

GREE Heat Pump System Analyzer

All applicable fields must be completed



Customer / Location Name : _____ Job Address: _____
 Dealer: _____ Date: _____
 Technician's Name: _____ Installation date: _____

MODEL INFO	Model #	Serial #	ELECTRICAL INFO
Furnace or Fan coil:			Control Voltage: _____ Vac
Outdoor Unit:			Supply Voltage: _____ Vac Φ _____
Air Cleaner:			3 Phase (Φ) Voltages: T1→T2 _____ Vac
UV Lights:			T1→T3 _____ Vac T2→T3 _____ Vac
Thermostat:			
Electronic Air Cleaner:			
Other:			
Humidifier:			

COMPRESSOR DATA	OUTDOOR
Comp. Start Voltage: _____ Vac	Air Temp Entering Outdoor Coil: _____ °F
Comp. Run Amps: U _____ V _____ W _____	Air Temp Leaving Outdoor Coil: _____ °F
Locked Rotor Amps: _____ amps U→V= _____ Ω	Outdoor Fan Amps: _____ amps
Refrigerant Pressures	Htg. Metering Device: _____ txv _____ piston # _____
Equal? _____ yes _____ no U→W= _____	Line Set Length: _____ ft
Run Cap: _____ μF (1Φ only) W→V= _____	Line Set Size: Suc _____ in, Liq _____ in
Hard Start Kit Used? _____ yes _____ no	

REFRIGERANT PROPERTIES	
A. Vapor Line Temp. _____ @ Indoor Coil at Service Valve: _____ °F	SuperHeat _____ °F (A - B)
B. Vapor Pressure at Service Valve: _____ psig _____ °F	
C. Liquid Line Temp. at Service Valve: _____ °F	Sub-Cooling _____ °F (C - D)
D. Liquid Pressure at Service Valve: _____ psig _____ °F	

INDOOR PROPERTIES
Air Temp Entering Indoor Coil: _____ °FDB _____ °FWB
Air Temp Leaving indoor Coil: _____ °FDB _____ °FWB
Airflow: _____ cfm
Supply Static *: _____ W.C. (Used with Total External Static Method)
Return Static *: _____ W.C. (Used with Total External Static Method)
Clg. Metering Device: _____ txv _____ piston # _____
Htg. Blower Speed Tap: _____ Clg. Blower Speed Tap: _____
Blower Amps: Hi Cool _____ amps Lo Cool _____ amps Heat _____ amps
Filter Type: _____
Dip Switch Settings: __ (1) __ (2) __ (3) __ (4) __ (5) __ (6) __ (7) __ (8)
Defrost Time Interval: _____ min Easy Select board connections _____

AIRFLOW
<u>Electric Heat Temp Rise CFM Method</u>
Volts = _____ Amps = _____
Ret. Air Temp. _____ °F Sup. Air Temp. † _____ °F
cfm = _____

<u>Electric Heat Temp Rise Method</u>
cfm = $\frac{(\text{Volts})(\text{Amps})(3.413)}{1.08(\Delta T)}$

<u>Total External Static Method *</u>
Ret. Static + Sup. Static = Total External Static
Use the Total External Static in conjunction with the Blower Performance data in the Product Specification Sheets

NOTE: 350-400 CFM PER TON
SYSTEM CAPACITY (Cal. On page 2)

Htg. Capacity (HP): _____ btuh
Clg. Capacity (AC/HP): _____ btuh
<u>Htg. System Capacity Method</u>
btu's = (cfm)(1.08)(ΔT)
btu's = _____

For split systems, is the indoor unit application - Horizontal Vertical

Any traps in the refrigerant line? Yes No If yes, where? Inverted or Std.? _____

Suction Drier Installed? Yes No If yes, for how long? _____ What is the temperature drop across it? _____

Liquid Drier Installed? Yes No If yes, what is the temperature drop across it? _____

Liquid line solenoid valve installed? Yes No

Are the refrigerant lines buried? Yes No If yes, how far? _____

HEAT PUMP JOBSITE SHEET

REMEMBER:

1. Circle Metering device used.
2. Circle Yes or No at drier locations.
3. Sat. Temp. is pressure converted to Temp.

Formula For Super Heat

Vapor Line Temp.

