



## INSTRUCTION MANUAL

**TEMPRYTE**

— FT-0350-AC

3400 BTUs

Serial # 188~~4~~12R0700

**FT-0350-AC-220**

phone (925) 606-6293

fax (925) 606-6297

*For*

*AG Services*

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*Plumbing Circuit*  
*Electrical*  
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*Refrigeration Diagram*

**SPECIFICATION**  
**TEMPRYTE FT-0350-AC-220**  
**AN AIR COOLED CLOSED LOOP WATER**  
**RECIRCULATION SYSTEM**

**SPECIFICATIONS**

<b>COOLING CAPACITY:</b>	3,400 BTU's/Hr. @ a circulating coolant temperature of 20°C
<b>CONDENSER:</b>	Air cooled
<b>COMPRESSOR:</b>	Hermetic type using R-134A
<b>CIRCULATING PUMP:</b>	1.5 GPM @ 50 psi via positive displacement carbon vane type pump
<b>CIRCULATING PRESSURE:</b>	0 - 100 psi ( <i>internally adjustable</i> )
<b>RESERVOIR CAPACITY:</b>	1.5 gallons
<b>TEMPERATURE CONTROL:</b>	Factory set to 20°C via probe points on the electrical box
<b>TEMPERATURE STABILITY:</b>	+/- 0.1°C

**SAFETY FEATURES:**

- 1) Reservoir level low switch, audible alarm and front panel warning light.
- 2) Coolant temperature high switch, audible alarm and front panel warning light.

**UTILITIES REQUIREMENTS**

<b>POWER:</b>	220V, Single Phase 50Hz
<b>FITTINGS:</b>	3 - 1/2" FPT

**TEMPRYTE FT-0350-AC-220**  
**FUNCTIONAL DESCRIPTION**

*The Bay Voltex FT Series temperature controller consists of the following basic functional groups which are discussed in more detail later in this manual.*

**REFRIGERATION CIRCUIT**

The purpose of this functional group is to remove heat from the circulating coolant (*via a heat exchanger in the coolant reservoir*) and transfer heat to the air in the air cooled condenser models. The refrigeration system is proportional, responding to instantaneous demand (*see refrigeration schematic*). The actual temperature of the circulating coolant is controlled by a combination of hot gas by-pass refrigeration, and temperature control functions.

**HOT GAS BY-PASS**

The purpose of this functional group is to maintain a proper compressor operating range when the refrigerant flow control solenoid valve is closed. This also provides some heating capability, which in turn makes possible tight temperature control.

**TEMPERATURE CONTROL FUNCTION**

A Bay Voltex designed temperature controller provides an analog drive to a solenoid valve controlling the refrigerant flow to the evaporator. The coolant temperature is measured with an RTD placed in the coolant supply line. A hot gas by-pass system provides for tight temperature control.

**CIRCULATING COOLANT FUNCTION**

The TEMPRYTE FT provides a closed loop circulation of temperature controlled coolant. Controlled temperature coolant is circulated from an enclosed reservoir by a high reliability pump. Pressure of the circulating coolant is controlled by a panel accessible by-pass valve. To prevent coolant leaks, there are no compression joints to open from temperature cycling. All couplings are of an "O" ring type for reliability and serviceability.

All fittings to and from the equipment are on a recessed rear panel and properly spaced to accept a return line filter housing.

**SAFETY FUNCTIONS**

The TEMPRYTE FT incorporates a range of safety features which makes this temperature controller acceptable in some semiconductor facilities.

All these functions are combined with quality construction to create a reliable, high performance temperature control system.

**Final Test Procedure**

**AC**

**Page 2**

**ELECTRICAL CHECK**

Full load amperage 5.65

- Star washers under all grounds
- All ground screws tight
- Check all electrical components for proper mounting
- Check all electrical connections for tightness
- Check that all crimps are good
- Check level switch will not foul heat exchanger
- Bypass valve set at 65 Psi.

**FINAL CHECKS**

- Tighten all caps on refrigeration circuit
- Refrigerant leak check
- Water leak check suction line with unit OFF for 1/2 hour
- Check all other components for proper mounting and tightness

**SPECIAL TEST REQUIREMENTS**

None.

NOTE unit stays in cooling at load and does not cycle.

NA Check fan blade for proper clearances

NOTE flow at 60 psi NA.

Note areas of condensation to be sealed before shipment None.

