

# **MANUAL**

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## **INSTALLATION, OPERATION & MAINTENANCE**

### **Commercial High Efficiency Heat Pipe Dehumidifier**

## **Model BKP™ 175**

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## **Model BKP™ 175**

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### **1. GENERAL DESCRIPTION**

The *BKP™ 175* is a commercial high efficiency dehumidifier that plugs into a standard 115Volt outlet. It is radically different from other dehumidifiers because of the proprietary heat pipe used to exchange heat between the warm intake air and the cold air discharge from the evaporator. This process pre cools the incoming air and allows more moisture to be condensed for less energy spent. The heat pipes are passive devices that use no energy.

The *BKP™ 175* comes pre-charged with refrigerant and is ready for operation. It comes with a mounted discharge air grill and a return air filter grill with filter. A Dehumidistat is pre installed on the unit for precise humidity control. Condensate water is removed by gravity drain or by the use of the built in condensate pump.

### **2. INSPECTION**

All HPT products are carefully tested and inspected prior to shipment. Each unit is in good working condition when packaged. If the package is damaged in any way, check the contents immediately; note damage on shippers Bill of Lading and have him/her sign your statement to insure prompt claim processing. Notify the carrier immediately of the damage so he can come out and inspect the product and packaging. The carrier alone is responsible for handling and settling your claim.

HPT will cooperate in assessing damage if unit is returned to the factory prepaid.

### **3. INSTALLATION**

The *BKP™ 175* can be placed as a stand-alone unit in an occupied space or ducted from a mechanical room with optional duct flanges. The *BKP™ 175* is designed to operate in conditioned space with temperatures ranging from 60°F to 85°F. Special factory options may be ordered for operation above or below these limits.

#### **3.1 DUCTING**

The *BKP™ 175* with optional duct flanges can be used with suitable metal or fiberglass ducts using approved methods. The ducts must be sized appropriately for the airflow listed. A good quality air filter of equal or larger size may be installed in the inlet register and located for ease of maintenance. **The duct must not add more than 0.5" E.S.P. inclusive of both supply and return ducts.**

### 3.2 Condensate Drain

The *BKP<sup>TM</sup> 175's* are supplied with a condensate gravity drain outlet. For the gravity drain, the pipe must have a downward slope for the entire distance to the outside. If installed above the ceiling, the pipe must be supported every 3 or 4 feet to prevent sagging. If the line has any level runs or dips, it will not drain properly. Ensure that the drain line has a U trap to prevent outdoor air from being aspirated into the *BKP<sup>TM</sup>s*.

For installation above the ceiling or above the ground floor, it is recommended that the *BKP<sup>TM</sup>* be installed over a separate drain pan, which is piped to a separate drain point.

The discharge line from the condensate pump needs to be piped to a suitable drain even if the gravity drain is the primary drain. If the gravity drain backs up it will drain into the condensate pump and be pumped out.

To use the condensate pump as the primary drain, the gravity drain needs to be plugged with a 3/4" MPT plug. Use thread sealant to prevent leakage. Open the lower access panel and uncoil the pump discharge through the grommet supplied. Make sure the tubing is not kinked inside the unit. Route the tubing to a suitable drain. The pump will pump vertically to a height of 20 Feet.