Minus Sat Temp.

Equals Super Heat

Formula For Sub Cooling

Sat Temp.

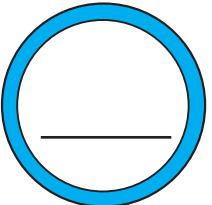
Minus Liquid Line Temp.

Equals Sub Cooling

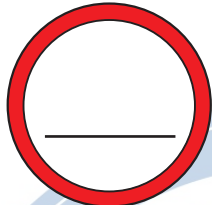
Circle One

Heat Mode

Cool Mode



Low side PSIG



High side PSIG

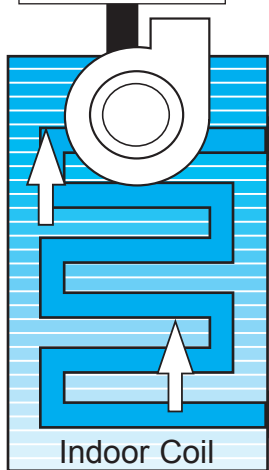
Saturation Temp.

Saturation Temp.

Inside Temp. Leaving

DB: _____

WB: _____



DB: _____

WB: _____

Circle one: Upflow - Downflow - Horizontal

Suction Line Temp.

VAPOR LINE

Liquid Line Temp.

Liquid Line Temp.

LIQUID LINE

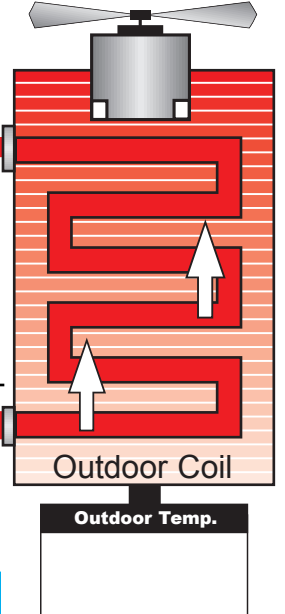
Metering Device

TXV or Piston
Piston size _____

Drier
Yes or No

Metering Device

TXV or Piston size _____



Outdoor Temp.

Reversing Valve

Discharge Line Temp.

VOLTS:

AMPS:

U: _____

V: _____

W: _____

Compressor

Accumulator

1. Liquid Line Size: _____
2. Liquid Line Length Vertical/Horizontal: _____
3. Vapor Line Size: _____
4. Vapor Line Length: Vertical/Horizontal: _____
5. Vertical Separation Below/Above: _____
6. Air Handler CFM: _____ Method Used for CFM: _____
7. Dipswitch Setting: _____

NOTE: An outdoor ambient temperature between 40°F and 50°F for heat mode and above 70°F for cool mode is recommended for completion of this sheet.

⊕ **MAKE SYSTEM OPERATIONAL CHECK**

Allow system to stabilize for 30 minutes after startup. If system is in pulldown with extreme conditions it may not stabilize for several hours.

Measure, then record the following temperature and pressure readings in Table 4 on lines A thru T. Use system drawing below as reference for temperature/pressure reading points.

Determine possible system problem by comparing actual readings with typical readings found in Table 4. Apply them in the Quick System Analysis chart found on page 4 to further identify possible system problem.