**TEMPRYTE FT-0350-AC-220**  
**INSTALLATION INSTRUCTIONS**

**LOCATION:** Position the FT so that the front and rear air vents are not blocked or obstructed.

**POWER:** Plug unit into a suitable power outlet socket; 220V, 50/60Hz, Single Phase, 10 amps or larger circuit.

**WATER LINES:** Connect the equipment to be cooled. The "To Equipment" connection on the FT unit connects to the "Coolant In" connection of the equipment being cooled. The return coolant from the equipment, connects to the "From Equipment" fitting of the FT unit. **NOTE: Installation of a 20 micron filter on the "From Equipment" line is recommended to prevent pump damage from particulates.**

**RESERVOIR:** Remove the plug in the tank and fill to the top with water. (*Approximately 1.5 gallons*).

**START UP:** The factory temperature set point is 20° C. (*20° C is recommended for most applications*).

Power up the FT by plugging the power cord into the facility power source. Check the water lines for leaks. After the unit has run for 2 to 5 minutes, it may be necessary to refill the tank. The level may drop as the cooling lines are filled. Replace the FILL cover. Turn on the power of the equipment being cooled. Check for proper operation and temperature control.

*NOTE: If at any time you are unsure that the FT is operating as expected, please call **BAY VOLTEX SERVICE**.*

**TEMPRYTE FT-0350-AC-220**  
**FAULT DIAGNOSIS SUMMARY SHEET**

<b><u>FAULT</u></b>	<b><u>POSSIBLE DIAGNOSIS</u></b>	<b><u>OTHER INDICATIONS</u></b>
unit cools but doesn't hold temperature under load	low refrigerant charge	See "Trouble Shooting"
unit heats up will not cool	pump flow problem	pressure gauge reads 0
unit doesn't control to set point within 1.0°C	faulty front panel set POT check Pin 6	temperature gauge doesn't match set point
unit circuit breaker does not hold in	pump or compressor pulls excessive amperage	See "Trouble Shooting"
unit doesn't start	faulty "Level Low", or, "Temperature High" light	warning light doesn't illuminate when fault signal is energized
	faulty transformer	"Power On" light is not illuminated when the unit has power
	faulty relay on board	relay contacts do not switch when the coil is energized and de-energized
"Level Low" or "Temperature High" light remains illuminated when signal should be correct	level switch is hung up on heat exchanger	See "Trouble Shooting"
	faulty level or temperature switch	See "Trouble Shooting"
	faulty relay on board	See "Trouble Shooting"
unit cools only; will not heat	open circuit RTD	temperature gauge reads much higher than the actual tank temperature (45°C+)

**TEMPRYTE FT-0350-AC-220**  
**TROUBLE SHOOTING**

**I. COMPRESSOR**

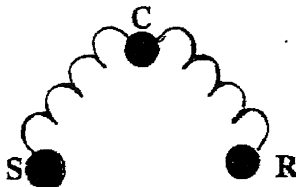
**A. Compressor Amperage**

- 1) Should be 7 amps full load in cooling.
- 2) Lock rotor amps 63 amps if lock rotor; change compressor.

**B. Excessive Amperage (*not lock rotor*)**

- 1) Check Windings.

**Note:** Windings are located in the electrical box mounted on the side of the compressor:



**COMPRESSOR TERMINALS**

- a. Check the resistance between C and R, and C and S.
  - b. Check the resistance between R and S; it should be the total of CR and CS. If the total is within +/- 1 ohm, proceed to #2. If the windings are bad, or shorted to ground, replace the compressor.
- 2) Change all the starting components.
- a) Check the amperage -- if it is still over specifications, compressor shorted --replace the compressor.
- C. Amps OK: Performance Poor**
- 1) Vacuum Check
    - a) Attach a manifold gauge to suction access valve on the compressor.
    - b) Front seat suction access valve. (*See drawing*)
    - c) Observe the pressure with gauge -- it should pull 15 inches hg of vacuum within 5 to 30 seconds. If the compressor does not pull into vacuum, or reach 10 to 15 inches hg of vacuum, replace the compressor.



**TEMPRYTE FT-0350-AC-220**  
**TROUBLE SHOOTING (cont'd)**

**I. COMPRESSOR (cont'd)**

- 1) Vacuum Check (continued)
- d) Compressor Thermal Overload Check.

**NOTE: Overload is located near the top of the compressor body.**

1. If the compressor reaches a temperature of 302°F, the thermal overload will open the common lead to the compressor. Thus, it will disable the compressor. Also, if the compressor amperage is too great, the thermal overload will open.
2. Once the compressor body is cooled down, the thermal overload will close and the compressor will restart. If the problem that created the thermal trip is not corrected, the compressor will cycle on the overload continuously until the windings are damaged.

