



## Appliance Controls

### Defrost Control Types

#### **Time-Initiated, Time-Terminated**

This type of defrost control is used where two things can be accurately predicted. One, the length of time needed between defrost cycles. Two, the length of time needed for defrosting. Here is how a typical time-initiated, time-terminated defrost control works.

First, the defrost cycle tripper is set on the 24 hour dial. (The one above is set to start the cycle at midnight, every 24 hours.) If more cycles are needed, additional cycle trippers may be placed on the 24 hour dial. Defrost cycles can be set for as often as every four hours, up to six times a day.

Second, the defrost cycle time set pointer is set on the two hour inner dial. It is set for as long as you want the defrost cycle to last. The cycle can be set to last from four to 110 minutes, in two minute increments. The length of defrost is accurate to within +/- two minutes.

1. Time-initiated, time-terminated compressor shutdown defrosting.
2. Time-initiated, time-terminated electric heat defrosting.
3. Time-initiated, time-terminated hot gas defrosting.

#### **Time-Initiated, Temperature-Terminated**

This type of defrost time control starts the defrost cycle according to the times set. However, a rise in temperature terminates the defrost cycle and starts the refrigeration cycles. The temperature control is set at the reading at which all the frost and ice have melted off the coil. A typical time-initiated, temperature-terminated defrost control works like this.

First, defrost cycle trippers are set on the 24 hour dial. Next, the fail-safe tripper is set on the inner dial. This control has a defrost period termination fail-safe built into the inner dial. If the equipment is not brought back to a refrigeration cycle by an increase in temperature, the fail-safe will terminate the defrost cycle. A small solenoid (defrost release coil) is built into each control of this type. This solenoid is connected to an external temperature control (cycle limit-switch) which is furnished by the installer. This external temperature control is set to energize the timer solenoid if the equipment is not brought back to a refrigeration cycle.

1. Time-initiated, temperature-terminated compressor shutdown defrosting.
2. Time-initiated, temperature-terminated electric defrosting.
3. Time-initiated, temperature-terminated hot gas defrosting.

#### **Time-Initiated, Pressure-Terminated**

Like all the others, this type of defrosting time control starts defrost cycles according to time set, but when the coils are free of frost. A pressure bellows on the control which is connected to the suction side of the refrigeration system senses when the coils are frost-free and starts the refrigeration cycle again no matter what time has elapsed. This type of defrost control is used when the compressor is remote from the refrigerated display case. A typical time-initiated, pressure-terminated control works like this.

First, cycle trippers are set on the 24 hour dial. Next, the pressure setting is adjusted to the pounds of pressure which corresponds to that in a frost free evaporator coil. It may be adjusted from 36 to 110 p.s.i. for R12, R22 or R502.

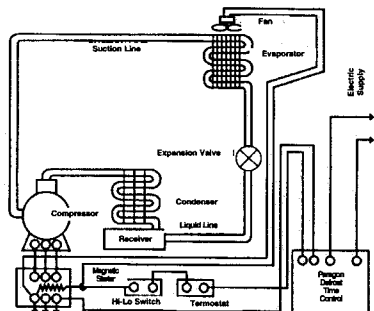
Then the fail-safe tripper is set on the inner dial. This fail-safe device guarantees that the timer will never fail on the defrost side of the cycle. If the pressure bellows doesn't work, the tripper turns on the refrigeration cycle.

1. Time-initiated, pressure-terminated compressor shutdown defrosting.
2. Time-initiated, pressure-terminated electric heat defrosting.
3. Time-initiated, pressure-terminated hot gas defrosting.

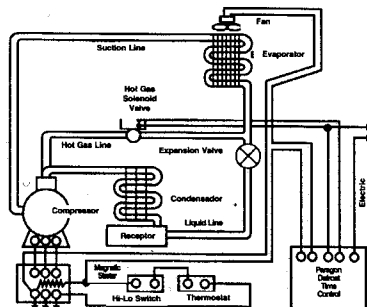
#### **Compressor Shutdown**

Normally used on applications where the space air temperature is 1°C or higher. When the space temperature requirement is satisfied, a thermostat acts to close the liquid solenoid valve and shut down the compressor. The air circulating fans continue to run and the frost on the coil is melted. In most applications, a defrost time control is used to operate the defrost cycle. These defrost times are generally two hours or more.

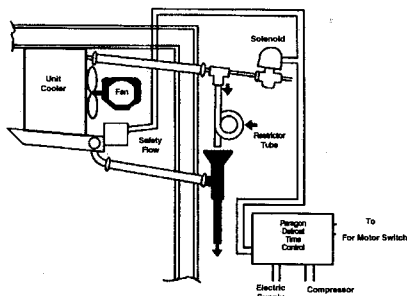
# Defrosting Methods



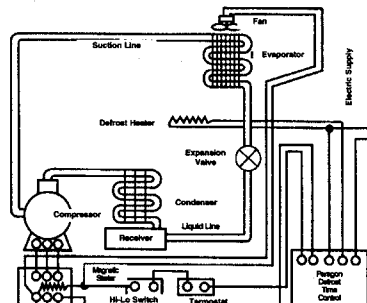
Compressor Shutdown



Hot Gas



Water Spray



Electric Defrost

## Water Spray

For coils operating in room temperatures of  $-18^{\circ}\text{C}$  and higher. The refrigeration system and air circulating fans are stopped and water is sprayed over the coils. It may be necessary to heat the water supply in the event normal water temperatures are below  $4.4^{\circ}\text{C}$ . Water supply and drain lines should be built to assure rapid drainage of refrigerated space when defrosting is completed. The defrost time control in this case controls the delay or pump down cycle, the length of the actual defrost cycle in which water is cascaded over the refrigerated coils and the drain time allowing the defrost water to drain away from the refrigerated area.

## Hot Gas

Utilizes compressed vapor from the compressor to apply heat directly to the evaporator and in some systems to the drain pan. Most systems use the latent heat of condensation of the compressed vapor the heat source, but some use only sensible heat of highly super heated vapor. Most hot gas systems introduce the hot gas at the suction connection and bypass the expansion valve through a relief valve into the suction line downstream from a suction solenoid valve which closes during

defrost. The defrost time control will, in this case, operate the compressor during the defrost cycle and shut off the circulating fans. At the same time, it will energize the hot gas solenoid valve and allow the hot gas to enter the evaporator coil and warm it, thus removing the buildup of frost.

## Electric Defrost

Usually the heat is applied externally to the evaporator as opposed to the internal application of heat in the hot gas method. Such systems, therefore, require a longer defrost period than hot gas methods, usually 1-1/2 times as long. Heating elements used in supplying the defrost heat may be in direct contact with the evaporator or may be located between the evaporator fans and the evaporator. In each instance, the temperature limiting device should be used on or near the evaporator to prevent excessive temperature rise if any controlling device fails to operate. The defrost time control in this method will, therefore, turn the compressor off during the defrost cycle and turn on the heaters for the time required to defrost the coil.