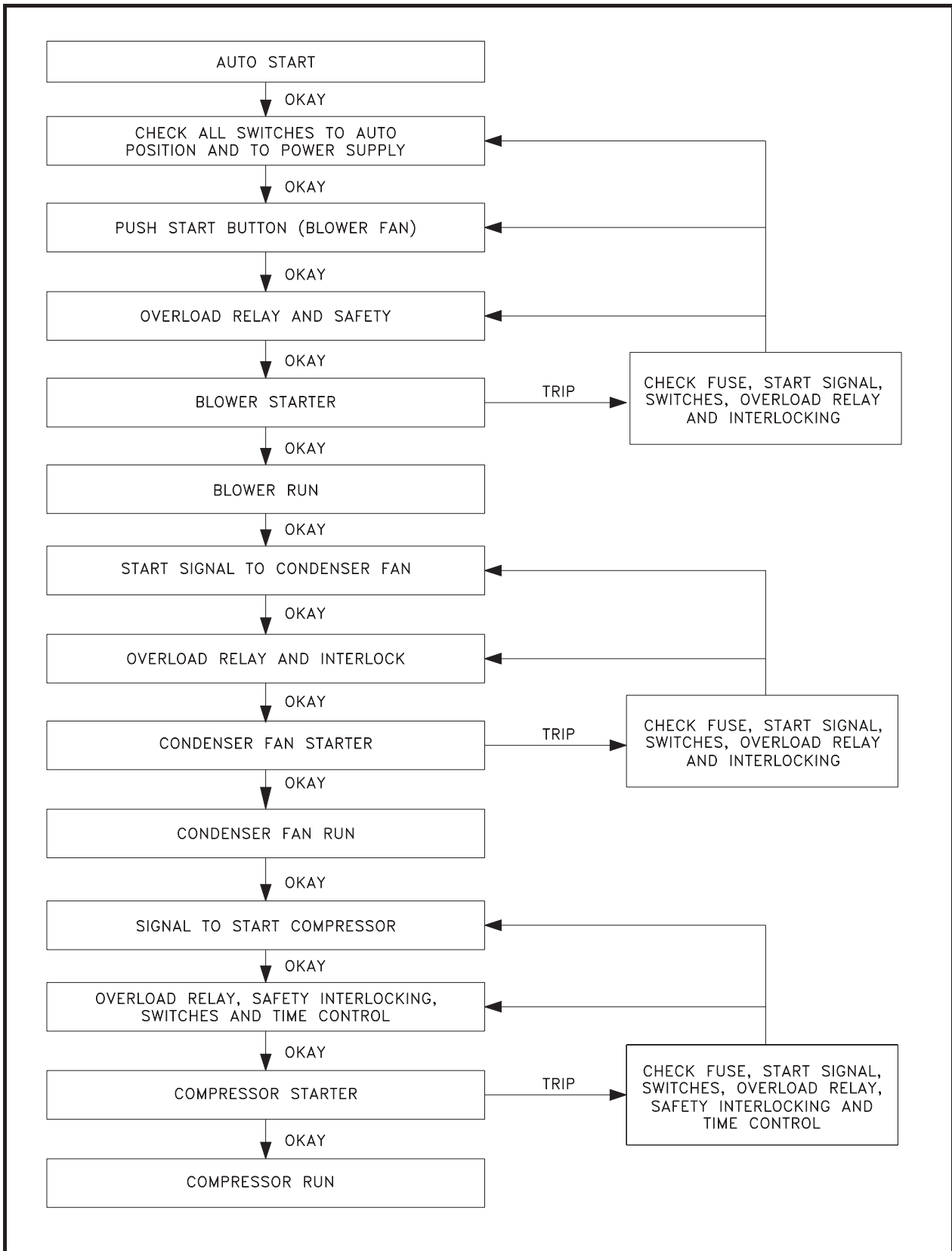


4.0 OPERATION

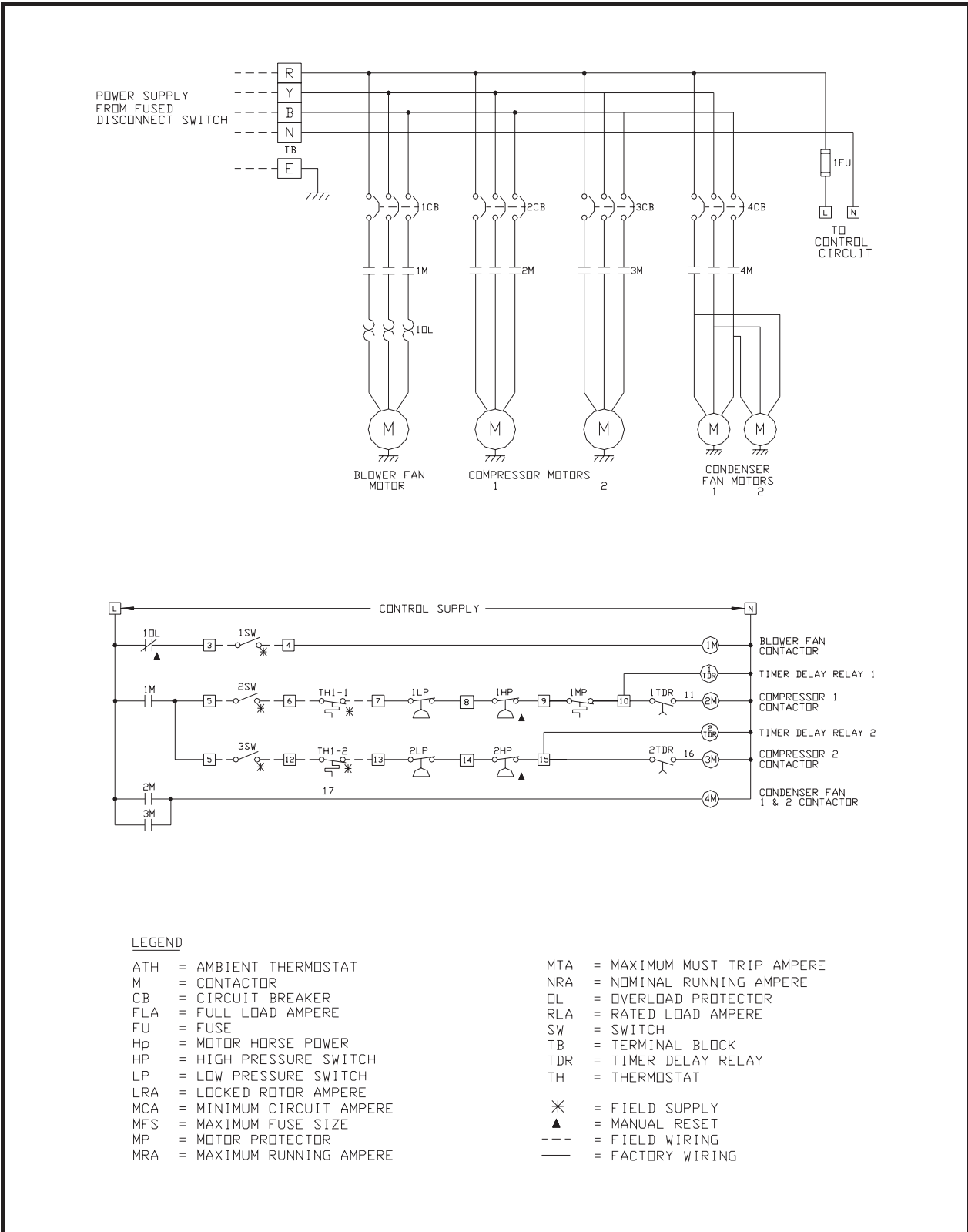
4.1 TYPICAL OPERATING SEQUENCE



4.0 OPERATION

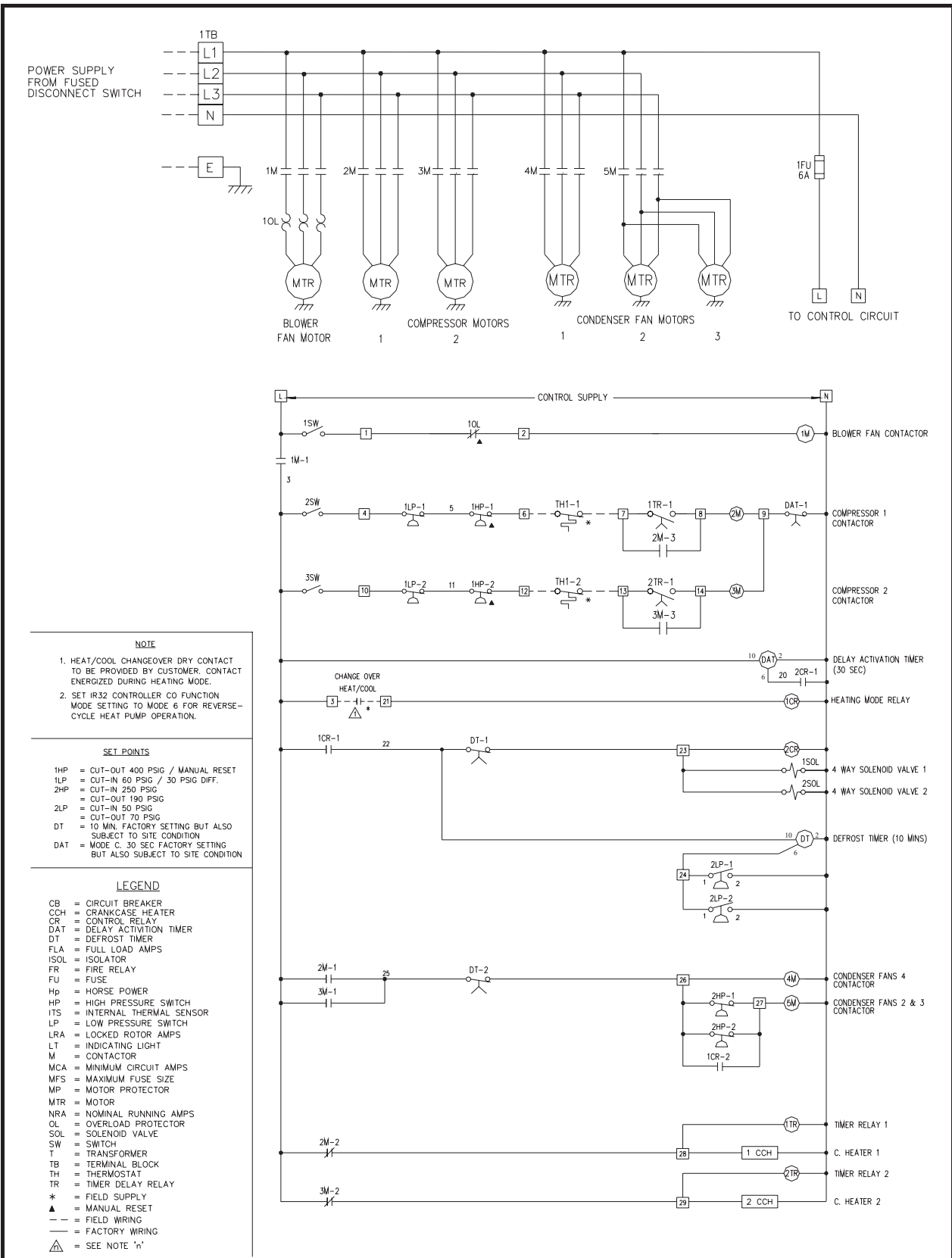
4.2 TYPICAL WIRING SCHEMATIC

A.) COOLING ONLY



4.0 OPERATION

B.) HEAT PUMP



4.0 OPERATION

4.3 PHASE ROTATION

If during initial start up the compressor does not build up pressure, noise is abnormally loud and power consumption is minimal, then there is a possibility that the unit is operating at reverse rotation. Shut down the power and connect phase to the proper terminals.

4.4 CYCLE LIMIT RATE

Each compressor must not be cycle on-off for more than 12 times per hour. The higher number of starts per hour will reduce the life of the compressor. Thus, it is suggested that anti short cycle timer is provided in the system.