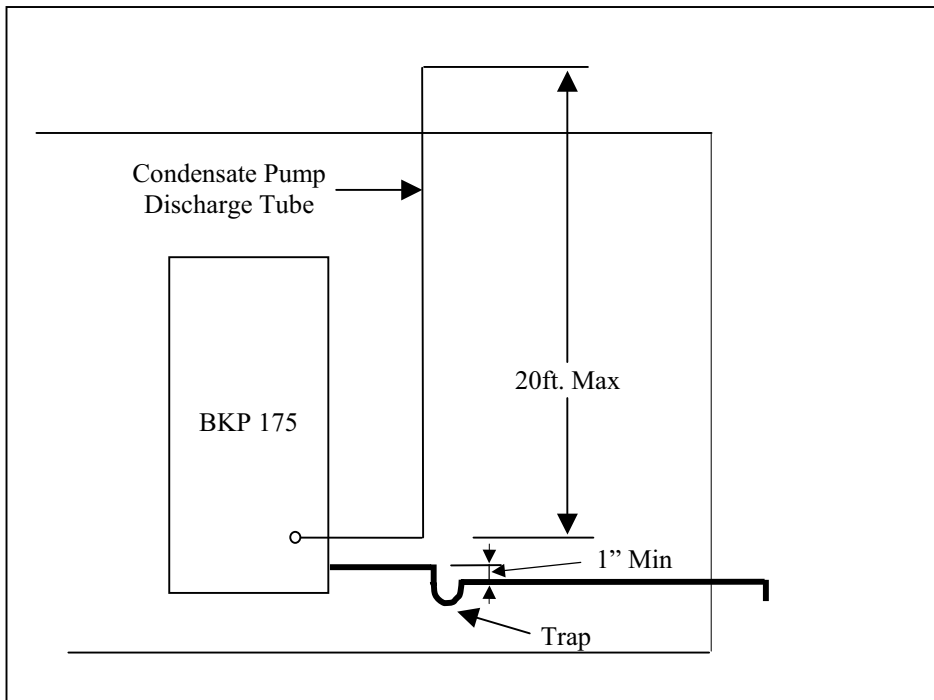


Fig 3.42 A P-Trap must be added to the condensate drain. Maximum lift for the condensate Pump is 20 ft.

## **4. ELECTRICAL WIRING**

### **4.1 Power Supply**

The *BKP™ 175* Should be plugged into its own 15 or 20Amp outlet. The use of an extension cord is not recommended. If it is necessary to locate the unit away from an outlet use a heavy duty appliance extension cord of the type used for window air conditioners.

### **4.2 24 VAC Control Wiring**

A dehumidistat is supplied and installed on the unit. If the *BKP™ 175* is to be ducted into a space the humidistat may be remote mounted. It should be placed in the conditioned space away from heat sources, entrance doors or any sources of humid air. It is recommended to place the dehumidistat at a location where it could sense the average relative humidity of the space.

The dehumidistat is of the 24 V type and should be wired with T-stat 18 gauge, low voltage wire. (See wiring diagram in unit control panel.)

## **5. Charging The BKP**

Troubleshooting and charging of the *BKP™ 175* must be done by an experienced refrigeration technician.

The *BKP™ 175* is charged with refrigerant 22. The charge amount is listed on the nameplate. It is important to have exactly the right charge in the unit or damage to the compressor or refrigerant components may occur. Due to the wide range of operation of the *BKP™ 175* it is highly recommended that the charge be weighed in to the ounce.

### **5.1 Standard Unit**

*BKP™ 175* are factory charged and ready to run after installation. If the charge is in question, first, recover the refrigerant in the system and weigh in the proper charge. If it is determined that the unit has a refrigerant leak, the leak must be repaired. Even though the unit appears to operate, as the refrigerant level drops the compressor will over heat and be damaged before the condition is recognized. Repair the leak and replace the liquid filter dryer. Evacuate the system using a Micron Gauge down to 400 microns. Valve off the vacuum pump and insure the vacuum does not rise above 700 microns. Then weigh in the charge using a scale accurate to 1 ounce.

## 5.2 ALTERNATE CHARGING METHOD

**NOTE: This method will only work if enough load can be maintained on the BKP™ that the suction pressure does not fall below about 65 PSIG while charging.** It will be necessary to fabricate a cover out of cardboard the same size as the front cover (use the cover as a template) in which a small flap can be cut for observing the sight glass. **Do not run the unit without a cover in place.** With the BKP™ turned off, charge the unit with liquid until the unit can be run without shutting down on low pressure. Start the unit in the heating mode and charge vapor into the low side port until the sight glass almost clears. Run the unit for 15 minutes and then slowly add vapor until the sight glass just clears.

## 6. OPERATION

The dehumidistat controls the operation of the dehumidifier.

