
(see following electrical schematics)
From control board to Fluid Cooler provide:

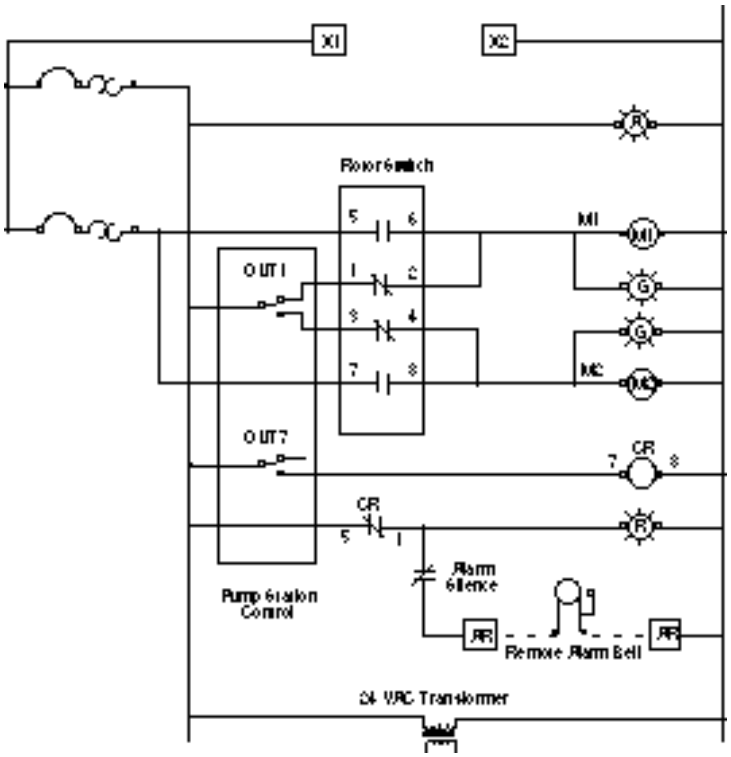
- two 120/1/60 18 awg wires for the High Speed Fan motor
- two 120/1/60 18 awg wires for the Low Speed Fan motor
- one 120/1/60 18 awg wire for the Spray Pump
- two 120/1/60 18 awg wires for the switchback circuit

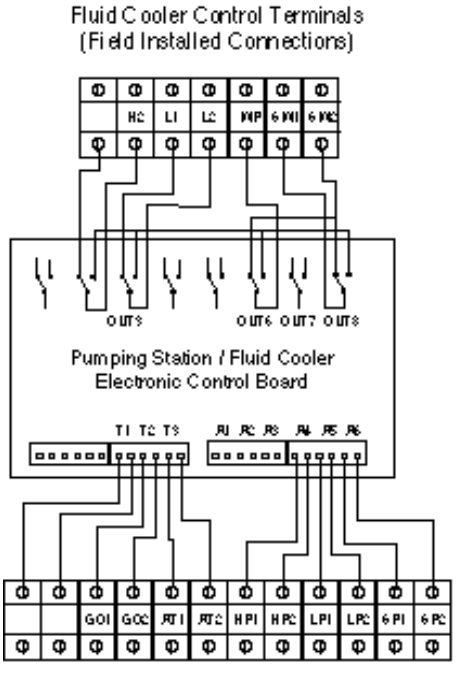
Note: The following field connections must be made with shielded two-conductor cable such as Belden #8762 or equivalent. The ground wire contained in the cable must be attached to the door panel liner of the Pumping Station control panel. **Important: The following field connections should be dry contact only — no voltage should be present.**

- one 2-conductor cable for High Speed Fan proofing
- one 2-conductor cable for Low Speed Fan proofing
- one 2-conductor cable for Spray Pump proofing