**II. PUMP**

**A. Not enough pressure and not enough flow:**

- 1) Check the filter, it may be clogged. Blocked lines will also inhibit flow.
- 2) Loop channel on itself. Close the flow-through loop and monitor the pressure gauge.
- 3) If the pressure and flow are still not adequate, adjust the water regulation valve clockwise until pressure on the gauge increases. It should increase to 80 - 100 psi with the loop fully closed. The pump will flow 1.5 GPM @ 50 psi. If the pump does not perform to specification, replace the pump.

**B. Leak areas:**

- 1) Plumbing
  - a. Check the plumbing lines for moisture traveling down the insulation from another area.
  - b. NPT threads into pump.
  - c. Check quick disconnect fittings for tightness or damaged "O" ring seal.
  - d. Check the "O" ring fittings in the reservoir.
- 2) Shaft leak
  - a. Check the above areas to make sure that moisture is not traveling to the pump head. *(It may appear to be from the pump, but, originate from a different area).*
  - b. If the pump seal leaks, see the pump manufacturer's information provided in this manual.

**TEMPRYTE FT-0350-AC-220**  
**TROUBLE SHOOTING (cont'd)**

**This procedure is for EPA certified refrigeration technicians only.**

**III. REFRIGERANT CHARGE**

**SIGHT GLASS**

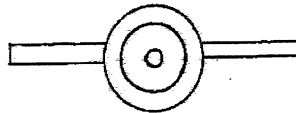
**NOTE: Sight glass is located in the liquid line after the filter.**  
**Use a flashlight!**

**IMPORTANT: Sight glass diagnosis must be done with the unit running in cooling.**

**A. Full charge:**

Sight glass will be clear. Refrigerant movement through the glass cannot be detected.

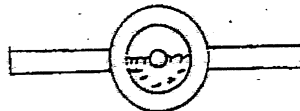
**SIGHT GLASS**



**B. Low Charge:**

Liquid can be seen traveling through the sight glass.

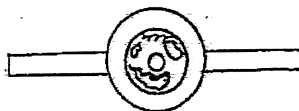
**SIGHT GLASS**



**C. Total loss:**

- 1) If there is a total loss of refrigerant, oil may be seen traveling across the bottom of the glass. The glass face will have traces of oil on it. Be **very careful** in diagnosing the sight glass in this condition. An empty sight glass may appear to be full or visa-versa. **It is very important to use a flashlight!**
- 2) The unit must be taken off-line and serviced if the refrigerant charge is low or empty. Call Bay Voltex Service.
- 3) Follow "Refrigerant Checking" procedure if refrigerant leak is suspected.

**SIGHT GLASS**



**TEMPRYTE FT-0350-AC-220**  
**TROUBLE SHOOTING (cont'd)**

**IV. WIRING**

**A. RTD Check (*DVM needed*)**

- 1) Remove the electrical box cover and reactivate the micro-switch.
- 2) On the temperature controller board, the voltage across J4A and J4E (*controller common*) should read 0.6 VDC +/-0.1V. If it reads 6.0 VDC, the RTD is defective.
- 3) Remove the RTD's from controller; Pins 13 and 16.
- 4) Check the resistance of each RTD:
  - a. 107 ohms at 20°C - GOOD
  - b. Open circuit -- replace RTD
  - c. Very high resistance -- replace RTD(See "*Spare Parts List*" for part number)

**B. Front panel pot check (*DVM needed*)**

- 1) Attach the meter to the center pin of pot (+); negative to Pin J4E (*controller common*).
- 2) Check the voltage (*0.0 to 4.0VDC*)
  - a. turn controller dial to:
    - 15°C - 1.50 VDC
    - 25°C - 2.50 VDC
    - 30°C - 3.00 VDC

**C. Level Switch Check (*ohm meter needed*)**

- 1) Remove the level switch wires from relay board
- 2) Attach ohm meter leads to level switch leads.
- 3) Move the level switch float towards and away from the tank lid by way of filling and removing fluid. If signal does not open and close; the level switch is faulty. Replace the level switch. (See "*Spare Parts List*" for part number)

**TEMPRYTE FT-0350-AC-220**  
**TROUBLE SHOOTING (cont'd)**

**IV. WIRING (cont'd)**

**E. Temperature Switch Check (*ohm Meter Needed*)**

- 1) Remove the temperature switch wires from relay board
- 2) Attach the ohm meter leads to the temperature switch leads.

If open signal is present when the tank temperature is below 45°C,  
the temperature switch is faulty. Replace the temperature switch.