Set the dehumidistat at the desired level, the dehumidifier will run and remove humidity until the set humidity is reached, at which time the dehumidifier will shut off. For normal operation, a range from 50% to 60% will provide the best comfort. Settings below 50% will make the unit run longer and will be less economical. Settings above 60%, which may be required in certain situations, will be more economical, but may not provide adequate comfort.

## 7. MAINTENANCE

It is essential that the air filter on the inlet of the unit be kept clean in order to prevent excessive power consumption and possible damage to the unit. Check the filters routinely to determine the frequency of replacement.

Check condensate drain regularly to ensure that the condensate is draining properly. If installed with an auxiliary drain pan under the unit, check that it is dry.

Check the operation of the condensate pump to make sure it is operational and clean.

It is recommended that the BKP™ be serviced annually by an authorized HPT certified technician to provide maximum efficiency and insure long life equipment.

## 8. SERVICE DIAGNOSIS

The BKP™ is equipped with safety controls, which will shut down the unit if a problem occurs. The BKP™ will remain locked out until it is reset by either raising and then lowering the dehumidistat setting or by turning the power to the BKP™ off and then back on.

## **8.1 If The unit locks out:**

1. Check the air filter in the inlet of the unit. A dirty air filter will cause an increase in power consumption and in the long run may cause damage to the unit.
2. Check refrigerant charge as described above.

## **8.2 To reset the BKP™**

Reset the BKP™ by either raising and then lowering the dehumidistat setting or by turning the power to the BKP™ off and then back on. Allow 5 minutes for the BKP™ to restart. If the unit locks out again after restart, thoroughly check the operation of the BKP™ to determine the cause of the shutdown and correct the problem. See troubleshooting section below.

## **9. Sequence of Operation for the BKP™ 175**

The BKP™ 175 is controlled, on or off, by a dehumidistat which senses the relative humidity of the space. The dehumidistat is factory mounted on the side of the unit.

On a call for dehumidification the contact in the dehumidistat is made sending control power through the safety shutdown switches, through the lockout relay and to the blower relay. Control power is also sent through recycle time delay to the compressor contactor.

The safety shutdowns consist of a high and low refrigerant pressure cutout and a condensate pump high level cutout. If any of these cut-outs open, the current path from the dehumidistat to the contactor is shifted through the coil of the lock-out relay. The normally closed contact in the lockout relay opens and the normally open contact closes, essentially shorting across the coil of the contactor and providing full control voltage to the lockout relay coil.

The contactor will remain off as long as the lockout relay receives voltage from the dehumidistat. Turning the dehumidistat up and then back down, mechanically opens the contact in the dehumidistat, dropping the power from the lockout relay.

After reset, voltage can now go through the normally closed contact of the lockout relay to the compressor contactor and blower relay, provided the safety shutdown has cleared. Control power to the contactor will be resumed through the off-cycle time delay when the machine has been off for the selected number of minutes (factory set to 5 minutes).

The coil is prevented from freezing up by a hot gas bypass valve which bypasses hot gas directly into the evaporator. The valve starts to open at 60 PSIG and prevents the coil temperature from dropping below freezing.

The refrigerant system is a R-22 (Chlorodifluoromethane) system consisting of a compressor, condenser coil, hot gas bypass valve, thermal expansion valve, and an evaporator with dehumidifier heat pipes. The coil section contains both the evaporator and condenser coils. The airflow enters through the precool heat pipe then through the evaporator then the reheat heat pipe and the condenser.

**10. SPECIFICATIONS**

**BKP™ 175**

<b>Models</b>	<b>175</b>
<i>Capacity (lbs/day) at 80°F &amp; 60% RH (AHAM)</i>	175
<i>Capacity (lbs/day) at 80°F &amp; 50% RH (ASHRAE)</i>	128
<i>Operating Range</i>	From 55°F/100%RH to 95°F/55%RH
<i>Air Flow Rate (cfm)</i>	300
<i>Dimensions (WxHxD) (in.)</i>	20 x 42 x 24
<i>Net Weight (lbs)</i>	190
<i>Filter Size (WxHxD) (in.)</i>	16 x 10 x 1
<b>Electrical (60 Hz)*</b>	
<i>Voltage/Phase</i>	115V/1 ph
<i>Max. Fuse or HACR Circuit Breaker (A)</i>	25
<i>Min. Circuit Ampacity (A)</i>	17.6
<i>Normal Operating Power (W)</i>	1300 W
<i>Compressor</i>	Rotary
<i>Blower Motor Power (hp)</i>	1/10
<i>Condensate Pumps</i>	Installed

Specifications subject to change without notice.