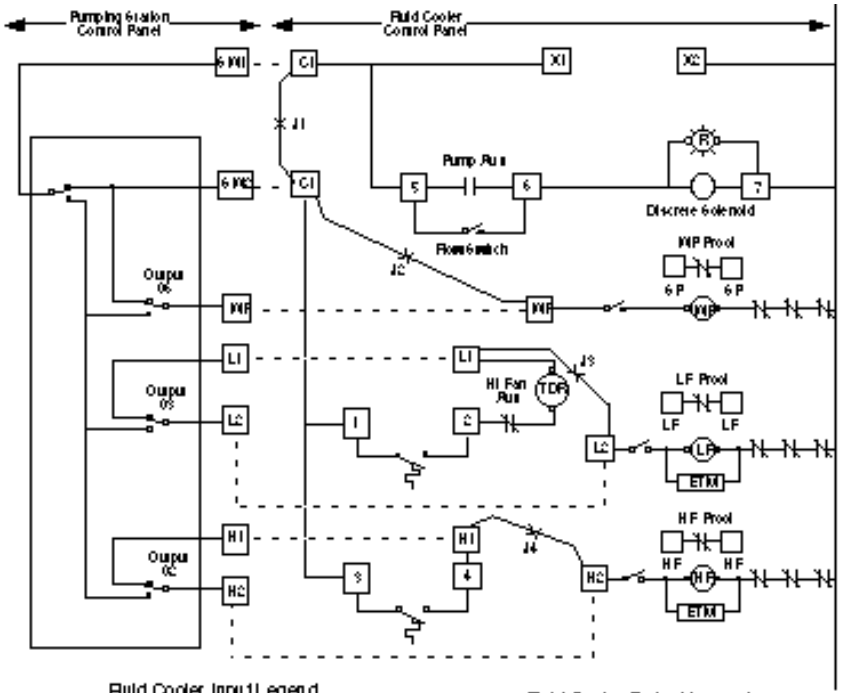
- one 2-conductor cable for temperature sensor mounted in leaving glycol temperature stream
- one 2-conductor cable for temperature sensor mounted in ambient location of fluid cooler
- one 2-conductor cable for temperature sensor mounted in entering glycol temperature stream.




Fluid Cooler Input Terminals




Fluid Cooler Input Legend

HP1, HP2 - Hi Speed Proofing
LP1, LP2 - Low Speed Proofing
6 P1, 6 P2 - 6 pos. Pump Proofing
GI1, GI2 - Glycol Temp In
GO1, GO2 - Glycol Temp Out
AT1, AT2 - Ambient Temperature

Fluid Cooler Output Legend

H1, H2 - Hi Speed Fan Control
L1, L2 - Low Speed Fan Control
HP - 6 pos. Pump Control
6 M1, 6 M2 - 6 Switch Lock (3-Stage Total)
ETM - Elapsed Time Meter

## PUMPING STATION CONTROL METHOD OF OPERATION

The primary function of the Pumping Station algorithm is to rotate the operation of the pumps based upon a user-defined setting.

| PUMPROTATION | | |
|---|---|---|
| PARAMETER | LOCATION (Handheld Device) | LOCATION (Hussnet™) |
| Motor Changeover (units of hours) | CONFIG MENU PUMPSTATION | SYSTEM MENU |

Both Pumps are controlled through the Output #1 relay on the main control board when the rotor switch is turned to the AUTO position. When Output #1 is de-energized by the control, Pump #1 cycles on, and when the relay is energized, Pump #1 cycles off and Pump #2 will cycle on. The control monitors the operation of these pumps by looking at the proofing contacts wired back from the motor integrals. These contacts are connected to the A1(for Pump #1) and A2 (for Pump #2) inputs on the main control board.

When a Pump is energized, this contacts should close. If for some reason the contacts do not close, the control will place that Pump in ALARM condition by cycling the pump off and switching over to the other pump. The alarm relay (Output #7) is de-energized which provides an alarm condition to the 'AR' terminal blocks. The control also monitors water pressure as provided by a pressure transducer connected to the P1 input. If water pressure is not sufficient to meet the alarm limits, the control will sound an alarm and switch operation to the other pump. Alarm limits and time delays for a Pressure alarm can be programmed by the following table:

| PRESSURE ALARMS | | |
|---|---|---|
| PARAMETER | LOCATION (Handheld Device) | LOCATION (Hussnet™) |
| Disch High Alarm | CONFIG MENU PUMPSTATION | SENSOR SETUP |
| Disch Low Alarm | | |
| Time Delay | | |

The rotor switch mounted on front of the control panel can provide a quick method of forcing a pump on by turning the switch to the M1 or M2 position.

