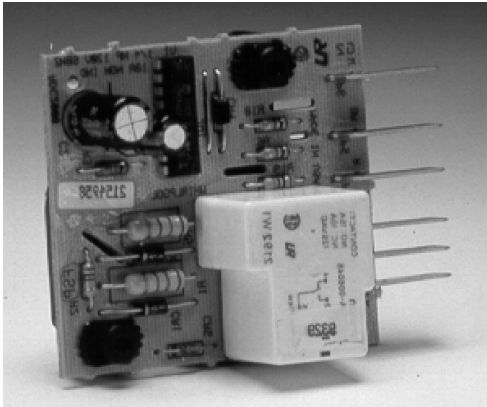




Appliance Controls

Electronic Adaptive Defrost Control



Design Features

- Automatically achieves optimal defrost periods
- Saves energy
- Improves food quality
- A microprocessor based defrost system that can accommodate a wide variety of refrigeration system applications including food display cases and domestic refrigerators
- Adjust to changing environmental conditions
- Adjust defrost interval to maintain system efficiency

Operating Parameters

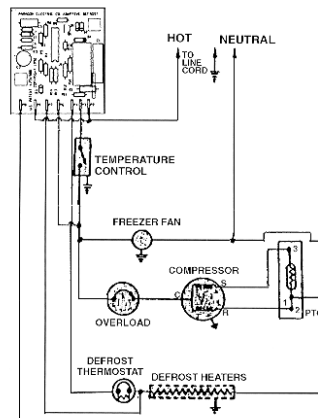
- System Constant (K) To Be Determined
- Initial frost build time 1 to 12 hours
- Minimum frost build time 2 to 24 hours
- Optimum defrost time 2 to 96 minutes
- Compressor delay time 0 to 30 minutes
- Maximum frost build time 6 to 96 hours
- Maximum duty time 4 to 24 hours
- Maximum defrost time 2 to 96 hours
- Bi-Metal reclosure time 0 to 30 minutes

The underlying theory of the Adaptive Defrost concept is that for each unique evaporative refrigeration system there exists an optimum defrost period. If the defrost is accomplished in less than the optimum time, it means that defrost was initiated too soon and if more than the optimum time is required to defrost the evaporator coil it means that frost has accumulated to the point of degrading system performance.

The new electronic adaptive defrost control produced by Invensys Appliance Controls adjusts the defrost function to automatically maintain system efficiency.

Specifications

- Temperature range 0°C to 65°C
- Control designed to operate to 95% relative humidity, non-condensing
- AC Line Voltage Input
120 VAC, 60 Hz, +10%-15%
208-240V, 60 Hz, +10%-15%
- Compressor normally closed relay contact rated as follows:
10 amp, 1/4 hp, 120 VAC
18 LRA, 3 FLA, 250 VAC
10 amp, 1/3 hp, 240 VAC
- Defrost heater normally open relay contact rated as follows:
10 amp, 1/4 hp, 120 VAC
750 W, 250 VAC
10 amp, 1/3 hp, 240 VAC

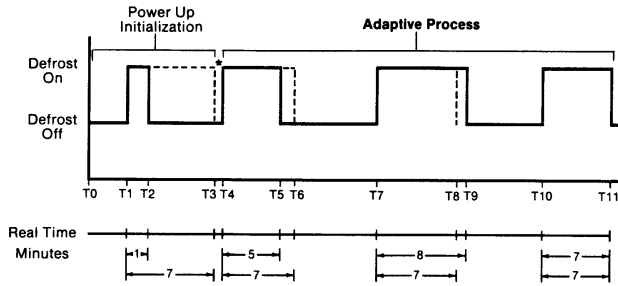


PINOUT DESCRIPTION

- P1 - AC Hot
- P2 - Relay Common
- P3 - Relay NC, Compressor Output
- P4 - Relay NO, Heater Output
- P6 - Compressor Run Sense Input
- P7 - Defrost Sense Input
- P8 - AC Neutral

Working Example

This example is intended to illustrate the conceptual operation of the adaptive defrost system. The example can be most readily followed by referring to the timing diagram below.



System Parameters

Optimum defrost interval:	7 minutes
System turn on:	T0
Initiation of defrost:	T1, T4, T7, T10
Termination of defrost:	T2, T5, T9, T11
Optimum defrost termination:	T3, T6, T8, T11

Sequence of Events

Time	Event
T0	System turn ON
T1	Defrost initiated by the Adaptive Control
T2	Defrost terminated by external sensor
T4	Defrost initiated by Adaptive Control
T5	Defrost terminated by external sensor
T7	Defrost initiated by Adaptive Control
T8	Defrost terminated by external sensor
T10	Defrost initiated by Adaptive Control
T11	Defrost terminated by external sensor

Results

The system is placed in the frost build mode for a preset interval.

Due to initial power-up of the system, the defrost error is not a true value. Therefore, the frost build interval is increased by a preset increment.

Since the optimum interval is known to be 7 minutes and the system has terminated after only 5 minutes, the adaptive defrost control will record an error of (-2) and lengthen the frost accumulating period.

This time the defrost interval has gone beyond the optimal period and an error of (+1) is recorded and the frost accumulation period is shortened.

This time the system required 7 minutes to defrost the evaporator coil which is equal to the optimal period. The adaptive control will not adjust the frost accumulation for the next cycle. If another error is detected the control will adjust the frostbuild either forward or reverse depending upon the value of the error term.

Sudden changes in environmental conditions will cause unit to reset a defrost interval and then re-start to a minimum frost build interval time.