Merlin II Smart Speed Controller - Instructions



Description: **Merlin II** is a printed circuit board measuring 1.75" square, that mounts on to the C, T, and D terminals of the standard Danfoss/Secop 101N0210 compressor controller. Two power feed wires are supplied with "piggy-back" terminals to facilitate connection with the existing power feed wires on the "+" and "-" terminals of the controller. Thermostat wires connect to the C and T terminals on the face of **Merlin II**. A green LED is provided to show compressor speed and thermostat status; a red LED shows alarm codes.

Location: **Merlin II** is designed to mount directly on to the Danfoss/Secop controller, but may be mounted remotely if desired using installer-provided connecting wires. If there is a Speed Board already installed on a Frigoboat compressor unit, this must be removed before the **Merlin II** is installed. If the **Merlin II** is to be mounted remotely, care must be taken to ensure that the location chosen will not subject the panel or its components to splashing or running water, steam, corrosive gasses, excessive vibration, or physical damage.

Installation: When installed as designed, **Merlin II** simply plugs directly on to the C, T, and D terminals of the controller using the female connectors on the rear (component) side of the board. Care must be taken to ensure that no components



are damaged during handling, that the connectors are properly mated, female over male, and that connection is correctly made to the terminals. Push on the center of the board to install. Do not push on the edges, sides or top and bottom of the board, or damage my result. Two wires from the system's thermostat plug on to the C and T terminals provided on the face of **Merlin II**, and color and/or polarity is not an issue. A 12v diode negative lead can be connected to the D terminal for remote alarm indication. If **Merlin II** is installed on any manufacturers' system other than Frigoboat, verification is required, by use of a multi-meter, that there is no resistor installed in the thermostat circuit wiring. If a resistor is installed it must be removed to ensure correct operation. The red (positive, +) and black (negative, -) wires connect to the incoming positive (+) and negative (-) 12v or 24v power using the piggy-back connectors provided and as shown in the photo's. **Merlin II** cannot be installed on the Danfoss/Secop 101N0500 AC/DC controller, and will need to be connected remotely.

Operation: **Merlin II** performs four vital functions by controlling compressor speed;

1. Protects electronics from overload at start-up using a warm-start ramp-up routine.
2. Selects the slowest possible compressor speed for maximum system efficiency.
3. Ensures that maximum speed, and hence full system capacity, is utilized when required.
4. Gives visual indication of thermostat status, compressor speed, and compressor fault alarms

(1) To avoid dangerous and potentially damaging high current draw when the system is first powered up in high ambient conditions, **Merlin II** will start the compressor in medium speed and ramp up one speed every 5 minutes until maximum speed is engaged after 15 minutes. This is the warm-start ramp-up routine. (See over)

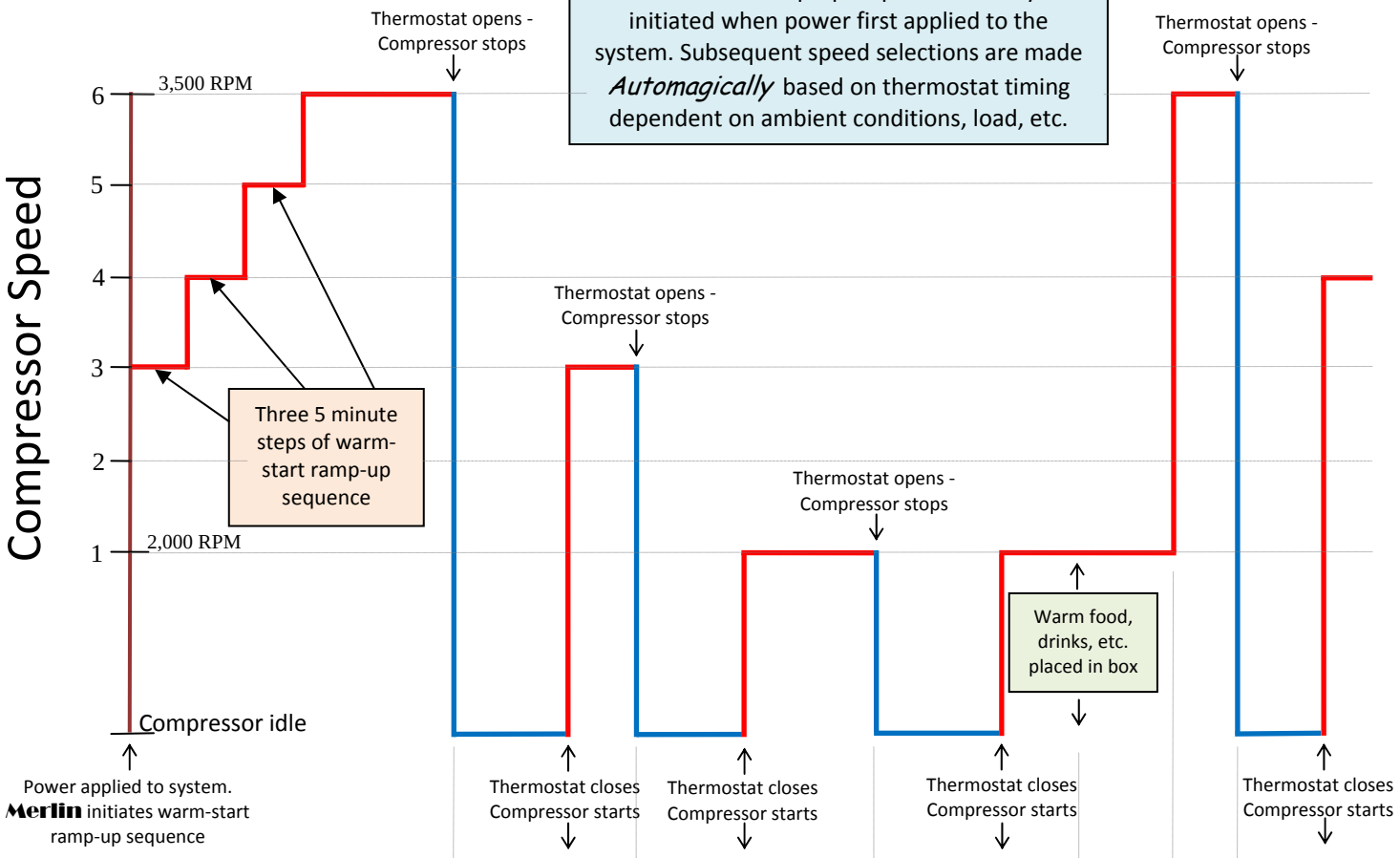
(2) The longer and slower a compressor runs, the more efficient it will be. **Merlin II** will automatically select the most efficient speed from the six available, based on the time of the previous compressor cycle. (See example over) The green LED labeled "Speed" indicates the speed at which the compressor is operating by flashing in groups of 1 through 6 corresponding to the speed. A steady glow will indicate that the thermostat contacts are open, and that the compressor is idle.