## FLUID COOLER METHOD OF OPERATION

In order to activate the Fluid Cooler algorithm, you will need to enable the feature as indicated by the following table:

| FLUID COOLER CONTROL | | |
|---|---|---|
| PARAMETER | LOCATION (Handheld Device) | LOCATION (Hussnet™) |
| Fluid Cooler | CONFIG MENU PUMPSTATION | SYSTEM MENU |

The Fluid Cooler Algorithm is based a band method of control. That is, a cutin and cutout level is used to cycle the appropriate outputs: Fan motors and spray water header.

| CONTROLPARAMETERS | | |
|---|---|---|
| PARAMETER | LOCATION (Handheld Device) | LOCATION (Hussnet™) |
| High Speed Fan Motor | CONFIG MENU FLUID COOLER | SYSTEM SETUP |
| Low Speed Fan Motor | | |
| Spray Pump | | |

It is important, that the correct levels of operation are programmed into the control to ensure proper operation and consequently to prevent rapid cycling and changing between fan speeds and water activation. The following table provides a recommended configuration for most locations. You will need to modify these settings based upon your particular location.

| RECOMMENDED CONTROLSETTINGS | | |
|---|---|---|
| PARAMETER | CUTIN | CUTOUT |
| High Speed Fan | 80 | 75 |
| Low Speed Fan | 70 | 65 |
| Spray Water Pump | 60 | 55 |

Based upon this table of recommended control settings, the control will now begin to maintain glycol temperature (T2 Input) leaving the fluid cooler. The stages of operation will be as follows:

| STAGES OF OPERATION | | |
|---|---|---|
| STAGE | OUTPUT | DESCRIPTION |
| 1 | Output 6 | Spray Water |
| 2 | Output 6 and 3 | Spray Water and Low Speed Fan |
| 3 | Output 6 and 2 | Spray Water and High Speed Fan |

If the cost of water is a premium in your area you may want to have the Water cycle on last. In that case, the following tables contain a suggested form of settings and the resulting stages of operation:

| WATER ON LAST SETTINGS | | |
|---|---|---|
| PARAMETER | CUTIN | CUTOUT |
| High Speed Fan | 70 | 65 |
| Low Speed Fan | 60 | 55 |
| Spray Water Pump | 80 | 75 |

| STAGES OF OPERATION | | |
|---|---|---|
| STAGE | OUTPUT | DESCRIPTION |
| 1 | Output 3 | Low Speed Fan |
| 2 | Output 2 | High Speed Fan |
| 3 | Output 6 and 2 | Spray Water and High Speed Fan |

### ALARM HANDLING

As previously indicated, the control will proof all outputs. The auxiliary contacts from the fluid cooler contactors are wired into inputs A3 (for High Speed fan proofing), A4 (for Low Speed fan proofing) and A5 (for Spray Water pump proofing). When the control turns on an output, it will look for a corresponding contact closure on the appropriate input. If no closure is present, the control will place that output in ALARM and trigger an alarm through Output #7 (Alarm relay). In the case of a proofing failure on either fan speed, the control will automatically switch to the available speed not in alarm.

The fluid cooler algorithm provides a mechanical switchback method based upon glycol temperature alarms. If glycol temperature exceeds the hi or low alarm setting, the control will activate the alarm relay (Output #7) and the switchback relay (Output #8). The switchback relay passes operation of the fluid cooler away from the electronic control and back to a mechanical thermostat mounted in the fluid cooler. The high/low alarm limits should be programmed in the following areas:

| FLUID COOLER ALARM SETTINGS | | |
|---|---|---|
| PARAMETER | LOCATION (Handheld Device) | LOCATION (Hussnet™) |
| High Speed Fan | CONFIG MENU ALARM SETTINGS | SYSTEM MENU |
| Low Speed Fan | | |
| Water Spray Pump | | |

### WINTER MODE OF OPERATION

The Fluid Cooler algorithm provides a mode of operation for winter time, or low ambient conditions, to lockout the Spray Water pump from coming on. Implemented in the winter mode of operation is a Maximum Glycol Temperature Override function which overrides the spray water

pump lockout in the event that Glycol temperature reaches too high of a level. The following table shows the location and the necessary configuration required to implement this feature. As before, the cutin/cutout level for the winter mode is essential to prevent the control from quickly converting in and out of this special mode of operation. A difference of about 15 degrees fahrenheit is suggested between the cutin and cutout levels.