□ **SUPERHEAT**

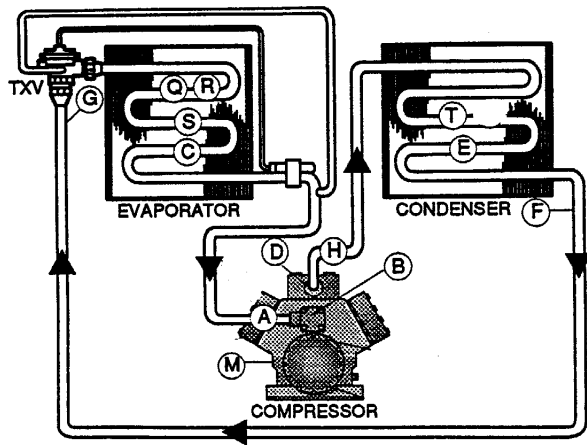
Ⓐ Ⓑ Ⓒ

Compute the superheat by determining saturated suction temperature from Temperature-Pressure Chart on Page 2, and subtracting from actual suction line temperature.

□ **SUBCOOLING**

Ⓓ Ⓔ Ⓕ

Compute subcooling by subtracting liquid temperature entering TXV from saturated condensing temperature determined from Temperature-Pressure Chart on Page 4. Subcooling is listed on unit rating plate.



Refer to compressor operating temperature guidelines in Table 3 to determine possible problems.

□ **COMPRESSION RATIO**

Ⓟ Calculate the compression ratio by dividing absolute discharge pressure by absolute suction pressure.

Example: $260 \text{ psig} + 14.7 = \underline{274.7}$
 $70 \text{ psig} + 14.7 = \underline{84.7}$ = 3.24 to 1

□ **CAPACITY** (See Table 3)

Ⓠ Ⓡ Ⓢ

□ Measure DB and WB temperatures entering and leaving evaporator and DB temperatures entering and leaving condenser. Record values in Table 3.

□ Use psychrometric chart to determine evaporator ΔH (Btu/lb).

□ For condensing unit capacity look up the condenser CFM in the presale literature. Subtract the heat of compression of 25-30% for reciprocating and 20-25% for scroll compressors.

Ex: $\text{BTUH} = 1.10 \times \text{CFM} \times \Delta T \times .75$

□ Use formulas in Table 3 to calculate approximate evaporator and condenser capacities. Compare them to rated values. NOTE: Refer to GTA-3A "Air Properties & Measurement" for more information.

Ⓣ Ⓢ - Capacity Quick Check

□ Calculate temperature drop across evaporator and rise across condenser. Compare them to typical DB readings in Table 4.

✧ **PROCEED TO QUICK SYSTEM ANALYSIS CHART, PAGE 4, TO FURTHER IDENTIFY SYSTEM PROBLEM.**

✧ □ **RECORD SYSTEM PROBLEM:**

Ⓜ **COMPRESSOR TEMPERATURES**

Measure temperature of hot gas discharge line near service valve. Temperatures exceeding 300° F cause oil and refrigerant to break down.

Ⓜ Record crankcase temperature. It should not exceed 125° F.

REFERENCE CHARTS

PRESSURE -TEMPERATURE CHART

Temp °F	R-22 Pressure	R-410A Pressure
-50	6.2	3.5
-45	2.7	8.5
-40	0.5	11.6
-35	2.6	14.9
-30	4.9	18.5
-25	7.4	22.5
-20	10.1	26.9
-15	13.2	31.7
-10	16.5	36.8
-5	20	42.5
0	23.9	48.6
5	28.2	55.2
10	32.8	62.3
15	37.7	70
20	43	78.3
25	48.7	87.3
30	54.9	96.8
35	61.5	107
40	68.5	118
45	76	129.7
50	84	142.2
55	92.5	155.5
60	101.6	169.6
65	111.2	184.6
70	121.4	200.6
75	132.2	217.4
80	143.6	235.3
85	155.7	254.1
90	168.4	274.1
95	181.8	295.1
100	195.9	317.2
105	210.7	340.5
110	226.3	365
115	242.7	390.7
120	259.9	417.7
125	277.9	445.9
130	296.8	475.6
135	316.5	506.5
140	337.2	539
145	358.8	572.8
150	381.5	608.1

QUICK SYSTEM ANALYSIS (√)