4.5 FAN CYCLING (HEAT PUMP)

During cooling only, the head pressure control would allow the unit to operate at lower ambient temperature by building up the discharge pressure through cycling of fans (for single fan unit, this is achievable by reducing the fan speed). If there is demand for cooling, the unit would run on cooling until the manual change over is set to heating. Please observe the lowest ambient for cooling mode.

4.6 DEFROST CYCLE (HEAT PUMP)

During heating, a defrost controller would initiate the defrost cycle once there is demand for it. The sensor from the controller would sense the suction pressure and if the pressure is lower than the preset value, then a signal would be sent to the control panel which then relay the signal to the reversing valve to reverse the cycle. Now, the outdoor coil would be discharging hot air and defrosting the ice on the fins surface. The standard factory set timer for the defrost cycle is 10 minutes which could be adjusted according to the site condition.

4.7 CRANKCASE HEATER (HEAT PUMP)

Refrigerant tend to migrate to colder section of the unit. During winter, the compressor compartment is at lower temperature than the evaporator and thus refrigerant tend to accumulate in the compressor compartment. Connect power source to the unit at minimum 12 hours prior to compressor start up so that the refrigerant would be forced out of the compressor compartment. It is good practice to let the crankcase heater to be energized continuously, independent of compressor operation.

4.8 STOP VALVE

Inspect all stop valves prior to start up. They shall be in open position.

4.9 HYDROPHILIC CONDENSER COIL (STANDARD FOR HEAT PUMP)

Hydrophilic fins assist condensation to be removed faster and therefore reduce the possibility of icing on the condenser coil.

5.0 MAINTENANCE

i.) Relubrication Schedule

Relubrication Schedule in Month *							
Bore (mm) RPM	25 and below	From 26 to 35	From 36 to 45	From 46 to 55	From 56 to 65	From 66 to 75	From 76 to 85
750	24	18	12	12	8	8	8
1000	18	12	12	8	8	6	6
1250	18	12	8	8	6	6	6
1500	12	8	8	6	6	4	4
1750	12	8	6	6	4	4	2
2000	12	8	6	4	4	2	2
2250	8	6	6	4	2	2	2
2500	8	6	4	4	2	2	2
2750	8	6	4	4	2	2	2
3000	6	4	4	4	2	2	2
3250	6	4	4	4	2	2	2
3500	6	4	4	2	2	2	2
3750	6	4	4	2	2	2	2
4000	6	4	4	2	2	2	1

Note: Suggested greasing interval is based on 12 hour per day operation. For continuous (24hour) operation, decrease greasing interval by 50%.

ii.) Amount of recommended grease for ball bearing unit. (Recommended grease: Shell Alvania RL2, GOLD No. 3 or equivalent).