| WINTER MODE OF OPERATION | | |
|---|---|---|
| PARAMETER | LOCATION (Handheld Device) | LOCATION (Hussnet™) |
| Winter Setpoint | CONFIG MENU FLUID COOLER | SYSTEM MENU |
| Glycol Override | | |

| SUGGESTED SETTINGS | | |
|---|---|---|
| PARAMETER | CUTIN | CUTOUT |
| Winter Mode | 30 | 45 |
| Glycol Override | 85 | 80 |

## CLOSED LOOP COMPONENTS

1. Protocol™ Condenser - transfers heat from refrigerant to the circulating water/glycol.

2. Flow Control/Shutoff Valve - used to balance water/glycol flow across all Protocol™ units.

3. Hot Water Return Piping - carries heat laden water/glycol to Fluid Cooler

4. Fluid Cooler - discharges unwanted heat into the ambient air through evaporation of an expendable water supply.

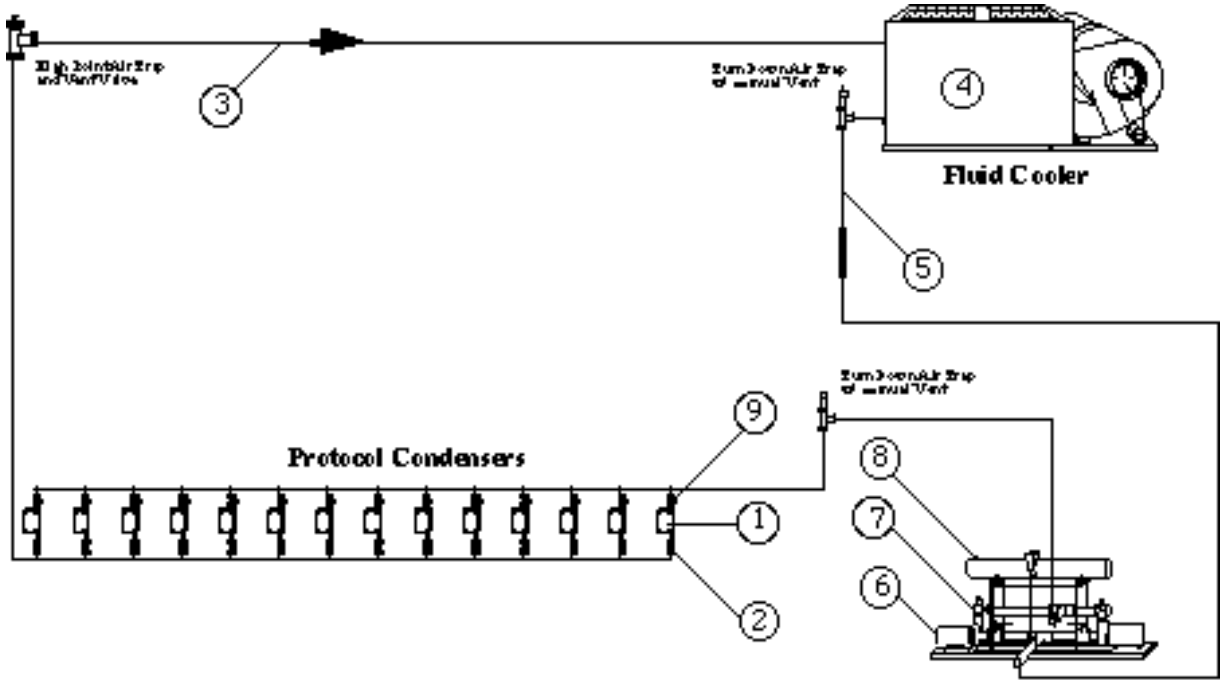
5. Cooled Water Supply Piping - carries cooled water/glycol back to the Protocol™ units to pick up more heat.

6. Pump and Motor Assembly - circulates the water/glycol. Two are used.

7. Triple Duty Valve - acts as check valve, flow control and shutoff valve. One Valve is immediately down stream of each pump.

