

TROUBLE SHOOTING THERMOBANK DEFROST ON KRAMER COMPRESSOR SYSTEMS

Thermobank defrost failure could be from either of three primary sources:

- (1) The defrost is not initiating or is terminating too soon.
 - (2) Warm air is being blown out of the coil by other fans or blowers operating in the box while defrost is in progress. All Systems must defrost simultaneously.
 - (3) Not enough heat is being delivered to the coil, pan or drain, to defrost them in a reasonable time.
- A. If there are symptoms of excessive defrost, refer to the Control Section of this Bulletin.
 - B. If defrost is incomplete and the duration is less than 15-minutes, refer to the Control Section of this Bulletin.
 - C. If defrost is incomplete and the duration exceeds 15-minutes, refer to the Systems Section of this Bulletin.

CAUTION

NEVER attempt to remove ice from the coil by increasing the defrost duration.

REMOVE THE ICE MANUALLY USING HOT WATER. Then increase defrost duration setting on timer or raise termination temperature.



CONTROL SECTION

TROUBLESHOOTING DEFROST CONTROLS

TEMPERATURE TERMINATION TYPE (T-Tp-P)

TIME TERMINATION DEFROST TYPE (T-T-T or T-T-P)

Coil icing may lead to coil failure not covered by warranty. Shut off system if ice on coil is observed. Water (ice) on floor under blower is a warning of such a condition. Remove ice with hot water after clearing drain.

I. Single Evaporator Systems

(A) INCOMPLETE DEFROST

Incomplete defrost is represented by ice accumulation on the coil, in the drain pan, or drain line. Frost on the ceiling, on the outside of the case, or on the evaporator fan blades does not constitute incomplete defrost since there is no means in the defrosting system for defrosting these areas. If the fan blades become excessively frosted or unbalanced, there is excessive infiltration of humid air or excessive defrost. Reduce infiltration and clean fan blades manually as necessary.

(B) TROUBLESHOOTING

1. Ice in the Drain Pan

- a. Check the drain line to make sure that it is clear. If it is plugged with ice, thaw the drain. Find out why it froze up and make the necessary corrective measures. The fault may be incorrect drain line pitch, frozen drain trap or poor hot gas-drain bonding.
- b. If the drain line is clear, ice in the pan may be generated by any of the following:
 - (1) Timers with temperature termination:
 - (a) Terminating temperature set too low.
 - (b) Fail-safe setting on timer too short.
 - (2) Timers without temperature termination:
 - (a) Defrost duration set too short.
 - (3) Incorrectly pitched unit or a distorted pan which allows a pool of water to remain in pan.
 - (4) Other units in room continue to refrigerate and blow air during the period this unit is in defrost. (All units in one room should defrost simultaneously.) The operation of any fans or air moving devices in the freezer during the course of the defrost

may blow heated air out of the evaporator causing ice accumulation on coil face, in the drain pan and in the coil itself.

2. Ice on the Coil

- a. Clear the coil, pan and return bend areas of ice.
- b. With a clean coil and gauges installed to monitor coil and crankcase pressures, note the time, and initiate defrost. Allow defrost to continue until the coil pressure rises at least to the following values:

R12 - 58 PSI
R22 - 102 PSI
R502 - 116 PSI

Note the time elapsed. If this time exceeds 10-minutes, there may be a refrigeration, not a control problem. Refer to Systems Section of this Bulletin.

- c. Allow defrost to continue until it terminates.
 - (1) If defrost terminates on override, there are only two possible reasons:
 - (a) Coil pressure did not rise high enough to achieve a defrost. Refer to Systems Section for Trouble Shooting Guide.
 - (b) Override is set for too short a time. If override is set under 20-minutes - increase override setting.
 - (2) If defrost terminates before override time is reached and the coil is not defrosted completely, check thermostat setting. If less than 60° reset to 60°. If set at 60° or over, check calibration. If bad - replace.
 - (3) Coil plugged with snow

If there is snow only, no ice, then no defrost has occurred. Check the following possibilities:

 - (a) Timer not running. Replace timer.
 - (b) Timer terminates defrost at the same instant defrost initiates.
 - 1- Short or error in Control Circuit wiring.
 - 2- Terminating thermostat contacts stuck closed.
 - 3- If with control wire disconnected

from terminal (x) of the timer, the timer still trips in and instantly out, the timer has failed. Replace.

- (c) Hot gas solenoid fails to open or hot gas hand valve closed.

© EXCESSIVE DEFROST

1. The evidence of excessive defrost is the formation of too much frost on the ceiling adjacent to the evaporator coil.

Control Type

- a. Time Termination (T-T-T) or (T-T-P)

Possible Causes:

- (1) Defrost duration set too long.

Control Type

- b. Temperature Termination (T-Tp-P)

Possible Causes:

- (1) Terminating temperature on thermostat set too high.
- (2) Inoperative terminating thermostat which fails to close the terminating circuit when the bulb has reached the desired coil temperature coupled with override time set too long.

④ TROUBLESHOOTING

Check the operation of thermostat by initiating defrost. Wait until the coil is defrosted; then with defrost still in operation, gradually turn down the terminating temperature on the thermostat. If the defrost does not terminate even when the terminating thermostat is turned down as low as 30°, carefully jump the thermostat contacts using an insulated jumper. If the circuit wiring is correct but the thermostat inoperative, the timer should then terminate defrost.