*(See Spare Parts List for part number)*

**TEMPRYTE FT-0350-AC-220**  
**REFRIGERANT LEAK CHECKING PROCEDURE**

**This procedure is for EPA certified refrigeration technicians only.**

**Leak detector and aluminum foil are required for this procedure.**

- 1) Vapor charge the unit in compliance with EPA Regulations.
- 2) Oil will be present at the location of the leak. Especially, if the majority of refrigerant has left the system. If traces of refrigerant oil are found in a particular area, leak check there first, and then go to other possible leak areas.
- 3) Possible leak areas:
  - a. Access valve seal on the compressor.
  - b. Thermostatic expansion valve 1/2" flare nut and 1/4" flare nut.

**HELPFUL TIPS ON LEAK CHECKING:**

- 1) If the leak is very large, the leak detector may be too sensitive to locate exact area of the leak. In this case, soap bubbles (*Snoop*), may be more useful.
- 2) If the leak is very small and hard to locate, take aluminum foil and wrap it around the suspected leak area and the nozzle of the leak detector. This will make a seal so that the detector will only sample air around the possible leak area.

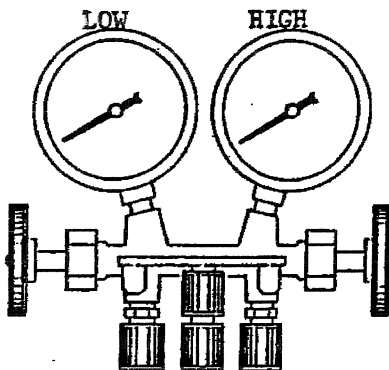
Once the leak area is found, repair the leak and consult Bay Voltex Service for evacuation and charging procedures.

**NOTE: Recommended Halogen Leak Detector GE model H10A**

**TEMPRYTE FT-0350-AC-220**  
**REFRIGERANT CHARGING PROCEDURE**

**This procedure is for EPA certified refrigeration technicians only.**

- A. Attaching service manifold gauges:**
- 1) High pressure line goes to the access valve on the liquid line.
  - 2) Low pressure line goes to the compressor valve.
- B. Open system to gauges:**
- 1) High side access.
    - a) mid seat receiver access valve  
*(See access valve positions)*
  - 2) Low side access
    - a) mid seat compressor access valve  
*(See access valve positions and drawing)*
- C. Liquid charge:**
- 1) This can only be done from the high side of the system.
  - 2) Back seat – suction access valve before charging high side.
- D. Vapor charge *(for adding refrigerant to partial charge)***
- 1) Vapor charge can be done through both high and low sides.



**TEMPRYTE FT-0350-AC-220**  
**ROUTINE MAINTENANCE AND PROCEDURES**

- 1) COOLANT: Purified Water; if set point is below 15°C use the following mixture:  
75 % water and 25 % Ethylene glycol

Change coolant every three months, or as needed.

- a. Drain tank through "tank drain" bulkhead -- replace plug.
- b. Inspect the fluid. If large deposits of sediment are found throughout the fluid, it would be advisable to remove the tank lid to clean out particulates.

**NOTE:** If sediment or particulates are getting back to the tank, the filter may be installed incorrectly. The correct placement for the filter is on the "From Equipment" line next to the chiller.

2) FILTER ELEMENT

Replace the element every time coolant is changed, or as needed.

3) SIGHT GLASS

Check the refrigerant on sight glass once every three months.  
(See "Trouble Shooting" - Refrigerant Charge)

4) AIR VENTS (*front and back*)

Make sure that no equipment is blocking either vent.

Use compressed air to clear build-up from the front vent and fins of the air cooled condenser annually, or as needed. Especially, if the unit is located in an environment that is unusually dusty.

If the condenser fins are bent, use a condenser comb to straighten them.

**TEMPRYTE FT-0350-AC-220**  
**PROCEDURE ON SERVICE REPAIRS**

Before returning any units to Bay Voltex Corporation, please call our Service Department for authorization or technical advice. You may have a problem that can be handled over the telephone and could save unnecessary costs of shipping, etc.

We require pertinent information from anyone that may be calling regarding repair:

- A. Unit's model number
- B. Unit's serial number (*located near the power cord*)

After it has been established what procedure to take in getting the unit repaired, follow all steps very carefully.

Any units coming to our facility to be repaired will need a "Return Authorization" number. The number will be given over the phone by the Bay Voltex Service Department. Without this number, the unit may be refused at our receiving dock.

Whether or not the unit is still under warranty, will be determined at the time when the Bay Voltex Service Department is contacted. Also, to help determine the warranty life, the unit's serial number must be provided.

Billable repairs are units which have a warranty life that has expired.

We would be happy to give a written estimate, keeping in mind that on most repairs, we need to have the unit physically present to analyze. We can make service calls if the unit is located in our area.

Contact the Bay Voltex Service Department for details.