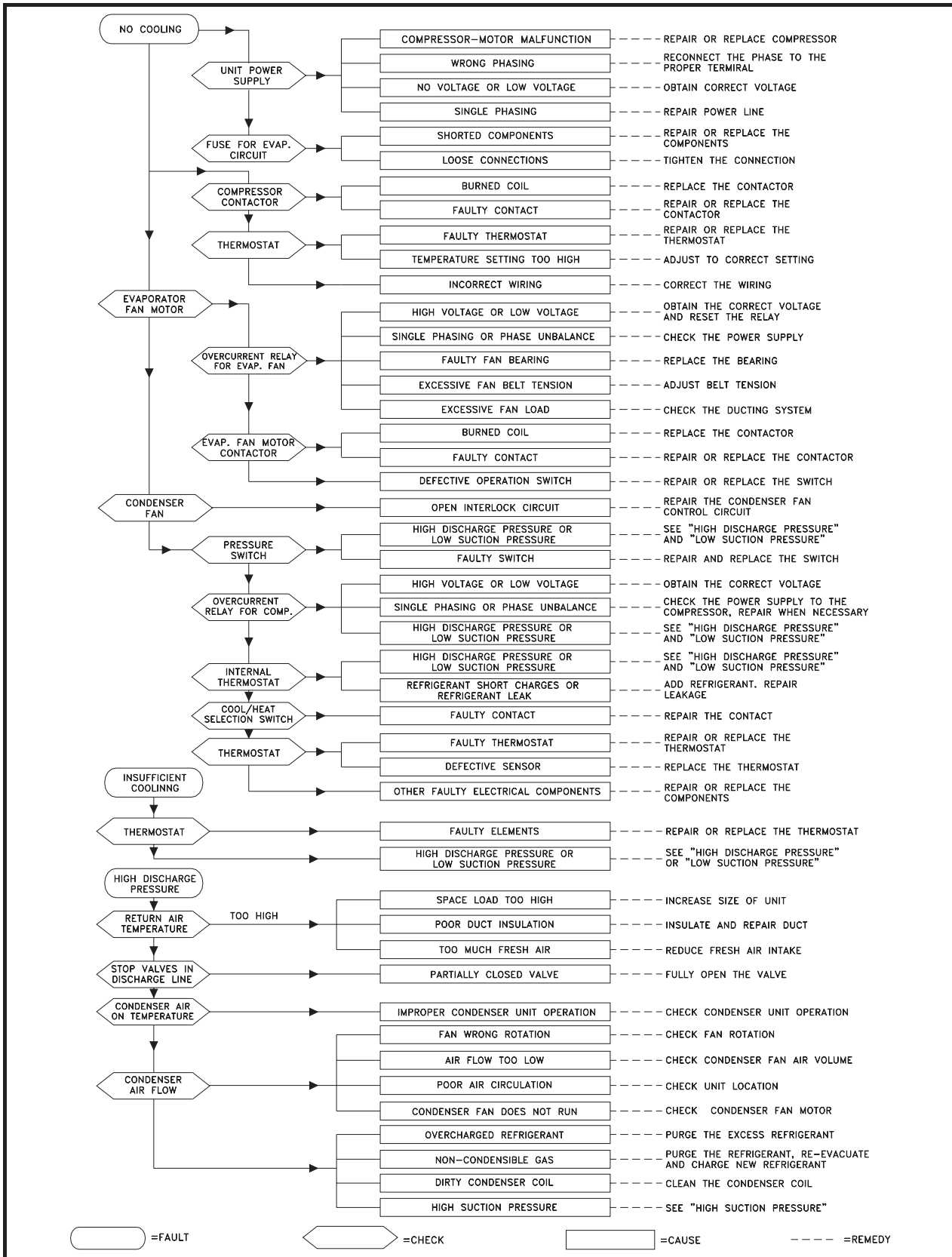
Bore Dia Code (Refer to the code casted on the bearing housing)	Grease Amount (g)
206	3.3
207	4.5
208	5.6
209	6.5
210	7.7
211	10.3
212	13.2
213	14.9
214	18.2
215	21.0
216	25.0
217	31.0
218	38.0

CAUTION: DO NOT exceed the initial greasing amount. Excessive and inadequate greasing may cause failure.