8. Expansion Tank - allows for expansion of water/glycol to prevent system safety shut down.

9. Protocol™ Shutoff Valve - in connection with the Flow Control/Shutoff Valve permits isolation of the condenser.



**OTHER COMPONENTS WHICH HAVE DIFFERENT LOCATIONS**

Shutoff Valves - placed in the lines so components may be isolated.

1 in. Hose Coupling - water fill - generally located at one of the lowest points in the system. It is used to fill the system at startup.

Manual Air Bleeds - are located at the high points in the system and are used at startup to remove air.

Closed Loop Feeder - Provides conditioning agents for the circulating water/glycol.

## STARTUP

**(Note:** The closed loop and evaporative fluid cooler must be up and running before starting up any Protocol™ units.)

Once the water piping is completed, the water loop should be tested for leaks using pressurized water. **DO NOT exceed 75psi, and isolate the pumps**.

**LEAK TESTING**

1–Isolate both pumps using the butterfly and triple duty valves.

2–Charge the system to 50 psig. Allow it to sit for 12 hours. If there is no drop in the gauge pressure, the system is good.

3–If a drop occurs, recharge and close isolation valves to the branches. Allow to sit. Test pressures on individual branch circuits. Check the branch(es) losing pressure. Check runs as well as joints, especially on PVC which can develop hair-line cracks.

**NOTE: DO NOT USE R-22 OR OTHER REFRIGERANTS TO LOCATE LEAKS, ESPECIALLY ON PVC PIPING. REFRIGERANTS CAN ATTACK PVC.**

**FLUSHING CHARGE**

A charge of water should be used to initially fill the system. This charge may be loaded at a high point or pumped in through the Hose Bib on the Pumping Station. If the system has copper piping, use a cleansing agent recommended by local suppliers of water conditioning agents.

Completely fill the system with water. Vent trapped air at all turn downs and high points. When the system has been completely charged with water, the pumps may be started.

**Note:** During winter construction, the contractor will need to take precautions to see that no freeze damage occurs during this procedure, especially in the fluid cooler.

**STARTING THE PUMPS**

Since 3-Phase motors are used and the pumps are centrifugal, pump direction should be checked.

1–Turn **M1** and **M2 circuit breakers** "off."

2–Turn the Rotor Switch to **M1**.

3–Close the Triple Duty Valve.

4–Be sure Butterfly Valve is open.

**NEVER RUN A PUMP WHEN ITS UPSTREAM VALVE IS CLOSED.**

5–Turn **M1 circuit breaker** to "on" and open the Triple Duty Valve. This procedure is used to reduce system shock.

6–Check discharge and suction gauges for proper rotation.

7–Turn **M1 circuit breaker** "off."

8–Turn the Rotor Switch to **M2**. Repeat Steps 3 through 7.

If pumps are running backward, have the field connections corrected.

Repeat Steps 1 through 4 to bring a pump on line.

Allow the flushing charge to circulate for 24 to 48 hours.

Drain the system completely.

Clean all strainers.

The system is now ready to be charged with the water/glycol mix.

### CHARGING THE CLOSED LOOP

The simplest procedure for charging the closed loop is to provide for a large ball valve at the highest point in the system. Using a funnel, the glycol may be poured or pumped into the loop. Water is added with a hose. The funnel provides an air break ensuring no glycol contamination of the water supply.

Where the high point is not accessible, glycol must be pumped into the system. The Hose Bib on the Pumping Station is provided for such installations. Water charging from a utility supply line will require anti-backflow equipment. (A simple check valve in the supply line is not sufficient.) A pump should be used where the water pressure fluctuates or is low.

Vent trapped air during the filling process. Place a towel around the vent valve to catch any liquid. Any valve and hose assembly used in venting should not be used for anything else.

### RE-STARTING THE PUMPS

This procedure should be used whenever the pumps have been shut down and the system has been opened.

1–Begin with the **circuit breaker** "Off."

2–Turn the Rotor Switch to **M1**.

3–Be sure Butterfly Valve is open.

**NEVER RUN A PUMP WHEN ITS UPSTREAM VALVE IS CLOSED.**

4–Turn **circuit breaker** "ON." Open the Triple Duty Valve. This procedure is used to reduce system shock.

5–Turn the Rotor Switch to **AUTO.**

## MAINTENANCE

Once the Pumping Station is up and running, there is no scheduled maintenance.

