



# Air Conditioner Installation Manual

## INSTRUCTIONS FOR MODELS 1.5 to 10 ton

Your **Freus**™ refrigerated air conditioner is the product of many years of experience and research. The effort invested in developing your new cooling equipment was the result of a genuine concern for our environment and a commitment to reducing energy consumption. Your added bonus is a unit requiring a minimum in service and maintenance while saving energy dollars at the same time.

### WHAT THIS MANUAL COVERS

This manual explains the scheduled maintenance of a **Freus**™ refrigeration

unit only. This unit is typically installed as part of a complete system that includes the following: indoor evaporator coil, furnace/air handling assembly, refrigeration lines, and thermostat controls.

### YOU WILL ALSO NEED

The instructions from the manufacturer of your air handling unit (furnace), your evaporator coil, and thermostat controls.

### READ AND SAVE THIS MANUAL

It has important safety and maintenance instructions. Record your model and serial numbers for future reference.

## TO BE FILLED OUT AT TIME OF INSTALLATION BY INSTALLER

### Freus™ Cabinet

Mod.# \_\_\_\_\_

Ser.# \_\_\_\_\_

### Indoor Evaporator Coil

Mod.# \_\_\_\_\_

Ser.# \_\_\_\_\_

Manufacturer: \_\_\_\_\_

### Indoor furnace on air handler

Mod.# \_\_\_\_\_

Ser.# \_\_\_\_\_

Manufacturer: \_\_\_\_\_

## SAFETY CONSIDERATIONS

Signal Words: **WARNING** or **DANGER** denote safety alerts regarding hazards that *will* result in severe injury or death, **CAUTION** denotes alerts to unsafe practices that *can* result in minor personal injury or equipment damage or required procedures for proper equipment performance, **NOTE** denotes *possible* injury, equipment damaging practices, or tips for better and more efficient installation.

Installation and servicing of cooling equipment can be hazardous due to electrical components, moving fan blades, presence of water, etc. Only trained and qualified personnel should install, repair or service refrigeration sections. Use only factory authorized replacement parts and accessories when servicing this equipment.

Owners may perform basic maintenance including: cleaning, rinsing the intake screen, pump intake and sump area, float adjustments, winter closed down, draining, and spring startup. Other operations should be performed by trained service personnel. When working on cooling equipment, observe warnings in the literature, tags and labels attached to the equipment, and any other safety precautions that apply. Follow all safety codes. Wear safety glasses and work gloves when servicing the equipment.

## REFRIGERANT HANDLING

The United States Environmental Protection Agency (EPA) has issued various regulations regarding the introduction and disposal of refrigerant including that used in this unit. Failure to follow these regulations can result in harm to our environment and the imposition of substantial fines and other penalties. Because these regulations may be updated periodically, we strongly recommend that only certified refrigeration mechanics service the refrigeration components of this unit. You may contact your local EPA office directly for more information.

## WATER TREATMENT

Chemical water treatment is generally not recommended. The chlorine and other treatments added to city water are generally more than adequate biocide treatments for residential applications. The flush pump is provided to control mineral deposits. The increased city water intake caused by the flush pump brings in additional biocides from the city water. The water pan is shaded by the intake assembly to restrict the growth of algae. If chemical water treatment is used, the **Freus**™ warranty will not be affected by any chemicals approved by the Cooling Tower Institute for use on evaporative condensers with copper tubes. Check local codes and water authorities for permissible disposal of chemical water treatments. Note: the flush line may have to be appropriately rerouted.



Notes:

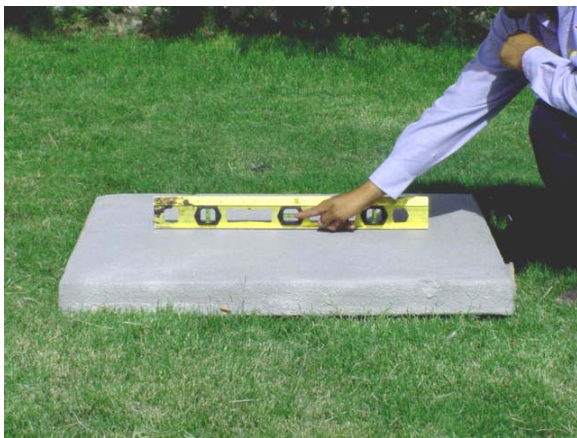
# INSTALLATION GUIDE (PHOTOS)



**Freus - The Highest Efficiency**



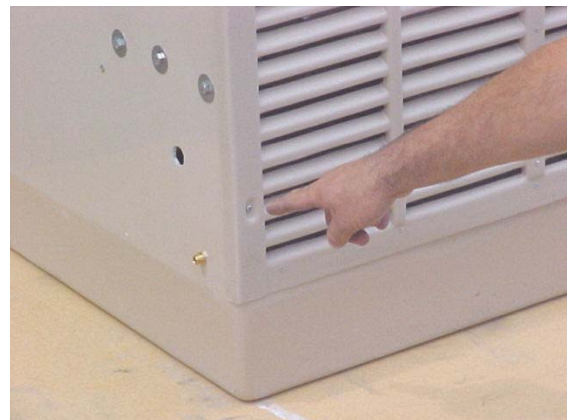
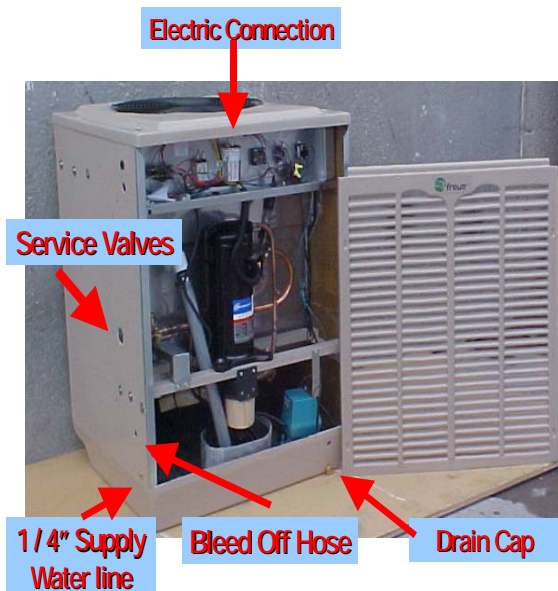
**Tools Needed For FREUS Install**