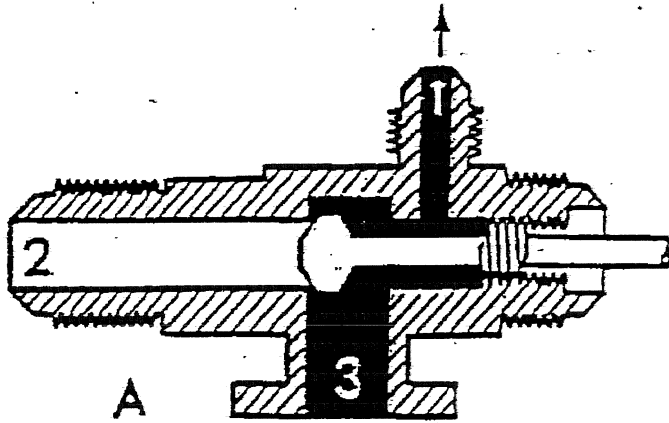
In most cases we will require a purchase order before doing the work. In some cases we may require a confirming copy prior to making repairs.



TEMPRYTE FT-0350-AC-220  
SPARE PARTS LIST

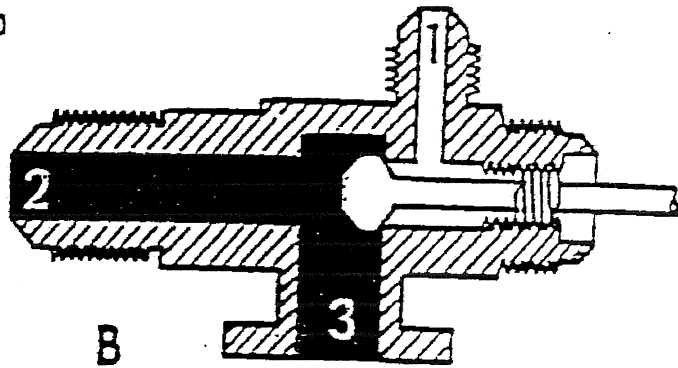
<u>BAY VOLTEX PART #</u>	<u>DESCRIPTION</u>	<u>RECOMMENDED STOCK QUANTITY</u>
1500-001Z	Procon pump 1504	1
5400-806Z	Temperature Controller	1
2060-100Z	Plat. Temperature Probe	1
1700-101Z	0 - 100 psi Pressure Gauge	1
1830-100Z	Level Switch	1
1840-100Z	Temperature Switch	1
2050-100Z	24V Lamp Green	1
2050-101Z	24V Lamp Red	1