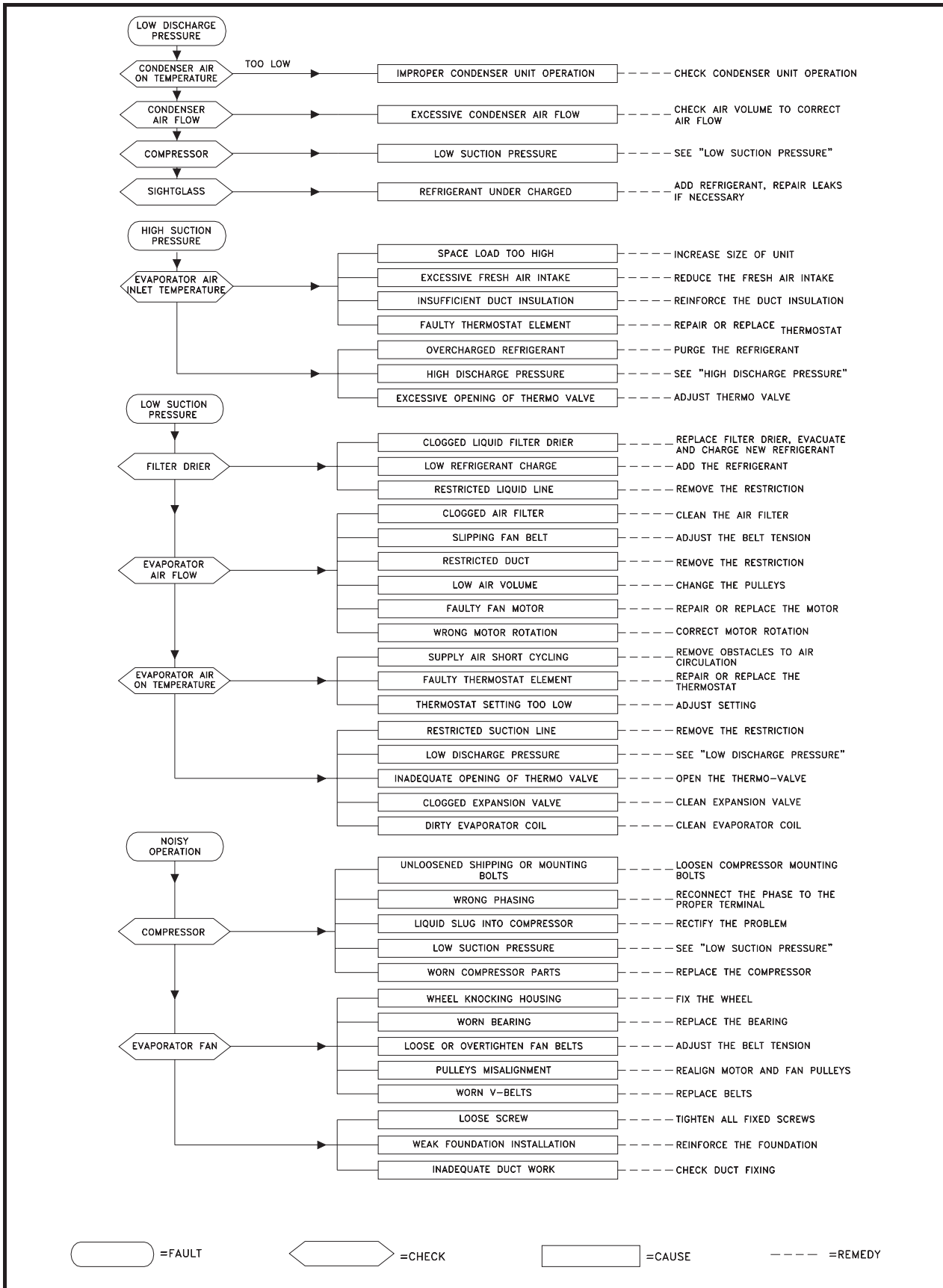
Note: The bearing should be relubricated while they are rotating and pumped in slowly until a slight bead forms around the seals.

5.0 MAINTENANCE

5.10 TROUBLE SHOOTING CHART



5.0 MAINTENANCE



5.0 MAINTENANCE

5.11 SAMPLE LOG SHEET

SHEET NO.....

American Pro® AIR COOLED PACKAGE UNIT

UNIT MODEL NO. UNIT NO. VOLTS: Hz.....

UNIT SERIAL NO.

START UP : DATE TIME.....

DATE									
TIME									
COMPRESSOR NO.									
SUCTION PRESSURE	1.								
	2.								
	3.								
	4.								
SUCTION TEMPERATURE	1.								
	2.								
	3.								
	4.								
DISCHARGE PRESSURE	1.								
	2.								
	3.								
	4.								
DISCHARGE TEMPERATURE	1.								
	2.								
	3.								
	4.								
DISCHARGE SUPERHEAT (SAT. DISCH.- DISCH. TEMP.)	1.								
	2.								
	3.								
	4.								
SUCTION SUPERHEAT (SAT. SUCT.- SUCT TEMP.)	1.								
	2.								
	3.								
	4.								
RETURN AIR TEMPERATURE- DB/WB									
SUPPLY AIR TEMPERATURE - DB/WB									
AIR VOLUME									
AMBIENT AIR TEMPERATURE									
OFF CONDENSER AIR TEMPERATURE									
COMPRESSOR AMPS	1.								
	2.								
	3.								
	4.								
CONDENSER FAN AMPS									
EVAPORATOR FAN AMPS									
VOLTS									

This log sheet is provided as a recommendation of the readings that should be taken on a periodic basis. The actual readings taken and the frequency will depend upon the units application, hours of use, etc. This type of information can prove very useful in preventing and/ or solving problems that might occur during the life of the unit.