**The Condenser Pad Should Be Level or use Large area Shims to level Freus**



**The FREUS Condenser Must Be Level, To Insure Proper Water Distribution Over The Condenser Coil**



**To Remove Louver – Unscrew Phillips #2 on Face Of Louver**

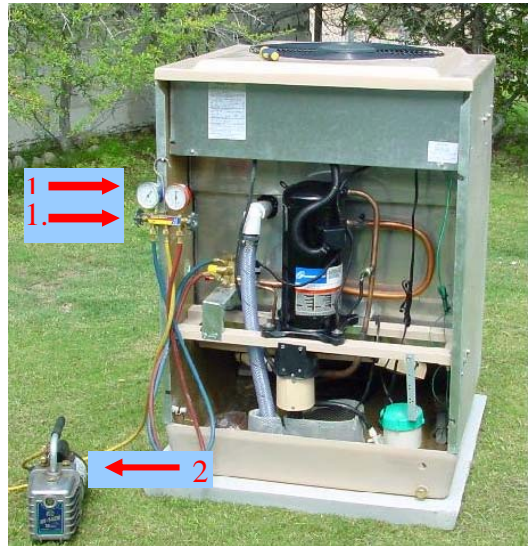




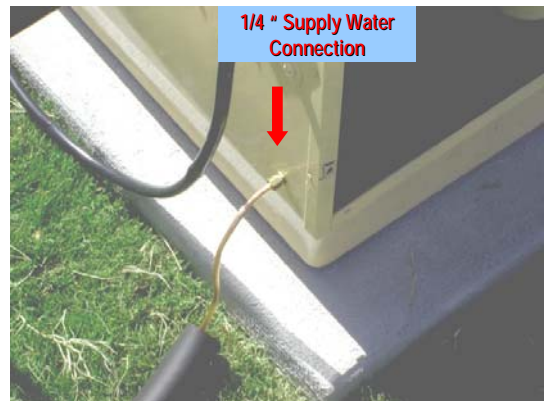
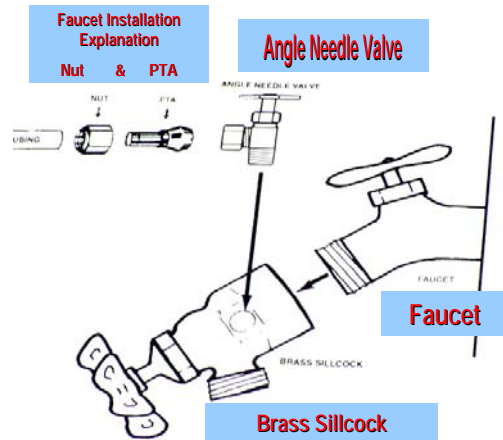
Nitrogen purge while Brazing Line Sets at Condenser & Indoor Coil, Then Pressure Test With Nitrogen At 200 – psi. If Pressure Does Not Hold For 15 Min. Use Leak Detection (Soap Suds) Then Repeat Test



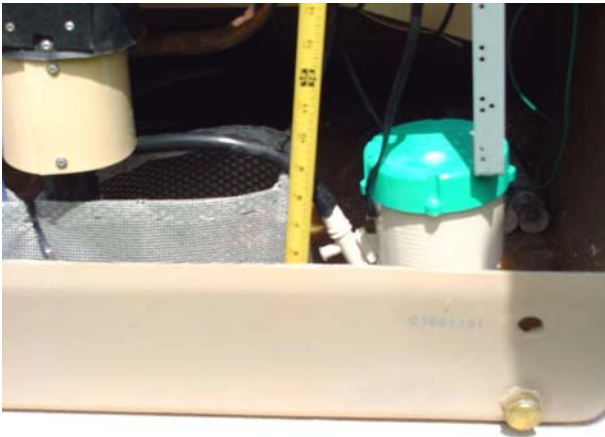
To Maximize Your FREUS Performance Use Aluminum Tape to secure Line Sets Together



1. Reinstall Schrader Cores, then
2. Evacuate To 29.9" Of Mercury, then
3. Continue Vacuum At Least 30 Minutes – to remove moisture.



Supply Water Line Should Be Insulated To Help Prevent Line Freezing



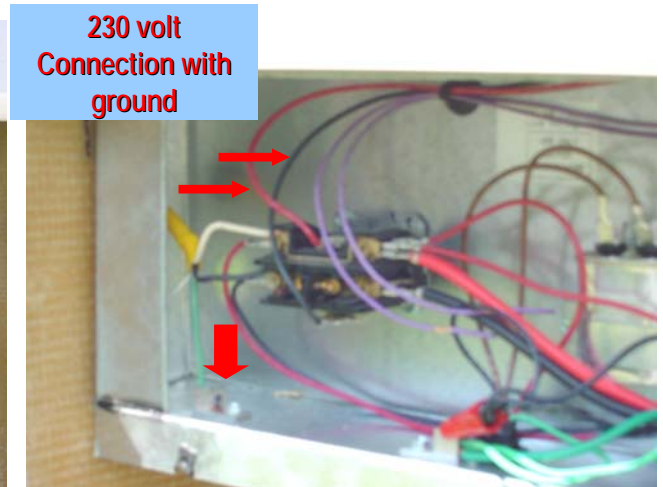
**Operating Water Depth In Freus Sump Should Be 2 3/4" To 3" Max.**



**DANGER**  
**Of Serious Injury Or Death**  
**Disconnect All Electricity Before Servicing**  
**Warning: There may be multiple disconnects on each Freus & all disconnects must be turned off!**



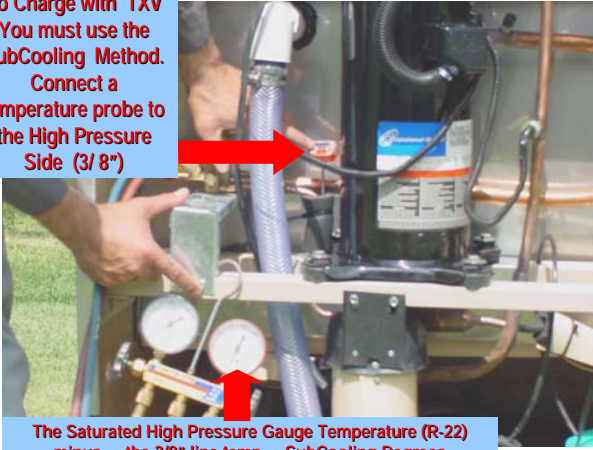
**Freus Wiring Panel**



**Ground Wire is required.**



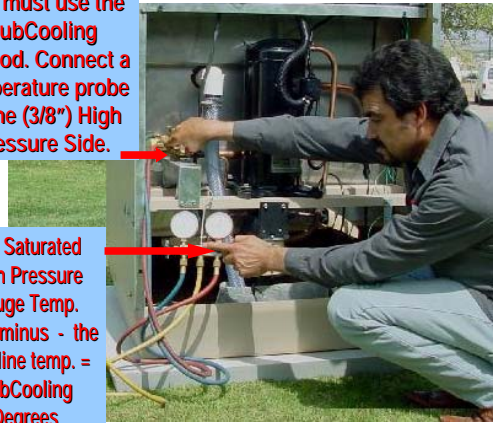
To Charge with TXV  
You must use the  
SubCooling Method.  
Connect a  
temperature probe to  
the High Pressure  
Side (3/8")



The Saturated High Pressure Gauge Temperature (R-22)  
minus - the 3/8" line temp. = SubCooling Degrees

**Indoor Coil with TXV – Use  
SubCooling or Sight Glass Charging**

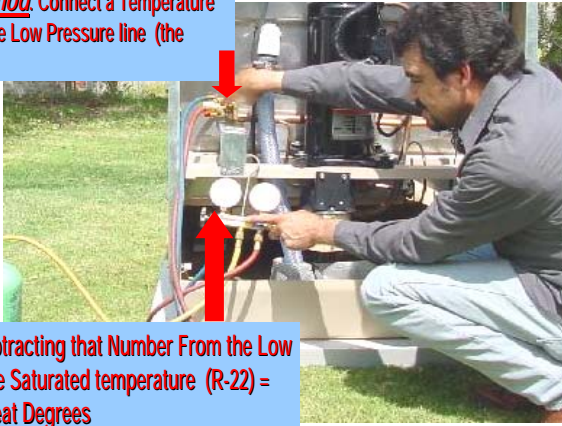
To Charge a TXV  
You must use the  
SubCooling  
Method. Connect a  
temperature probe to  
the (3/8") High  
Pressure Side.