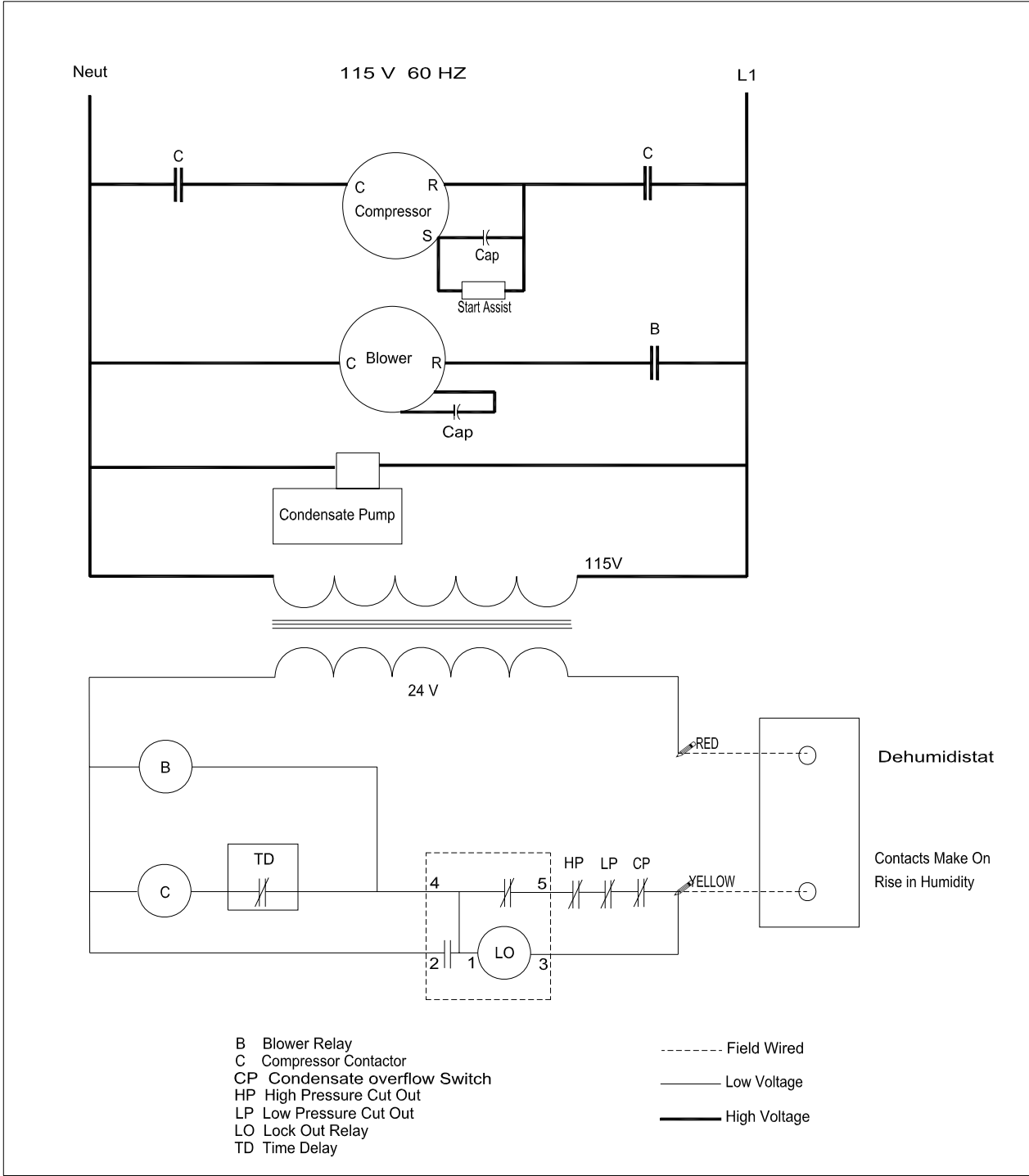
**BKP™ and BKP-AC™ SERIES TROUBLESHOOTING CHECK LIST**