# ACCESS VALVE



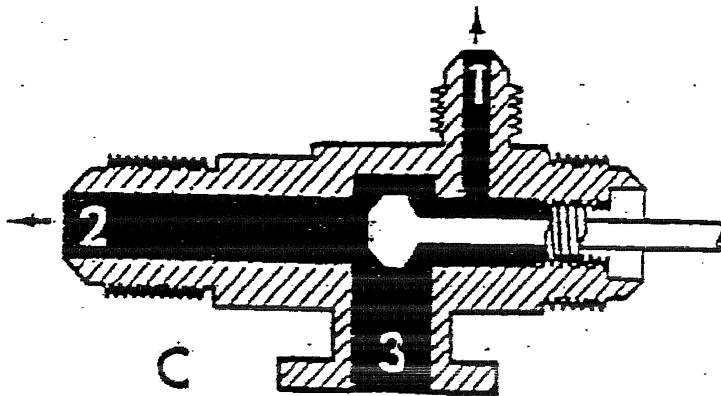
A

FRONT SEATED



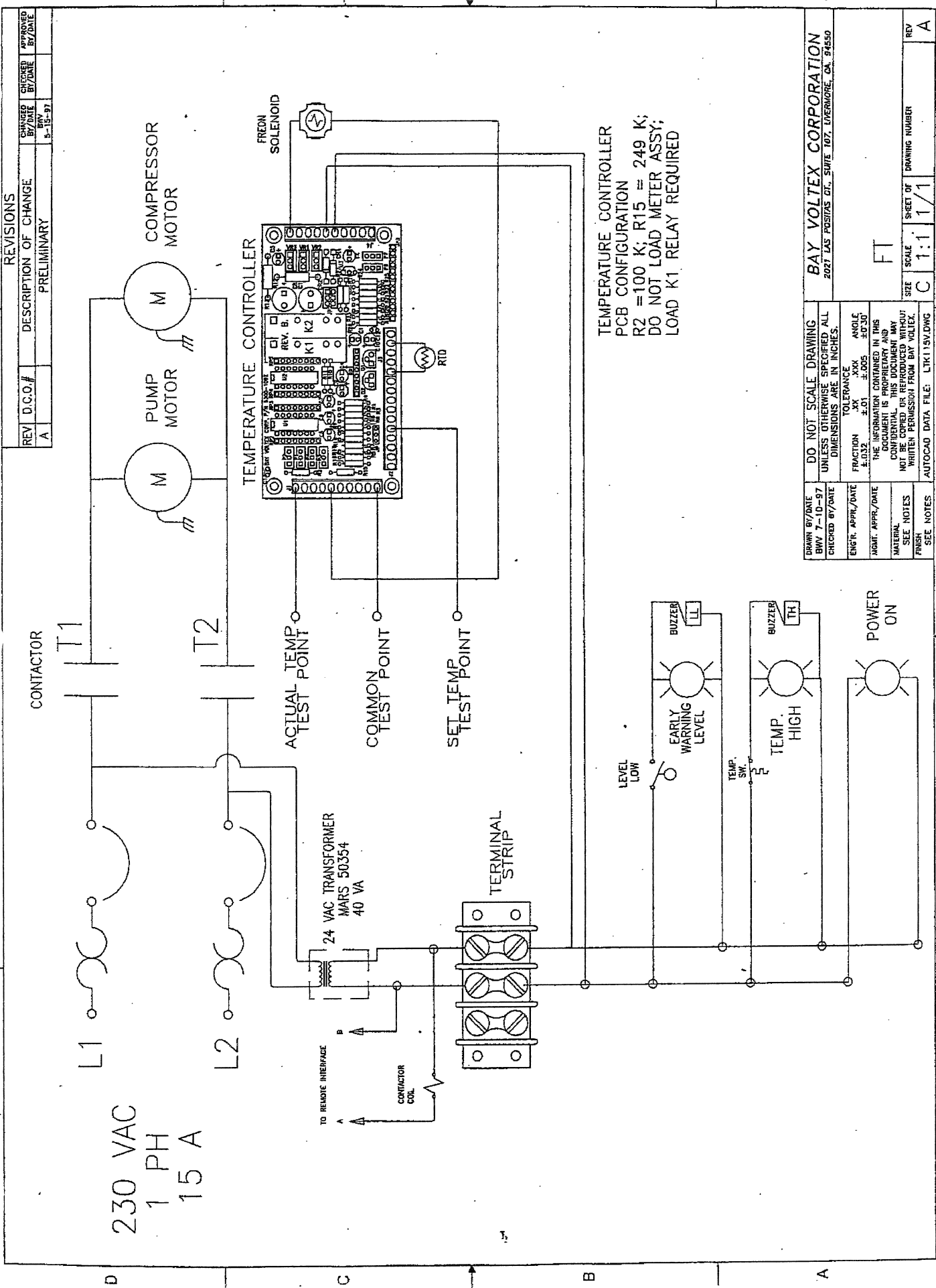
B

BACK SEATED



C

MID-POSITIONED (CRACKED)