The Saturated  
High Pressure  
Gauge Temp.  
(R22) minus - the  
3/8" line temp. =  
SubCooling  
Degrees

**Indoor Coil with a TXV – showing  
SubCooling Charging**

With an Orifice You Must use the Super  
Heat Method. Connect a Temperature  
Probe to the Low Pressure line (the  
Large line).



And Subtracting that Number From the Low  
Pressure Saturated temperature (R-22) =  
SuperHeat Degrees

**Indoor Coil Has An Orifice Use  
SuperHeat Charging**



**Verify Amps On All Components**



**FREUS Unit**



**From All Of Us Here At FREUS Inc.  
Thank You!**

Regular maintenance and/or service is the key to long trouble-free performance from your *Freus*<sup>TM</sup> unit. The following schedule will help you maintain an efficient unit with good appearance. Adhering to the suggested scheduled replacement of components at the start of the season will reduce in-season maintenance requirements.

**CAUTION:** Wear gloves & safety glasses when servicing.

**SEASONAL CLOSE-UP**

1. Turn off and/ or disconnect electricity.  
Warning: There may be multiple disconnects and all disconnects must be turned off!
2. Remove the drain cap & check anode.
3. Turn off and drain the water supply line.
4. Thoroughly rinse off the interior with a water hose to remove loose minerals that may be in the cabinet.

**SEASONAL START-UP INSPECTION**

Check the following and adjust, clean or replace as needed.

1. Rinse out the base to remove debris and minerals.
2. Check that drain cap is firmly seated and not leaking. Check Anode & replace if needed.
3. Check water level (should be 2 1/2" – 3" deep) and make sure the *Freus*<sup>TM</sup> unit is mounted level.
4. Turn on and/or connect electricity.
5. Check that the flush pump works and shuts off, if not install a replacement flush pump (also check anti siphon).
6. Turn thermostat lower to turn on unit and note that the fan, pump, and compressor all come on within a few minutes, if not call for professional service.

**EXCESSIVE SCALE BUILD UP (MAY INDICATE FLUSH PUMP FAILURE)** - See step by Step procedures.

**! WARNING !**  
*Turn off all power before working on Freus<sup>TM</sup> condenser, or electrical outlets. There may be more than one disconnect. When you put your hands in the unit you run the risk of injury if the unit is accidentally turned on from inside the house. Never wear slick soled shoes when working on a roof. You may slip when you least expect it. Gloves and safety glasses are required when working on this equipment.*

<b>Periodic service or maintenance</b>		
<b>Service needs</b>	<b>Semi Annual "Startup"</b>	<b>Semi Annual "Close-up"</b>
Rinse off face of <i>Freus</i> <sup>TM</sup> louver screen	X	X
Clean water pump/ screen	X	X
Rinse out base	X	X
Check/ Replace Anode	X	X
Indoor Furnace / Air Handler; Filter	X	X
Standard Maintenance Replacement Schedule for Parts*		
Every 5 years	Every 10 years	Every 20 years
Supply Pump & Hose Flush Pump & Hose Float Valve** Drain Gasket** Anodes**	Timers/Contactors/Capacitors Condenser Fan Motors/ Grilles/Blades Inlet Louver Nozzle System	Compressor / Filter Dryer Pressure Switches Copper Condenser Coil Drift Eliminator/ Fill
<ul style="list-style-type: none"> <li>• Check major components every 3 years.</li> <li>• Check refrigerant charge every 3 years.</li> </ul>		
<p>*NOTE: Failure to replace parts on schedule may result in component failure during the cooling season. Failure to replace parts in accordance with the standard maintenance schedule will not create a warrantable repair at a later date.  <b>EXPECTED CABINET LIFE IS OVER 30 YEARS</b>            Fiberglass components have demonstrated a service life well beyond 30 years in Coast Guard patrol boats. Accelerated weatherometer tests on fiberglass samples have indicated a service life in excess of 30 years. Fiberglass evaporative cooler cabinets have been in service nearly 30 years with no apparent loss of strength.  <i>Freus</i><sup>TM</sup> Fiberglass components carry a 15 year limited warranty. See complete <i>Freus</i><sup>TM</sup> limited warranty.</p>		

Disconnect All Power then RINSE LOUVER & SCREEN





## TROUBLE SHOOTING CHART

SYMPTOM	POSSIBLE CAUSES	POSSIBLE REMEDY
<b>Unit fails to start or perform.</b>	<ol style="list-style-type: none"> <li>1. Thermostat setting</li> <li>2. No electrical power to unit.</li> <li>3. Fuse blown.</li> <li>4. Circuit breaker tripped.</li> <li>5. Faulty wiring or shorts.</li> <li>6. High Limit Switch</li> <li>7. Condenser fan cord disconnected or damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check thermostat.</li> <li>2. Check power.</li> <li>3. Replace fuse.</li> <li>4. Reset breaker.</li> <li>5. Call electrician</li> <li>6. Call Air Conditioning service technician.</li> <li>7. Call Air Conditioning service technician</li> </ol>
<b>Inadequate cooling.*</b> Caused by Insufficient water flow	<ol style="list-style-type: none"> <li>1. Water pump intake screen is clogged.</li> <li>2. Water level too low (operating below 2-1/2").</li> <li>3. Pump impeller clogged</li> <li>4. Loose connection in water system.</li> <li>5. Wrong Replacement Pump (too small).</li> <li>6. Distribution nozzles clogged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean/ Replace pump intake screen &amp; Clean Sump.</li> <li>2. Adjust/ Replace float.</li> <li>3. Clean debris from impeller &amp; Replace pump screen</li> <li>4. Check for leaks, tighten as needed.</li> <li>5. Install new Freus pump (must be thermal protected)</li> <li>6. Clean Nozzles</li> </ol>
<b>Inadequate cooling.*</b> - Insufficient air flow	<ol style="list-style-type: none"> <li>1. Intake Louver Screen clogged</li> <li>2. Inadequate condenser exhaust</li> <li>3. Condenser Fan Motor underperforming.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean Intake Screen</li> <li>2. Clear debris from condenser's exhaust fan.</li> <li>3. Check required motor rpm and replace motor.</li> </ol>
<b>Water draining from Freus™ cabinet.</b>	<ol style="list-style-type: none"> <li>1. Water level too high</li> <li>2. Drain Cap loose or worn</li> <li>3. Flush system siphoning</li> <li>4. Cabinet not level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust Float setting/ Replace Float.</li> <li>2. Tighten or replace drain cap.</li> <li>3. Check anti syphon plug/ tap line outlet above water</li> <li>4. Level unit with shims or adjust / replace mounting pad. ( Note: shims must be minimum 2" W x 3" L)</li> </ol>
<b>Excessive Scale Build Up</b> (see Freus Bulletin on Cleaning Excessive Mineral Build Up)	<ol style="list-style-type: none"> <li>1. Flush Intake Screen clogged</li> <li>2. Low flush-off water volume.</li> <li>3. Flush pump failure.</li> <li>4. Excessive Minerals in make up water.</li> <li>5. Make Up water from Water Softener</li> <li>6. Anode is used up</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean/ Replace flush intake screen &amp; clean sump</li> <li>2. Clean/ Replace flush pump and Clean/Replace hose</li> <li>3. Test/ Replace flush pump as needed.</li> <li>4. Add magnetic Water Treatment.</li> <li>5. Move Make Up Connection to non-softened water.</li> <li>6. Replace Anode</li> </ol>
<b>Musty or unpleasant odor.</b>	<ol style="list-style-type: none"> <li>1. Stale or stagnant water in reservoir.</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain, flush and clean reservoir. Check flush pump flow. Refer to Freus water treatment bulletin.</li> </ol>
<b>Water spray out top of unit</b>	<ol style="list-style-type: none"> <li>1. Soap in water basin</li> </ol>	<ol style="list-style-type: none"> <li>1. Flush or rinse out base until soap residue is removed.</li> </ol>