Company: _____ Phone: (____) _____ Fax: (____) _____ Job Name: _____ Model # : _____ Serial # : _____ Test performed by: _____ Date: _____	
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Test		Dehumidification	Air Conditioning
<b>Air</b>	Return Air Flow	CFM	CFM
	Return Air Temperature	___ °F DB ___ °F WB	___ °F DB ___ °F WB
	Return Air Static Pressure (Negative)		in. WG
	Return Duct Size	" Depth	" Width
	Supply Air Temperatures	___ °F DB ___ °F WB	___ °F DB ___ °F WB
	Supply Duct Air Pressure (Positive)		In. WG
	Supply Duct Size	" Depth	" Width
	Condensate after 15 min (see <b>Note</b> below)		
<b>Refrigerant</b>	High Discharge Pressure / Sat. Temperature	___ psig ___ °F	___ psig ___ °F
	Liquid Line Temperature / Sight Glass	°F SG Clear? <input type="checkbox"/>	°F SG Clear? <input type="checkbox"/>
	Low Suction Pressure / Saturated Temperature	___ psig ___ °F	___ psig ___ °F
	Suction Line Temperature (@coil outlet)	°F	°F
	Suction Superheat	°F	°F
<b>Elec.</b>	Compressor ___ Volts / Amps at outdoor °F	___ Amps at ___ °F DB	___ Amps at ___ °F DB
	Indoor Blower <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi Volts/Amps	___ Volts	___ Amps
<b>BKP-AC</b>	Outdoor Fan _____ Volts / Amps		_____ Amps
	Outdoor Fan Pressure Switch set at		ON: _____ psig OFF: _____ psig
	Vapor Line Length / Size		_____ ft _____ "OD
	Liquid Line Length / Size		_____ ft _____ "OD

**Note:** To perform condensate flow test, run the unit for 15 minutes, then capture condensate for 5 minutes in a graduated container. Air side conditions must be measured during this time.  
 Is condensate TRAP properly installed?  Yes.  No.





BKP 175 Wiring Schematic

## 11. BKP™ TROUBLESHOOTING

Follow each applicable section in order from top to bottom.

Note 1 - Acceptable control voltage range 22 volts to 30 volts.

### 1) The unit does not start.

<i>Possible Cause</i>	<i>Solution</i>
No power to the unit.	Check the voltage to unit at the top of contactor.
Humidistat set above space humidity level.	Lower the humidistat setting.
If the unit locks out	Reset the BKP™ by turning the dehumidistat up and then down. then wait for time delay. If the BKP™ locks out again Follow Procedure #3 “Unit locks out before starting”
Check if the transformer has 24V. (see note 1)	If no, replace the transformer
Check for 24V at lockout terminals 3 & 2	If no, make sure the dehumidistat and field wiring are OK.
Check for 24V at lockout terminals 1 & 3.	If yes, Follow Procedure #2 “Unit locks out before starting”

### 2) Fan runs but compressor doesn't

<i>Possible Cause</i>	<i>Solution</i>
Check for 24v across time delay	If yes wait 5 minutes. If compressor does not start, replace the time delay
Check for 24v at the compressor contactor coil	If yes and the contactor does not pull in, then replace the compressor contactor If no check wiring
Check Voltage at bottom of compressor contactor	If no, Replace contactor.
Check for proper voltage at compressor terminals	If no, Repair wiring from contactor to compressor.
Compressor is hot	Compressor off on internal overload. Let it cool down.
Check capacitor	Replace if bad.
Check compressor ohms	Replace if bad.

### 3) Unit locks out before starting.

Turn power off to unit for this section. Put gauges on high and low refrigeration ports.