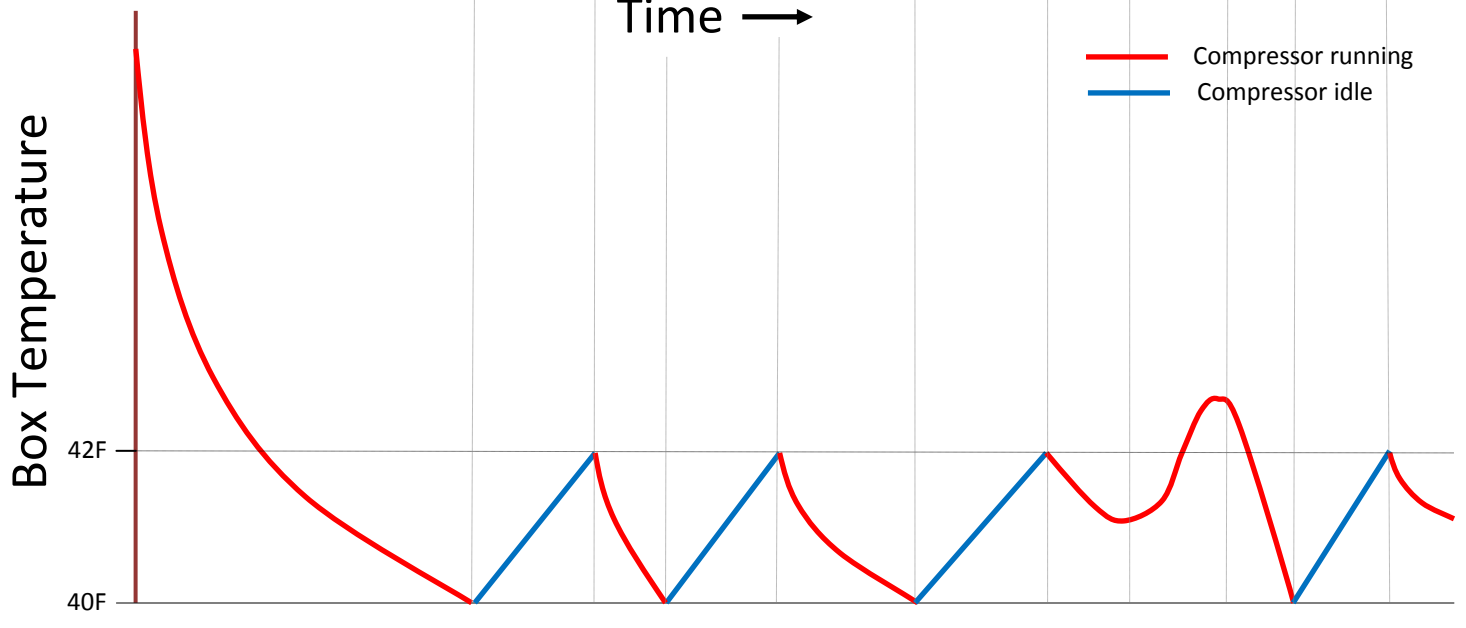
(3) If warm goods are loaded into the box, or a door/lid is not closed properly, **Merlin II** will, after a suitable delay, increase compressor speed to ensure maximum cooling. The speed will be reduced again after the issue is resolved.

(4) The red LED marked "Alarm" is for compressor fault diagnostics, and will flash a code for one of five compressor alarms: 1-Low Voltage; 2-Fan/Pump Fault; 3-Compressor Non-Start; 4-Compressor Minimum Speed Alert; and 5-Electronics Overload.

Coastal Climate Control, Inc.
www.CoastalClimateControl.com
info@CoastalClimateControl.com
301-352-5738 - Bowie MD USA

Example of *Automagic* speed control by **Merlin SSC.**
Warm-start ramp-up sequence is always initiated when power first applied to the system. Subsequent speed selections are made *Automagically* based on thermostat timing dependent on ambient conditions, load, etc.





Graphics show typical performance of refrigerator box with thermostat set at 40F with 2 deg F differential.

Coastal Climate Control, Inc.

www.coastalclimatecontrol.com
info@coastalclimatecontrol.com

301-352-5738