### NOTES:

\*Inadequate cooling listed above refers only to the Freus™ portion of the complete system. If cooling does not improve after checking the above listed items, consult the literature provided for your evaporator coil system and furnace/ air handler.

## LIMITED WARRANTY

Commercial Freus applications are limited to five (5) years on all parts. For residential applications the following extended time periods apply. All warranties are from proof of installation date or one year after manufacture date if installation date is unavailable. Repair or replacement under this warranty does not extend any warranty time from the original date.

All components carry a five (5) year warranty. Proof of purchase is required on all warranties. Any additional service or installation is between dealer and purchaser and not the responsibility of the manufacturer. No labor is paid by Freus after 31 days from installation. Freus™ does not pay freight from the nearest distributor, the cost of a service call at the

site of installation to diagnose cause of trouble, the cost of labor to install or remove a part (after 31 days), or mileage to or from the site.

If the warranty is registered within 15 days of installation there is a 5 year bonus warranty on the copper condenser coil and compressor for a total of up to ten (10) years on those parts, provided the annual service/ maintenance is performed (cleaning & anode replaced before it is 80% consumed). If within fifteen (15) years from installation any fiberglass part of the Freus™ cabinet should prove defective and non-serviceable in materials or workmanship, the part will be replaced or repaired at factory option.

Maintenance such as float replacement or adjustment, filter/ screen cleaning or replacement, anode

replacement, and standard part replacement, are not warrantable.

This warranty is in lieu of any other expressed or implied warranty and all other obligations on the part of Freus™. Freus™ does not authorize any other Person or entity to extend or alter any portion of this warranty in connection with the products. Third party 10 year all parts & labor warranty may be separately purchased (make claim with that third party warranty provider, if any).

This Freus warranty gives you specific legal rights and you may have other rights which vary from state to state.