<i>Possible Cause</i>	<i>Solution</i>
If both gauges are below 40 psig, the unit has a refrigerant leak	Repair and recharge the unit.
Low pressure gauge below 40 psig and high pressure gauge at saturation pressure	Replace constant pressure expansion valve and filter dryer.
If Low pressure is above 40 psig, and high pressure is below 250 psig,	Remove wire from terminal 5 of lockout relay. Continue below.
check continuity from wire to terminal 3 of lockout relay.	If there is continuity, replace the lockout relay.
No continuity across low pressure cut out.	Replace low pressure cutout.
No continuity across high pressure cut out.	Replace high pressure cutout.
If there is continuity across all cut outs then the wire between cutouts is open.	Replace or repair the wire.

### 4) Unit runs a short time then locks out.

A cardboard cover should be made to replace the front cover. Use the front cover for a template. Make sure the cardboard lays against the diagonal drip rail on the coil. Any leakage of air around the coil will affect the pressure readings. Cut a small flap in the cover that can be opened and closed to observe the sight glass. Start unit and observe the refrigerant pressures. The low pressure cutout is 15 psig. The high pressure cutout is 350 psig. If the unit tries to shut down on the low pressure switch, try to observe the sight glass just before it shuts down.

*Do not run the unit with the cover(s) off.*

#### 4a) Unit shuts down on low pressure.

<i>Possible Cause</i>	<i>Solution</i>
Insure inlet air conditions are above 70°F and 45% humidity	Do not run if conditions are too low.
If there are bubbles in sight glass just before shut down, the unit may have a refrigerant leak.	Leak check, Recover refrigerant and repair. Replace filter dryer. Evacuate and weigh in charge.
If there are no bubbles in sight glass just before shut down,	Replace Thermal expansion valve and filter dryer.

#### 4b) Unit shuts down on high pressure.

<i>Possible Cause</i>	<i>Solution</i>
Check for proper airflow.	Replace filter, clean coil, duct and blower.
If air flow is low, check that the coil is not icing up.	Let ice melt and check hot gas bypass valve operation
Fan motor not running.	Repair wiring to the motor and/or replace the fan motor.
If pressure is still high, unit has probably been overcharged. NOTE: Proper charge cannot be determined by refrigerant pressures,	Recover all refrigerant and weigh in proper charge.

#### 5) Unit shuts down occasionally.

Follow the procedure under (4) "unit runs a short time then locks out". If unit shuts down, follow the outlined procedure. An occasional shut down can be a very difficult problem to diagnose. It usually involves some trial and error and multiple trips back to solve. If everything looks normal while the machine is running, consider whether there could be any environmental changes taking place during the day. Such as the air conditioning or heating being shut down at night while the BKP™ runs continuously.

Small trip indicators are available from local AC supply houses to help in diagnosis. These are attached across each safety cut out and will tell you which control is shutting the system down. This will narrow down the possibilities. Do not permanently bypass any safety control unless directed by the factory.

**6) BKP™ runs but does not dehumidify.**

Follow the procedure in (4) "unit runs a short time then locks out" to observe sight glass while running the BKP™. Using thermometers and hygrometers, take the dry bulb temperature and relative humidity readings at the air inlet to the BKP™.

<i>Possible Cause</i>	<i>Solution</i>
High and low pressure gauges did not move when the unit comes on.	Check compressor wiring, and capacitor. If compressor is hot, allow to cool. OHM compressor to determine winding condition. Replace compressor
If the compressor runs, but low pressure reads too high and high pressure reads too low.	Check that the hot gas bypass is not leaking by. Replace the compressor.
If the compressor runs, but both low and high pressure reads low	Check if the evaporator coil is frosted up. If frost is present, allow the frost to melt completely. Check hot gas bypass
If pressures are still low, and there are bubbles in the sight glass, the unit may have a refrigerant leak.	Check for leak, recover refrigerant, repair leak, replace filter dryer, evacuate and weigh in proper charge.
If pressures are still low and there are no bubbles in sight glass.	Replace thermal expansion valve and filter dryer.
If high press reads high and low pressure is ok or high.	Check airflow through the unit. If it is low, check filter and ductwork. External static should not exceed 0.5" Check that air inlet temperatures are not too hot or too humid.
If no problems are found, unit may be overcharged.	Recover refrigerant. Evacuate and weigh in proper charge.