5.0 MAINTENANCE

5.12 American Pro® STARTUP REPORT

AIR COOLED CONDENSING UNITS & PACKAGED UNITS

SITE INFORMATION

Job Name _____ Installing Contractor _____
 Address _____
 Unit No. _____ Unit Location _____ Area Served _____

NAMEPLATE DATA

Unit Details

	<u>Model</u>	<u>Serial No.</u>	<u>Factory Order</u>
Indoor or Packaged Unit	_____	_____	_____
Outdoor Unit (<i>Remote Condenser</i>)	_____	_____	_____

Blower Motor

Model _____ Serial No. _____ Manufacturer _____
 Volt _____ Phase _____ Hz _____ FLA _____ LRA _____
 RPM _____ kW/HP _____ Type _____

Compressors

	<u>Compressor 1</u>	<u>Compressor 2</u>	<u>Compressor 3</u>
Model	_____	_____	_____
Serial No.	_____	_____	_____
V / Ph / Hz	_____ / _____ / _____	_____ / _____ / _____	_____ / _____ / _____
FLA / LRA	_____ / _____	_____ / _____	_____ / _____

Condenser Fans (Air Cooled & Remote Condenser)

	<u>Model</u>	<u>Serial No.</u>	<u>General</u>
1)	_____	_____	Volt _____
2)	_____	_____	Phase _____
3)	_____	_____	Hz _____
4)	_____	_____	FLA _____
5)	_____	_____	LRA _____
6)	_____	_____	HP/kW _____

BLOWER & COIL

Blower Section

Blower Model _____ Size _____ Fan Belt Model _____
 Blower Pulley Model _____ Size _____ Fan Belt Size _____
 Motor Pulley Model _____ Size _____ Quantity _____

Coil Section

Coil Material Aluminium Copper Hydrophilic

Coil Arrangement FPI _____ Length _____ Height _____ # Rows _____

Filter Type _____ Filter Size 1) _____ X _____ # Filters _____
 2) _____ X _____ # Filters _____
 3) _____ X _____ # Filters _____

5.0 MAINTENANCE

5.14 OPERATING PARAMETERS

Job Name _____ Unit Model _____ Date _____

Job Location _____ Unit Serial No. _____ F/O _____

			Actual	Controller Setpoint	-
GENERAL	Room Temperature °C				-
	Evaporator	On Coil	(Dry Bulb) °C	-	-
			(Wet Bulb) °C	-	-
	Off Coil	On Coil	(Dry Bulb) °C	-	-
			(Wet Bulb) °C	-	-

			System 1	System 2	System 3	
SYSTEM	Pressure	Suction Pressure bar				
		Discharge Pressure bar				
		Liquid Pressure bar				
	Temp	Suction Temp °C				
		Discharge Temperature °C				
		Liquid Temperature °C				
	SSH	Suction Superheat °C				
		Discharge Superheat °C				
		Subcooling °C				
	Condenser	On Coil	(Dry Bulb) °C			
			(Wet Bulb) °C			
		Off Coil	(Dry Bulb) °C			
(Wet Bulb) °C						

ELECTRICAL	Amperage	Blower Fan A			-		-	
		Compressors A	System 1		System 2		System 3	
		Condenser Fans A	1	2	3	4	5	6
	Voltage	L1~L2 V						
		L1~L3 V						
		L2~L3 V						

REMARKS

DETAILS OF STARTUP ENGINEER

CUSTOMER ACCEPTANCE OF STARTUP

Signature _____

Signature _____

Name/Title _____

Name/Title _____

Company _____

Company _____

Address _____

Address _____

Contact No. _____

Contact No. _____