### Manufacturer's Mailing Address:

**Freus, Inc.**  
**P.O. Box 1328**  
**Anthony, NM 88021**  
**www.Freus.com**

Place staple or tape here



Warranty Registration Department

**PO Box 1328**  
**Anthony, N.M. 88021**

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Fold Here Second

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Fold Here First

**Install Date** \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**Homeowner's Name** \_\_\_\_\_

**Homeowner's Address** \_\_\_\_\_

**Homeowner's Telephone #** (\_\_\_\_) \_\_\_\_ -- \_\_\_\_ **Freus Model #** \_\_\_\_\_

**Freus Serial #** \_\_\_\_\_ **Furnace/Air Handler Model #** \_\_\_\_\_

**Coil Manufacturer** \_\_\_\_\_ **Coil Model #** \_\_\_\_\_

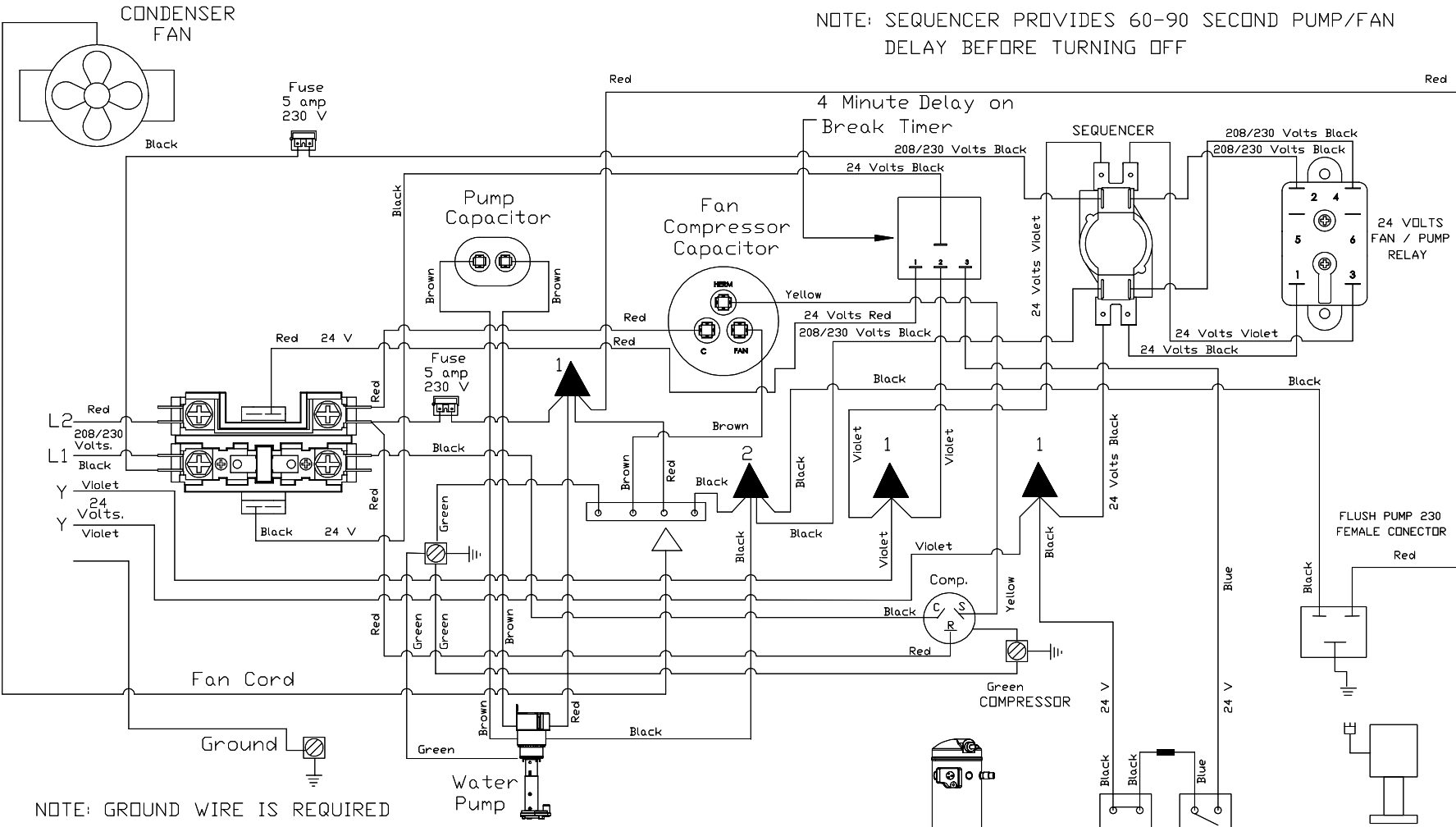
**Install Contractor Name** \_\_\_\_\_

**Address** \_\_\_\_\_

**Contractor Telephone #** (\_\_\_\_) \_\_\_\_ -- \_\_\_\_\_



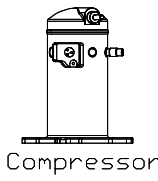