SYSTEM PROBLEM	OPERATING TRENDS (LOW-NORMAL-HIGH)															
	SUCTION PRESSURE			DISCHARGE PRESSURE			SUPERHEAT			SUBCOOLING			AMPERES			
	L	N	H	L	N	H	L	N	H	L	N	H	L	N	H	
Overcharge			●			●	●						●			●
Condenser (Air) Restricted			●			●	●				●					●
Non-Condensibles in System						●	●				●					●
High Evaporator Load			●			●		●			●					●
Loose TXV Feeder Bulb																
- Oversized TXV																
- Leaking TXV Seat			●			●	●				●					●
- Wrong Equalizer Connection																
- Uninsulated Feeder Bulb																
Undercharge	●			●					●	●				●		
Liquid Line Restriction	●			●					●			●	●			
Low Outdoor Ambient	●			●					●			●	●			
Suction Line Restriction	●			●					●			●	●			
Evaporator Air (Cooler Liquid) Restriction	●			●			●					●	●			
Undersized TXV																
- Leaking Feeder Bulb	●			●					●			●	●			
- No External Equalizer																
Inefficient Compressor			●	●					●			●	●			
ACTUAL SYSTEM OPERATION (■)																

INDOOR DRY BULB ADJUSTMENT

Use equations below in conjunction with unit's "Tech Label" information for total and sensible capacities @ indoor dry bulbs other than 80°F entering coil.

$$\text{Sensible Capacity at Indoor db LOWER than } 80^{\circ}\text{F} = (\text{MBh} \times \text{S/T}) - \left(\frac{(\text{80-Indoor db}) \times 835 \times \text{Indoor cfm}}{1000} \right)$$

$$\text{Sensible Capacity at Indoor db HIGHER than } 80^{\circ}\text{F} = (\text{MBh} \times \text{S/T}) + \left(\frac{(\text{Indoor db-80}) \times 835 \times \text{Indoor cfm}}{1000} \right)$$

SYSTEM CAPACITY CALCULATOR

Temperature	Enthalpy	Temperature	Enthalpy	Temperature	Enthalpy	Temperature	Enthalpy	Temperature	Enthalpy	Temperature	Enthalpy
Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB	Wet-Bulb (F)	Btu/LB
40	15.23	48	19.21	56	23.84	64	29.31	72	35.83	80	43.69
41	15.7	49	19.75	57	24.48	65	30.06	73	36.74	81	44.78
42	16.17	50	20.3	58	25.12	66	30.83	74	37.66	82	45.9
43	16.66	51	20.86	59	25.78	67	31.62	75	38.61	83	47.04
44	17.15	52	21.44	60	26.46	68	32.42	76	39.57	84	48.22
45	17.65	53	22.02	61	27.15	69	33.25	77	40.57	85	49.43
46	18.16	54	22.62	62	27.85	70	34.09	78	41.58		
47	18.68	55	23.22	63	28.57	71	34.95	79	42.62		
INDOOR COIL (EVAPORATOR)						OUTDOOR COIL (CONDENSOR)					
W.B. Enthalpy		ENTERING	LEAVING	DIFFERENCE		Air) D.B.		ENTERING	LEAVING	DIFFERENCE	
				Δh = Btu/LB						ΔT = f	
EVAPORATOR CAPACITY						CONDENSOR CAPACITY (Cooling)					
BTUH = 4.5 x cfm x Δh						BTUH = 1.08 x COND. Cfm x ΔT x .75 (for recip comp.) x .80 (for Scroll comp.)					

Due to varying field conditions, a tolerance of 10% must be expected when comparing test data to actual performance.

* Used in the "Total External Static" method in conjunction with the "Blower Performance Data" in Product Specification sheets or the unit's "Tech Label" to calculate airflow.
 † Temperature rise is equal to the supply air temp. minus the return air temp. at steady state operation. The supply air temp. should be measured away from the line of sight of the heat exchanger.