The state of the defrost may be monitored by observation of a gauge tapped on the evaporator external equalizer line. When the coil pressure begins to drop, defrost has terminated.

If the timer still does not terminate defrost, return to the timer and create a jumper from Terminal (N) to Terminal (X). These circuits are live and an

insulated jumper should be used together with all possible care. If the defrost then terminates, the problem is in the defrost control circuitry. If the defrost still does not terminate, the problem is in the timer and the timer should be replaced.

II. Multiple Evaporator Systems

Ⓐ INCOMPLETE DEFROST

(Review Paragraph A, Single Evaporator)

If some evaporators defrost completely but others do not defrost completely, increase the terminating temperature setting on the terminating thermostats for the icing coils. Treat all other control problems as in "Single Evaporator Systems."

Also refer to paragraph 7 – Systems Section.

Ⓑ EXCESSIVE DEFROST

All evaporators must have the same defrost duration. In a large room, it is entirely possible that some evaporators may require a longer defrost than others. In this case, it will be necessary to expose lightly frosted evaporators to a longer than necessary defrost duration in order to insure that heavily frosted evaporators are completely defrosted. In this event, some signs of excessive defrost may be observed. This is normal.

However, if all evaporators controlled by a single timer exhibit symptoms of excessive defrost on (T-T-T) or (T-T-P) shorten defrost duration. On (T-Tp-P) check the defrost control circuit to make sure that it is functioning by temporarily installing a jumper between Terminal (N) and Terminal (X). If the defrost terminates, that means the timer is operative.

All terminating thermostats must function correctly for termination of defrost to occur. If even one thermostat fails to close, then functioning of all the other thermostats still would not cause defrost to terminate until the override time has elapsed. To check the operation of each thermostat, trip the system into defrost manually, allow the defrost to continue until all the coils have thoroughly defrosted, then carefully, using an insulated jumper, jump the terminals of each thermostat in sequence. Reset or replace the thermostat whose terminals when jumped terminate the defrost.

SYSTEM SECTION

1. DON'T FEEL HOT GAS LINE – hot gas will not defrost the coil, only pressure will.
2. INSTALL GAUGES at port on coil side of holdback valve, at crankcase, at head, and at receiver.
3. DOES HEAD AND RECEIVER PRESSURE DROP at beginning of defrost?
 - A. 50 or more PSI
Hot gas line, solenoid hand valve, strainer, pan and distributor all OK.
 - B. SLIGHTLY OR NOT AT ALL
Restricted hot gas line, solenoid strainer, hand valve, pan or distributor.
Install pressure taps to tell which. Don't rely on temperature loss in line.
 - C. HEAD DROPS SLIGHTLY; RECEIVER DROPS 50 or more PSI
Restricted "W" check or "W" hand valve.
4. RECHECK HOLDBACK VALVE SETTING
R-12 – 5 to 10 PSI
R-22 and R-502 – 10 to 15 PSI
5. DOES BANK GET COLD and does Bank inlet (between holdback valve and Bank) frost through most of the defrost?
 - A. Yes
 1. Then enough heat is probably getting to evaporator but air circulation in box during defrost is blowing hot air out of evaporator coil.
 2. Drains are plugged.
 3. Defrost duration too short.
 4. Excessive ice already present on coils is preventing defrost completion.

CHECK COIL PRESSURE BEFORE END OF DEFROST. With clean coil, pressure should reach at least:

R-12 – 58 PSI
R-22 – 102 PSI
R-502 – 116 PSI

If final pressures are lower than these, then lengthen defrost.

B. No

Not enough liquid being returned to holdback valve from defrosting evaporator. (Failure of liquid refrigerant to return may prevent holdback valve from maintaining desired suction pressure.)

Causes:

Horizontal suction line insufficiently pitched or pitched in wrong direction. Inadequate back surge from cool or empty receiver; add refrigerant.

Make sure receiver is hot or warm before defrost. If not, check for low head or non-condensibles. Purge. Raise head pressure.

Water cooled systems with long lines may require auxiliary receivers. Water cooled receivers will not hold extra charge without causing high head.

6. IS THERE FLOODBACK or frosting to compressor during defrost?
Check Bank water temperature before defrost. Should be 100°+.
Check water level in Bank. Bank should be full.
If Bank is warm and full of water, reduce holdback valve setting to correct floodback. (Refer to Paragraph 4)
 7. SIMULTANEOUS DEFROST OF MULTIPLE EVAPORATORS: All multiple evaporators may fail to defrost completely if branch hot gas line to even one evaporator is restricted or closed (hot gas branch check, for instance). Liquid will accumulate in coil with plugged branch line and will exhibit characteristics like 5B. System may also exhibit long post defrost and some floodback on return-to-normal.
 8. ICED DRAIN PAN: Check to see that drain line is open. (Also see Control Section.)
 9. FROZEN DRAINS: Check bond of hot gas line to drain line.
Straddles: increase time between defrosts.
- CAUTION: Never allow ice to accumulate on coil or in drain pan since unrepairable damage not covered by warranty may result.