NOTE: SEQUENCER PROVIDES 60-90 SECOND PUMP/FAN DELAY BEFORE TURNING OFF



NOTE: GROUND WIRE IS REQUIRED

- 1 ▲ 19WIRENUTYE
- 2 ▲ 19WIRENUTRD

FREUS 204 ELECTRICAL DIAGRAM 1 COMPRESSOR  
208 / 230 VOLTS 1 PHASE

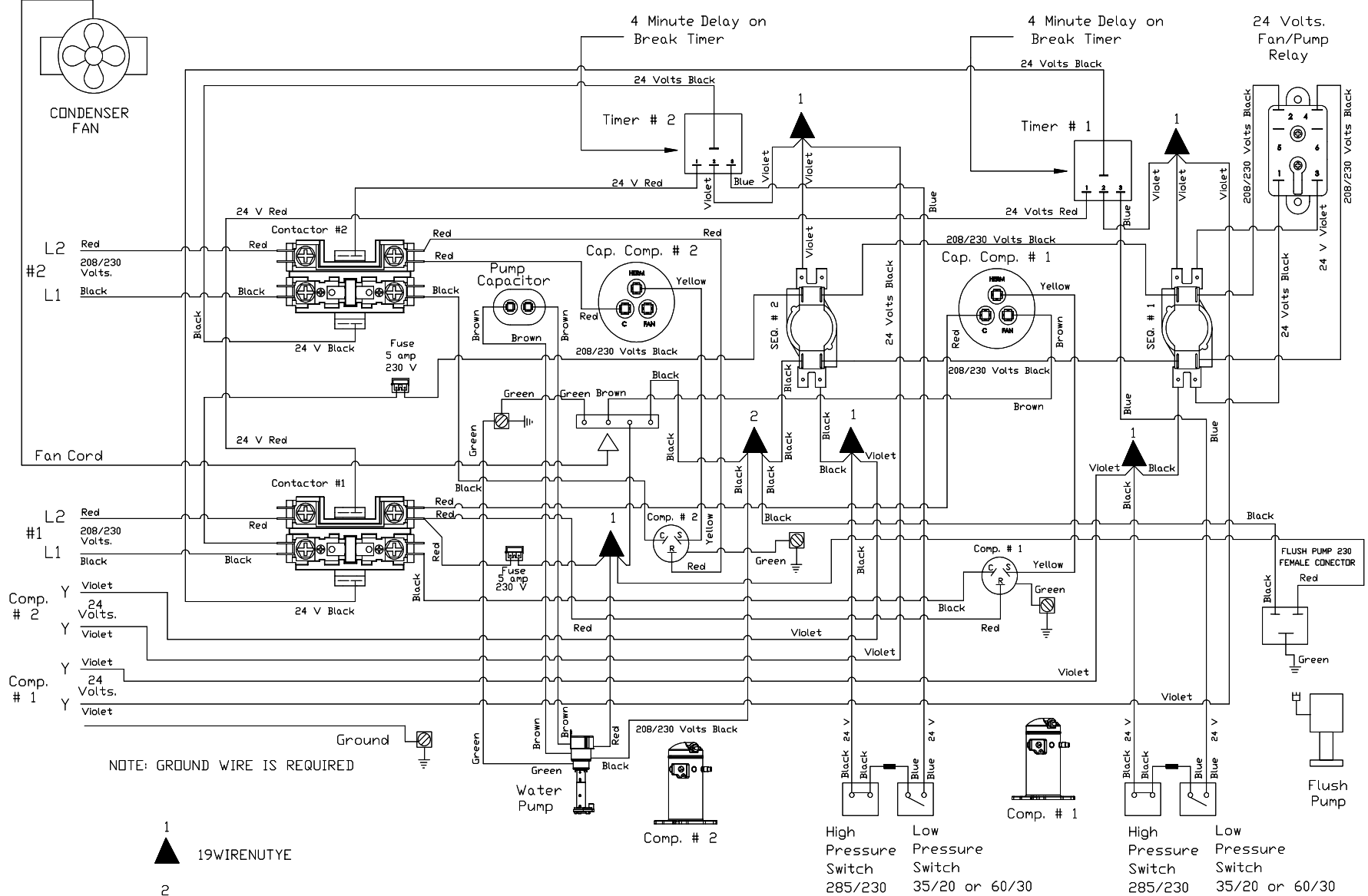


Compressor

High Pressure Switch 285/230  
Low Pressure Switch 35/20 or 60/30

FREUS / QAI / DIC/10/2003  
D1

NOTE: SEQUENCER PROVIDES 60-90 SECOND PUMP/FAN  
DELAY BEFORE TURNING OFF



NOTE: GROUND WIRE IS REQUIRED

- 1 ▲ 19WIRENUTYE
- 2 ▲ 19WIRENUTRD

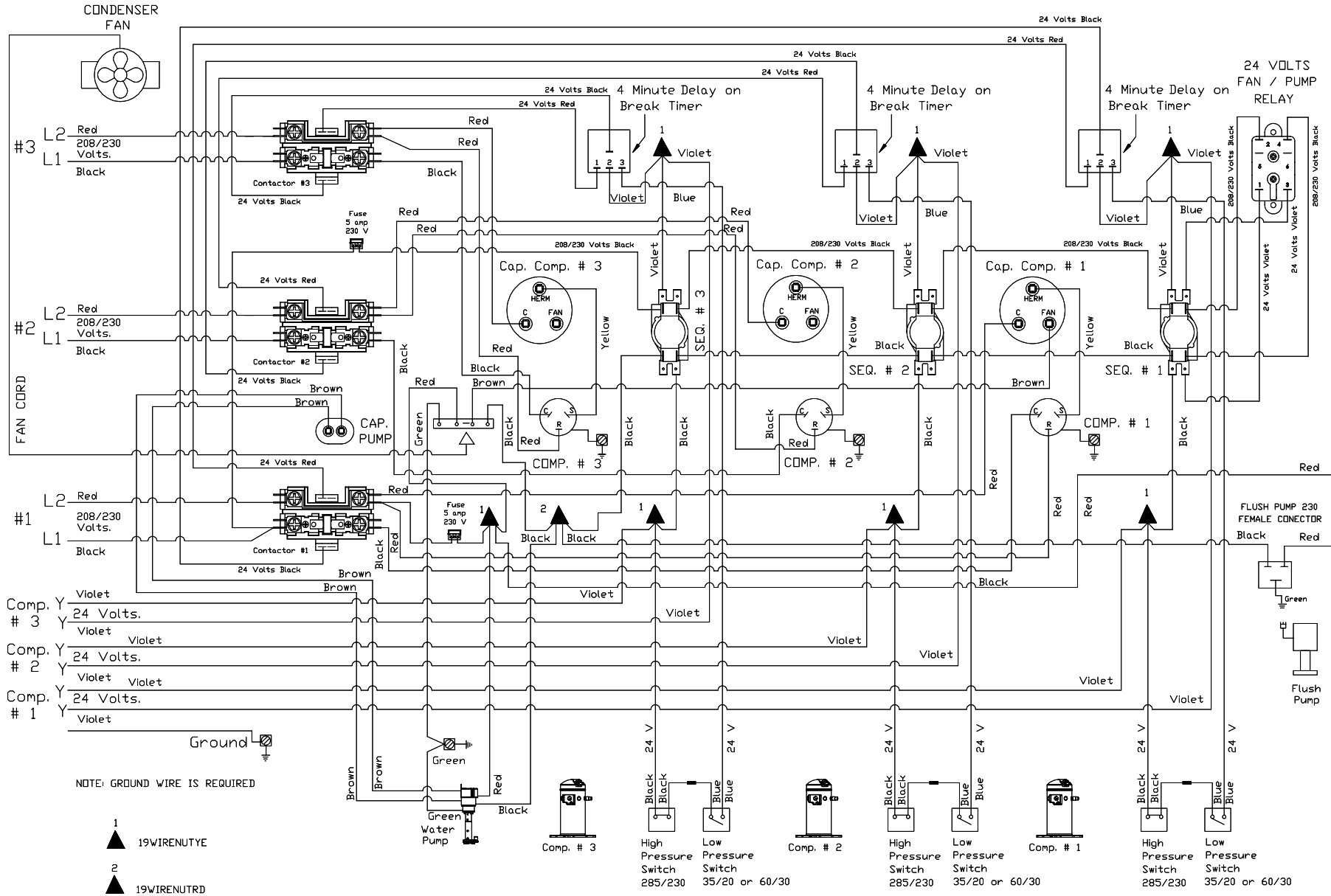
FREUS 204 ELECTRICAL DIAGRAM 2 COMPRESSOR  
208 / 230 VOLTS 1 PHASE

High Pressure Switch	285/230	Low Pressure Switch	35/20 or 60/30	High Pressure Switch	285/230	Low Pressure Switch	35/20 or 60/30
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FREUS / QAI / DIC/10/2003  
D2