Hussmann highly recommends that daily inspection be performed by a member of the store's staff. Check for:

- grinding noises
- loud pumping noises
- water dripping
- pumps not seeming to alternate.

Use manufacturer's procedures when replacing Pumping Station components.

# HUSSMANN®

Limited Warranty

**This warranty is made to the original user at the original installation site and is not transferable.**

Hussmann merchandisers are warranted to be free from defect in material and workmanship under normal use and service for a period of one (1) year from the date of original installation (not to exceed fifteen (15) months from the date of shipment from the factory). **Hussmann Impact *Modular Coils* are warranted for a total of five (5) years based upon the above criteria.** Hussmann's obligation under this warranty shall be limited to repairing or exchanging any part or parts, without charge F.O.B. factory or nearest authorized parts depot within said period and which is proven to the satisfaction of the original manufacturing plant warranty group to be thus defective.

Hussmann covers the entire case or refrigeration product and all its components (except for lamps, driers, fuses, and other maintenance type replacement parts) for the one (1) year warranty period.

Additionally, Hussmann warrants for a total period of three (3) years all sealed, multi-glass assemblies except those used in sliding doors on closed meat display cases. If within three (3) years from the date of installation (not to exceed thirty-nine (39) months from the date of shipment from factory), it shall be proven to the satisfaction of the originating factory warranty group that there is impaired visibility through the multi-glass assemblies thereof caused by moisture between the glasses, the multi-glass assembly will be replaced free of charge, F.O.B. factory. This additional warranty excludes accident, misuse, or glass breakage.

On Hussmann-Gloversville manufactured self-contained display cases, Hussmann agrees to repair or exchange, at its option, the original motor/compressor unit only with a motor/compressor of like or of similar design and capacity if it is shown to the satisfaction of Hussmann that the motor/compressor is inoperative due to defects in factory workmanship or material under normal use and service as outlined in Hussmann's "Installation Instructions" which are shipped inside new Hussmann equipment. Hussmann's sole obligation under this warranty shall be limited to a period not to exceed five years from date of factory shipment.

On Hussmann refrigeration systems (Atlanta, Bridgeton, Brantford, Chino) and self-contained display cases (Bridgeton, Brantford, Chino, Denver), an additional (4) year extended warranty for the motor/compressor assembly is available, but must be purchased prior to shipment to be in effect. Hussmann reserves the right to inspect the job site, installation and reason for failure.

The motor/compressor warranties listed above do not include replacement or repair of controls, relays, capacitors, overload protectors, valve plates, oil pumps, gaskets or any external part on the motor/compressor replaceable in the field, or any other part of the refrigeration system or self-contained display case.

**THE WARRANTIES TO REPAIR OR REPLACE ABOVE RECITED ARE THE ONLY WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, MADE BY HUSSMANN WITH RESPECT TO THE ABOVE MENTIONED EQUIPMENT, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS, AND HUSSMANN NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT, ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH THE SALE OF SAID EQUIPMENT OR ANY PART THEREOF.**

***THIS WARRANTY SHALL NOT APPLY TO LOSS OF FOOD OR CONTENTS OF THE EQUIPMENT DUE TO FAILURE FOR ANY REASON*. HUSSMANN SHALL NOT BE LIABLE:**

- For payment of labor for any removal or installation of warranted parts;
- For any repair or replacements made without the written consent of Hussmann, or when the equipment is installed or operated in a manner contrary to the printed instructions covering installation and service which accompanied such equipment;
- For any damages, delays, or losses, direct or consequential which may arise in connection with such equipment or part thereof;
- For damages caused by fire, flood, strikes, acts of God or circumstances beyond its control;
- When the equipment is subject to negligence, abuse, misuse or when the serial number of the equipment has been removed, defaced, or altered;
- When the equipment is operated on low or improper voltages
- When the equipment is put to a use other than normally recommended by Hussmann (i.e. deli case used for fresh meat);
- When operation of this equipment is impaired due to improper drain installation;
- For payment of refrigerant loss for any reason;
- For costs related to shipping or handling of replacement parts.

Hussmann Corporation, Corporate Headquarters: Bridgeton, Missouri, U.S.A. 63044-2483 August 15, 1998