## **BKP™ and BKPool™ Series Packaged Dehumidifier Twelve-Month Limited Warranty**

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Subject to the following conditions, **Heat Pipe Technology, Inc. (HPT)**, warrants this product to be free from defects in material and workmanship for a period of TWELVE MONTHS from the date of installation, not to exceed 90 days from date of shipment. This warranty is in lieu of all other warranties not expressly set forth herein, whether expressed or implied by operation of law or otherwise. In the event this product fails under normal use and service within the applicable period, HPT will correct, repair or, at its sole discretion, replace the defective product or refund the purchase price of products which are returned freight prepaid to HPT for inspection, when accompanied by proof of purchase and written claims of defect, and which upon inspection by HPT, do comply with the terms of this warranty.

This warranty applies to the first retail buyer and extends to any subsequent owners of the systems.

### **Additional Three-Year Limited Warranty On Compressor (Packaged Equipment Only)**

Additionally, HPT warrants the COMPRESSOR to perform under normal use and conditions for a period of THREE YEARS from the date of completion of installation, not to exceed 90 days from date of shipment, when installed in accordance with factory instructions and recommendations. In the event the compressor malfunctions or fails to perform during this warranty period, HPT will repair or, at its option, replace the compressor at the pro-rated schedule of cost shown below:

Percentage of repair or replacement cost paid by Heat Pipe Technology, Inc.

Month of Claim	Percentage
1 - 12	100%
13 - 24	66%
25 - 36	33%

The cost of replacement parts or components shall be determined by the price schedule in effect at the time of submission of warranty claim.

Repair or replacement parts will be furnished F.O.B. factory in all cases.

If HPT elects to replace or provide a refund, the defective product must be returned to HPT free and clear of liens or other encumbrances.

### **Limitations on Liability**

- A. **This warranty does not cover and no warranty is made with respect to:**
- B. Failures not reported to HPT within the period specified above;
- C. Failures or damage due to misapplication, misuse, abuse, improper storage or handling, abnormal conditions of temperature, water, dirt, corrosive substances or other contaminants;
- D. Products which have been repaired with parts or materials not furnished or approved by HPT or by its authorized dealers or representatives, or products which have been in any way tampered with or altered; and
- E. Products damaged in shipment or storage or otherwise without fault of HPT.
- F. Failure of the product resulting from modifications to the product or due to unreasonable use including failure to provide reasonable and necessary maintenance. Failure due to corrosion on models not corrosion protected. Damage to the product caused by improper power supply voltage, accident, fire, floods, or acts of God. **WARRANTOR IS NOT RESPONSIBLE FOR CONSEQUENTIAL DAMAGES.**

HPT total responsibility for any claims, damages, losses or liabilities related to the product covered hereunder shall not exceed the purchase price of such product. In no event shall HPT be liable for any special, indirect, incidental or consequential damages of any character, including but not limited to loss of use of productive facilities or equipment, lost profits, property damage, transportation, installation or removal, lost production, or personal injury whether suffered by Purchaser or any third party. HPT disclaims all liability for any and all costs, claims, demands, charges, expenses or other damages, either direct or indirect, incident to personal injury or property damage arising out of any cause of action based on strict liability.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the exclusion or limitation above of consequential damages or the limitation of time above on implied warranties may not apply to you.

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

## Warranty Registration

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To insure your warranty protection, please fill in the Warranty Registration form and mail or fax it to:

**Heat Pipe Technology, Inc.**  
4340 NE 49<sup>th</sup> Avenue, Gainesville, FL 32609  
Fax: (352) 367-1688

<b>WARRANTY REGISTRATION FORM</b>	
Customer Name:	
Customer Address:	
Phone: (     )     -	Fax: (     )     -
Please Check One: <input type="checkbox"/> Homeowner <input type="checkbox"/> Dealer	
Model No:	Serial No:
Type of Product:	
Date of Installation:	Dealer/Installer:
Name & Address of Dealer/Company You Purchased from	
Name:	
Address:	
Customer Signature:	