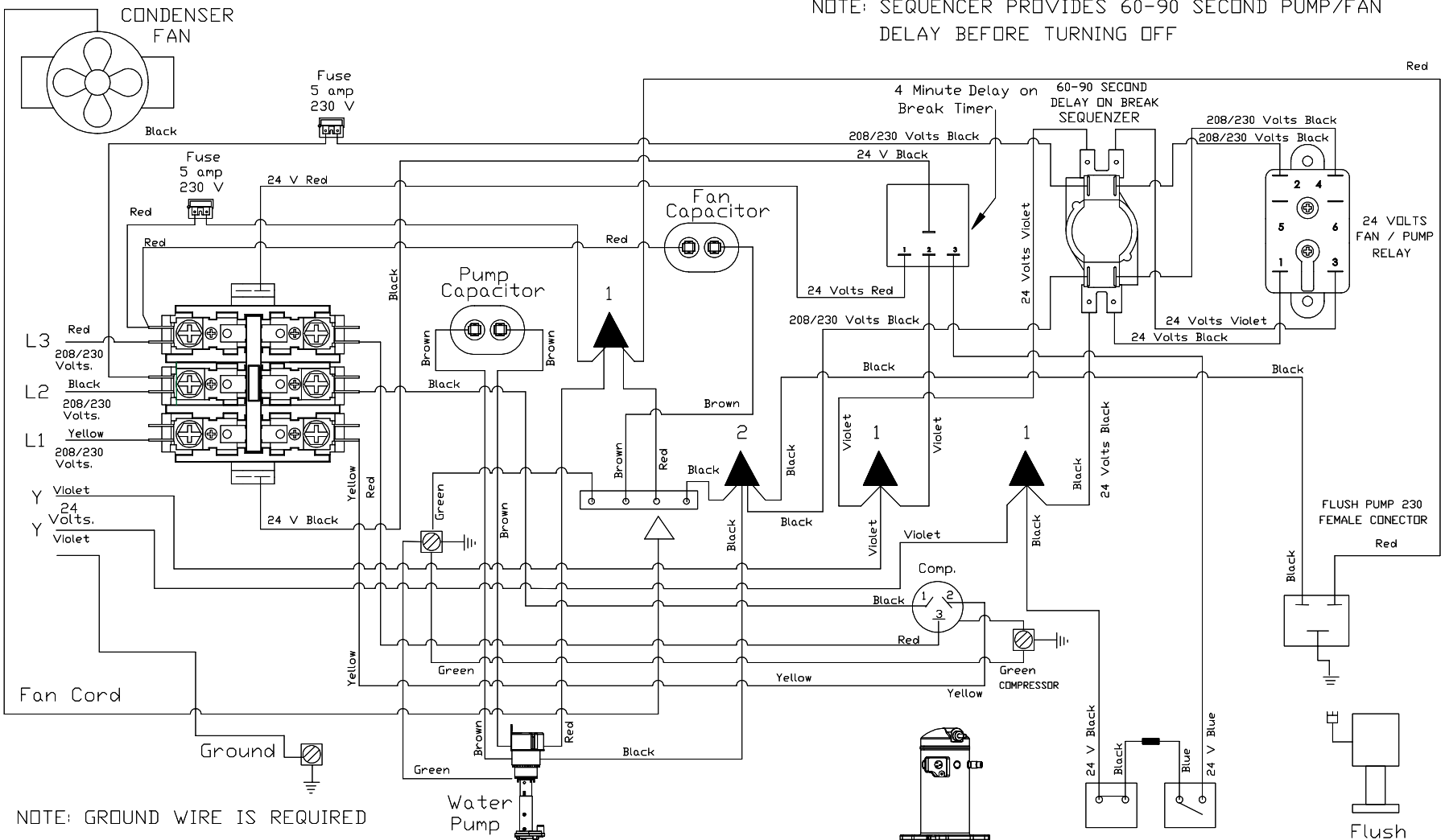


NOTE: SEQUENCER PROVIDES 60-90 SECOND PUMP/FAN  
DELAY BEFORE TURNING OFF



FREUS 04 ELECTRICAL DIAGRAM 3 COMPRESSOR  
208 / 230 VOLTS 1 PHASE

NOTE: SEQUENCER PROVIDES 60-90 SECOND PUMP/FAN DELAY BEFORE TURNING OFF



NOTE: GROUND WIRE IS REQUIRED

- 1 ▲ 19WIRENUTYE
- 2 ▲ 19WIRENUTRD

FREUS 2004 ELECTRICAL DIAGRAM 1 COMPRESSOR  
208/230 VOLTS 3 PHASE

High Pressure Switch 285/230  
Low Pressure Switch 35/20 or 60/30

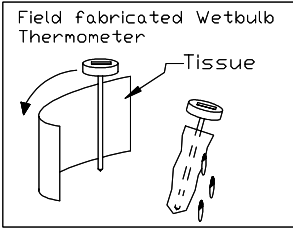
NOTE: COMPRESS ROTATION MUST BE CHECKED AT STARTUP (SWITCH L2 Y L3 TO REVERSE ROTATION).

FREUS / QAI / DIC/10/2003  
D4

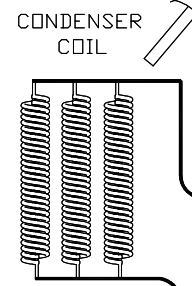
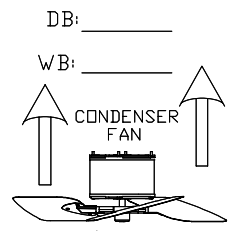


# ORIFICE-SUPERHEAT CHARGING

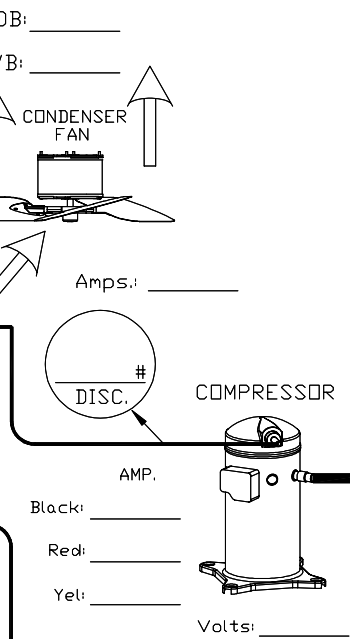
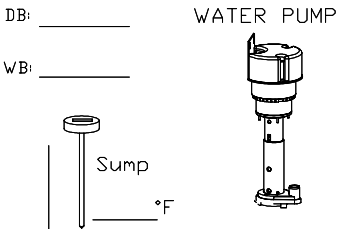
Site Address	City	State	Phone	Zip	Date
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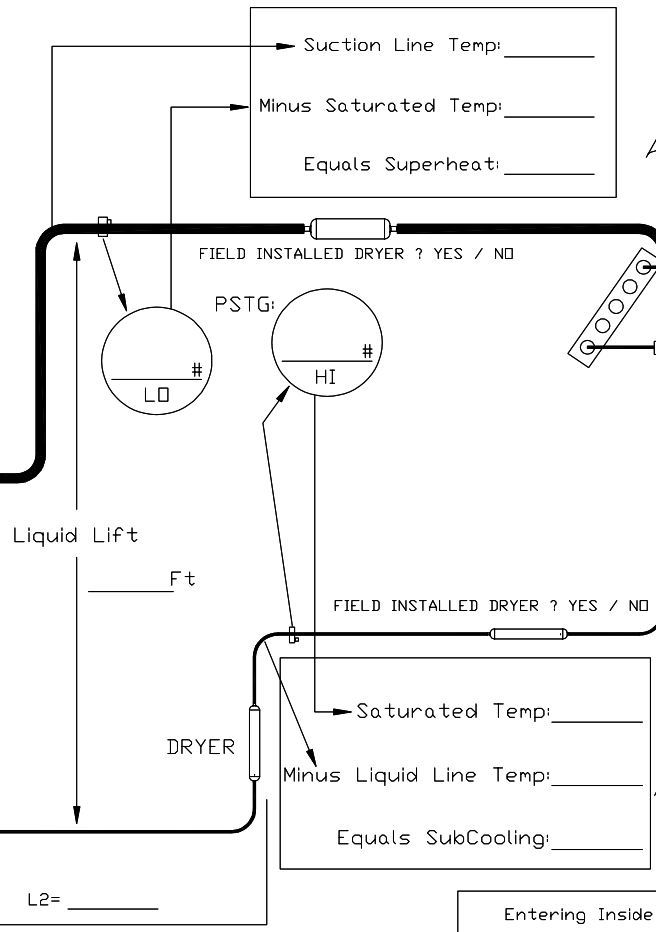
Notes:  
Wet Bulb can be measured with a sling Psychrometer or "Wetbulb Thermometer" These devices must be placed in a moving air stream in order to stimulate evaporation



Entering Outside Temperature



NOTE: CHARGE WITH ONLY ONE SYSTEM OPERATING ON MULTISYSTEMS UNITS



**SUPERHEAT**

Suction Line Temp: \_\_\_\_\_

Minus Saturated Temp: \_\_\_\_\_

Equals Superheat: \_\_\_\_\_

Leaving Inside Temperature

DB: \_\_\_\_\_

WB: \_\_\_\_\_

Tons	Orifice Size
1.5 Ton.	.055
2 Ton.	.063
2.5 Ton.	.072
3 Ton.	.078
3.5 Ton.	.084
4 Ton.	.092
5 Ton.	.102
6 Ton.	.109

Saturated Temp: \_\_\_\_\_

Minus Liquid Line Temp: \_\_\_\_\_

Equals SubCooling: \_\_\_\_\_

Volts: \_\_\_\_\_

Amps: \_\_\_\_\_

Total Return Grille Surface Area (sq. Inc.) \_\_\_\_\_

Entering Inside Temperature

DB: \_\_\_\_\_

WB: \_\_\_\_\_

Air Volume Indications

TD < 15 - High CFM

TD > 20 - Low CFM

Check Air Filter

Model #: \_\_\_\_\_ Serial #: \_\_\_\_\_

Coil Model #: \_\_\_\_\_ Furnace Model #: \_\_\_\_\_

Superheat Table I Type II

Ambient Condenser Inlet Temp. °F Wet Bulb	Indoor Return Air Temp. °F DRY				
	65	70	75	80	85
85	-	2	5	10	12
80	1	3	7	12	15
75	2	4	7	14	18
70	3	5	10	17	20
65	4	5	12	21	26
60	5	10	17	25	29

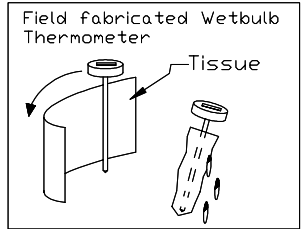
Notes:

1. if you have a fixed orifice or capillary tube evaporator coil, you MUST use the Superheat charging table.
2. Performance is optimized by using the correct orifice size shown in this chart and charging by the superheat Table.
3. Within normal operating ranges, an increased orifice size will lower subcooling and may require a reduction in refrigerant charge in order to obtain the recommended superheat
4. Charging by sight glass in a system that uses a fixed orifice will not work ! bubbles may appear under normal operating conditions in a fixed orifice system.