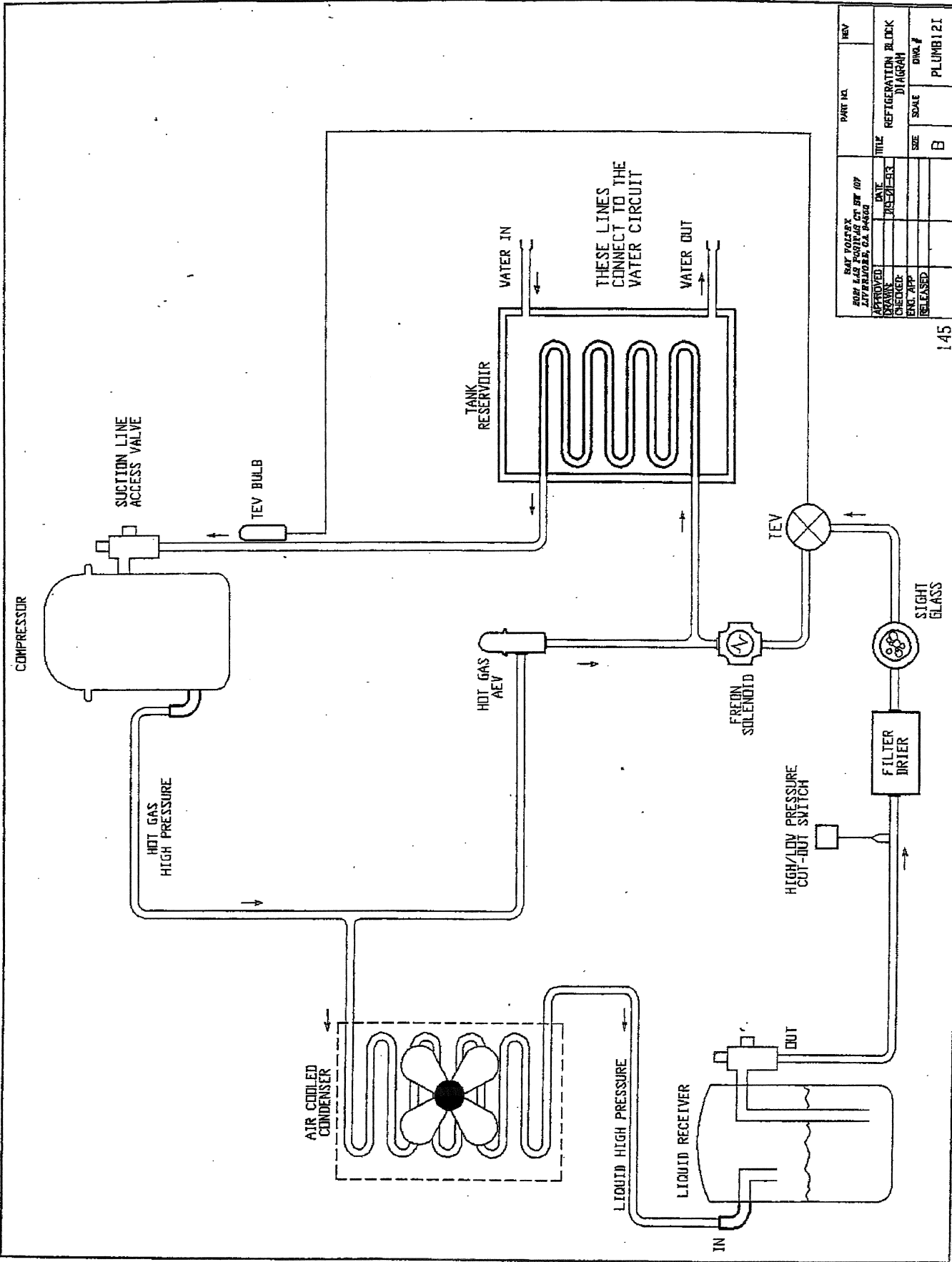


REV	D.C.O.#	DESCRIPTION OF CHANGE	DESIGNED BY/DATE	CHECKED BY/DATE	APPROVED BY/DATE
A		PRELIMINARY	9-15-97		

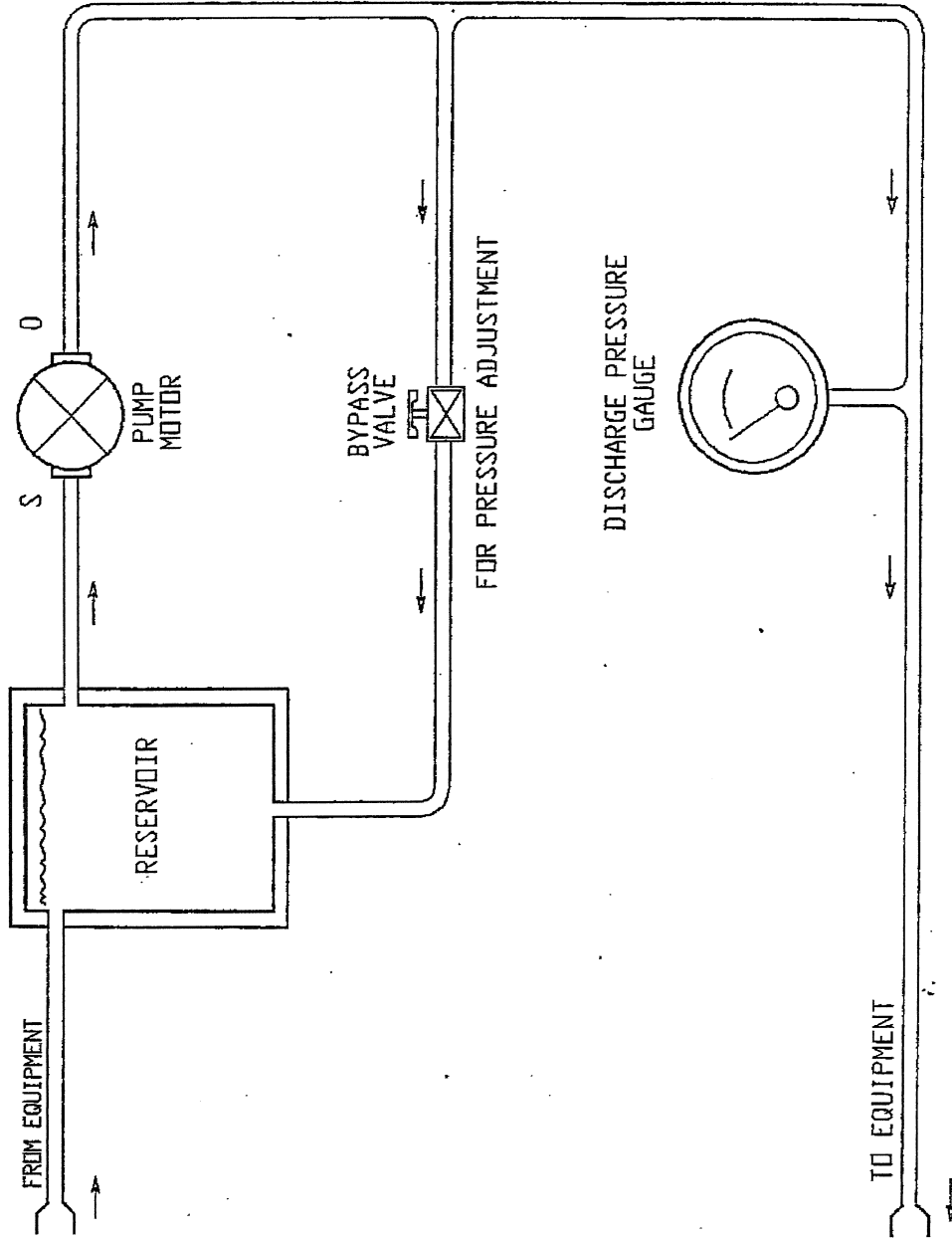
REV	D.C.O.#	DESCRIPTION OF CHANGE
A		PRELIMINARY

TEMPERATURE CONTROLLER  
 PCB CONFIGURATION  
 R2 = 100 K; R15 = 249 K;  
 DO NOT LOAD METER ASSY;  
 LOAD K1 RELAY REQUIRED

DRAWN BY/DATE BWV 7-10-97 CHECKED BY/DATE ENGR. APPR./DATE MGMT. APPR./DATE MATERIAL SEE NOTES FINISH SEE NOTES	DO NOT SCALE DRAWING UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES. FRACTION .XX ANGLE ±.032 ±.01 ±.005 ±0°30'	BAY VOLTEK CORPORATION 2027 LAS POSITAS CTR. SUITE 107, OVERRIDGE, CA 94650 FT
AUTOCAD DATA FILE: LTK115VDWG	SCALE 1:1	SHEET OF 1/1
SEE NOTES	DRAWING NUMBER C	REV A



REV	PART NO.	DATE	BY
APPROVED	TITLE	DATE	BY
DESIGNED	REFRIGERATION BLOCK	08-21-83	
CHECKED	DIAGRAM		
ENG. APP.	SIZE		
RELEASED	B		
	SCALE		
	DWG. #		
	PLUMB121		



BAY VOLTEX 2081 LAS POSITAS CT SW 10? LIVERMORE, CA. 94550		PART NO.	REV
APPROVED	DATE	TITLE	
DRAWN:	JULY 8, 93	WATER CIRCUIT DIAGRAM	
CHECKED:		SIZE	DWG. #
ENG. APP		A.	PD0050
RELEASED		SCALE	PLUMB5

**FINAL TEST PROCEDURE**

**AC**

Start Date 7-31-00 Unit Model FT-0350-AC-220V

Customer A.G. Services Serial # 18812 R0700

Builder Miguel Wiring By Lisa Test By Mukosh

Visual Check

*B.A. Chhabra 8/7/00*

Apply Silicone to RTD's

**PLUMBING CHECK**

Loop "To Equipment" and "From Equipment" to Test Fixture

Fill tank

Check for water leaks (*static*)

Check level switch float is on correct way and that level contact is closed when empty / open when full

Use meter: check that controller signal switches solid state relay

Calibrate voltage on Set Point POT to 20 °C.  
Set valves for start up: AEV counter clockwise

Connect refrigeration gauges

Set cooling AEV to 43 °F R 134a Scale unit in cooling

Set hot gas AEV to 10 °F R 134a Scale unit in heating

Refrigerant leak check -- insulate pipes

Check cooling capacity at 20 to 26°C ambient -- Log ambient 22°C

At 0 watts log temperature stability 19.7°C to 20.1°C

At 1000 watts log temperature stability 20°C to 20.2°C

At — watts log temperature stability —

Check for water leaks (*dynamic*)