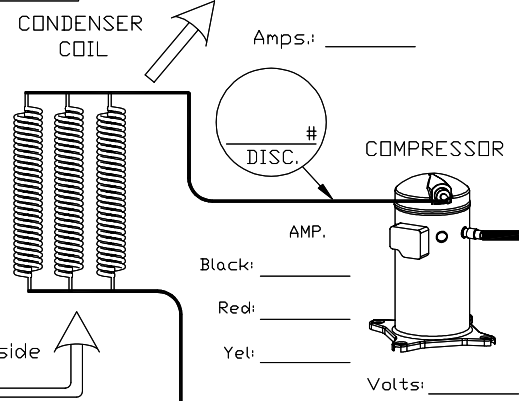
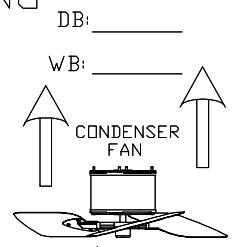
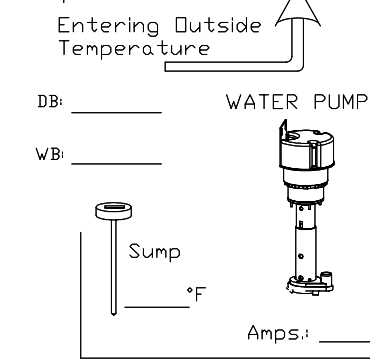
Phone #: \_\_\_\_\_ Company: \_\_\_\_\_ Technician Name: \_\_\_\_\_

# TXV-SUBCOOL OR SIGHT GLASS CHARGING

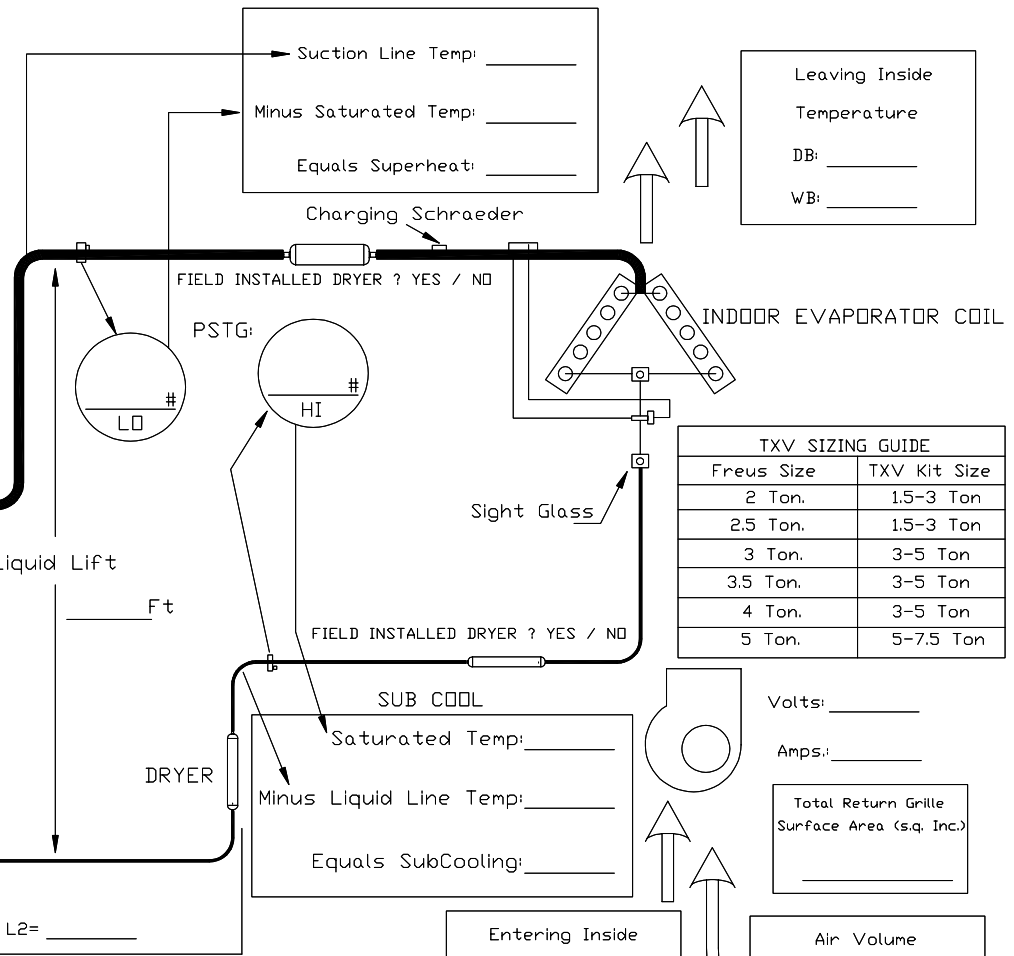
Site Address	City	State	Phone	Zip	Date
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Notes:  
Wet Bulb can be measured with a sling Psychrometer or "Wetbulb Thermometer". These devices must be placed in a moving air stream in order to stimulate evaporation.



NOTE: CHARGE WITH ONLY ONE SYSTEM OPERATING ON MULTISYSTEMS UNITS



Freus Size	TXV Kit Size
2 Ton.	1.5-3 Ton
2.5 Ton.	1.5-3 Ton
3 Ton.	3-5 Ton
3.5 Ton.	3-5 Ton
4 Ton.	3-5 Ton
5 Ton.	5-7.5 Ton

Liquid Line Vertical Lift (Ft)	Line Length 0'-25'	Line Length 26'-50'	Line Length 51'-74'
	*F Sub Cooling		
0-10	6	6	6
11-22	6	8	10
23-39	8	11	13
40-50	NA	13	15

Notes:  
1. TXV systems may be charged either by the subcooling table or by the Sight Glass method.  
2. If charging by sight glass, the glass MUST be installed near the evaporator coil, if the line is longer than 25' or has more than 5' of lift.  
3. Charging by sight glass add or recover charge until the sight glass has just barely cleared of bubbles. The system must be charged enough to clear the glass of bubbles, but over charging will raise the condensing pressure (after the bubbles have cleared) and lower efficiency. In general, adding charge to raise the condensing pressure (high side) by five pounds after clearing the sight glass allows a good buffer for changing temperature conditions.

Model #:	Serial #:
Coil Model #:	Furnace Model #:

Phone #: \_\_\_\_\_ Company: \_\_\_\_\_ Technician Name: \_\_\_\_\_