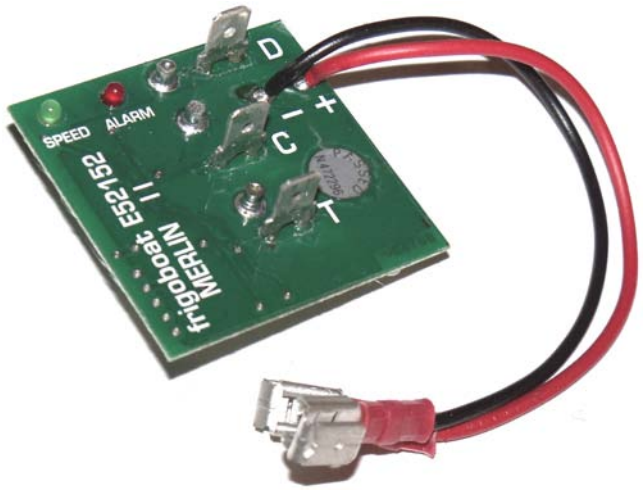
MERLIN II Smart Speed Controller



Description: Merlin II SSC is a plug-on printed circuit board (PCB) that can be installed on any system incorporating the Danfoss/Secop BD35 or BD50 compressor.* The Merlin II SSC PCB measures 1.75"" square and plugs on to the "C", "T", and "D" thermostat pins on the standard 101N0210 Danfoss/Secop electronic controller. The "C", "T", and "D" pins are replicated on the front of Merlin II SSC to enable the thermostat wires and a remote fault-indicating LED to be connected. Not for use with the 101N0300 AEO controller. 12v or 24v DC power connection is made simple with "piggy back" slip-on electrical connectors. A steady green LED shows that thermostat circuit is open-circuit; while a flashing LED shows speed compressor is currently running at. A red LED shows flashing compressor alarm codes.

**Not recommended for pumped-water cooled systems, or those utilizing a holding plate. These systems should be run at maximum speed only.*

Operation: Merlin II SSC performs four functions:



1. Uses warm-start ramp-up speed routine for protection of electronics.
2. Automatically controls compressor speed for highest possible system efficiency.
3. Gives visual indication of thermostat status or compressor speed.
4. Gives visual indication of compressor alarms.

(1) **Warm-Start Ramp-Up Sequence:** When a refrigeration system is first powered up (warm start), the loads on the electronic controller are extremely high compared to normal cycling loads. This condition exists for only the first few minutes of operation, then as the refrigeration process starts to work and begins to lower the temperature of the evaporator, the loads on the electronics decrease accordingly. To protect the electronics from these potentially damaging loads on a cold start, Merlin II SSC will start the compressor in a medium speed and then ramp up gradually until full speed is engaged after fifteen minutes of system operation.

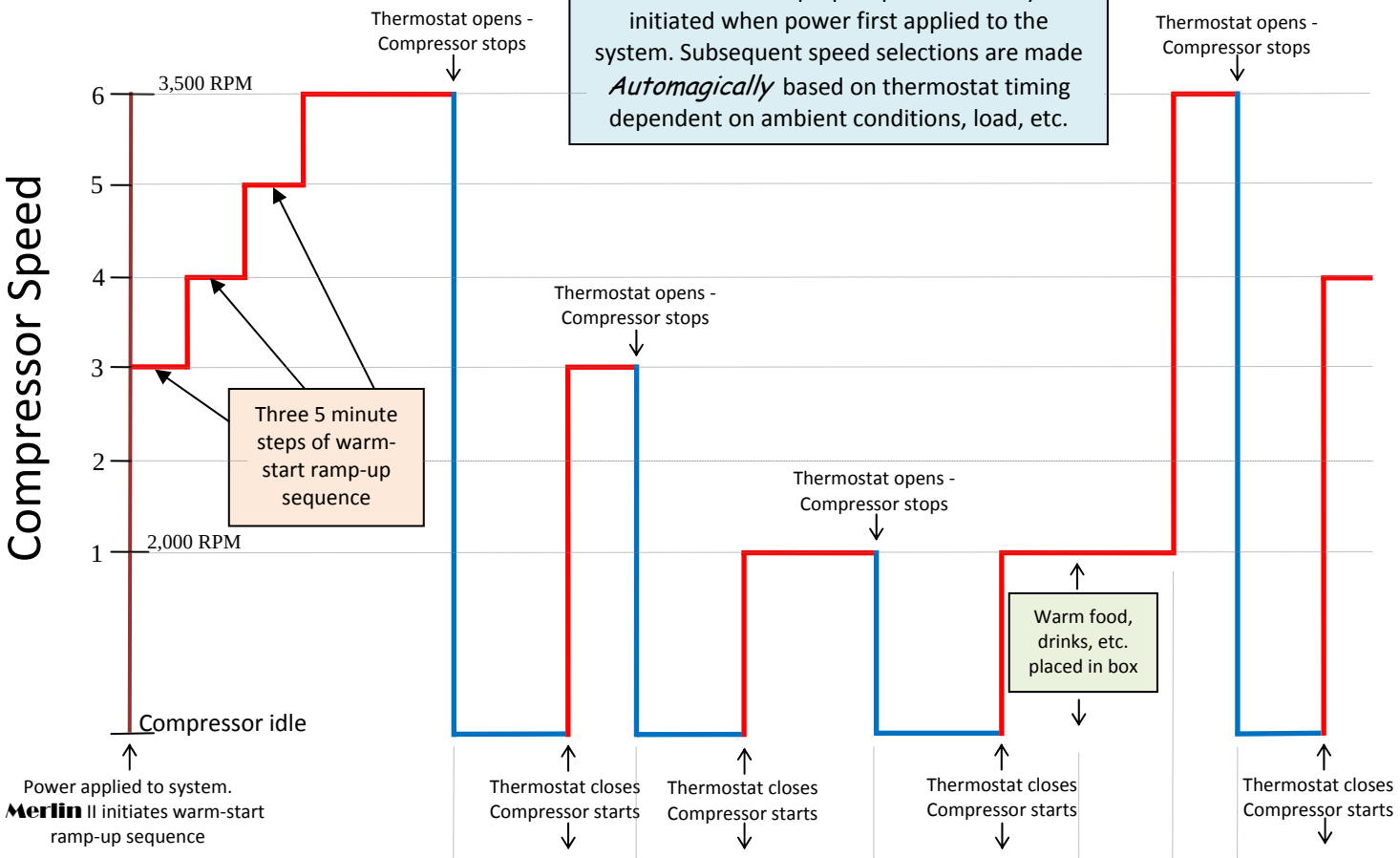
(2) **Automatic Compressor Speed Selection:** Merlin II SSC will decide which of the six available compressor speeds is appropriate, determined by the run-time of the previous thermostat cycle and with reference to the algorithm stored in memory. After the initial warm-start ramp-up sequence and over the course of the next few cycles, the compressor speed choice will settle down to one that will give the longest possible run-time and hence the highest efficiency. As operating conditions and usage change, the compressor speed will be adjusted by Merlin II SSC to maintain the highest possible efficiency while ensuring that the box is kept at the desired temperature. The principle behind controlling compressor speed being that the longer and slower a compressor can be run, the more efficient it will be, and the less energy it will consume overall.

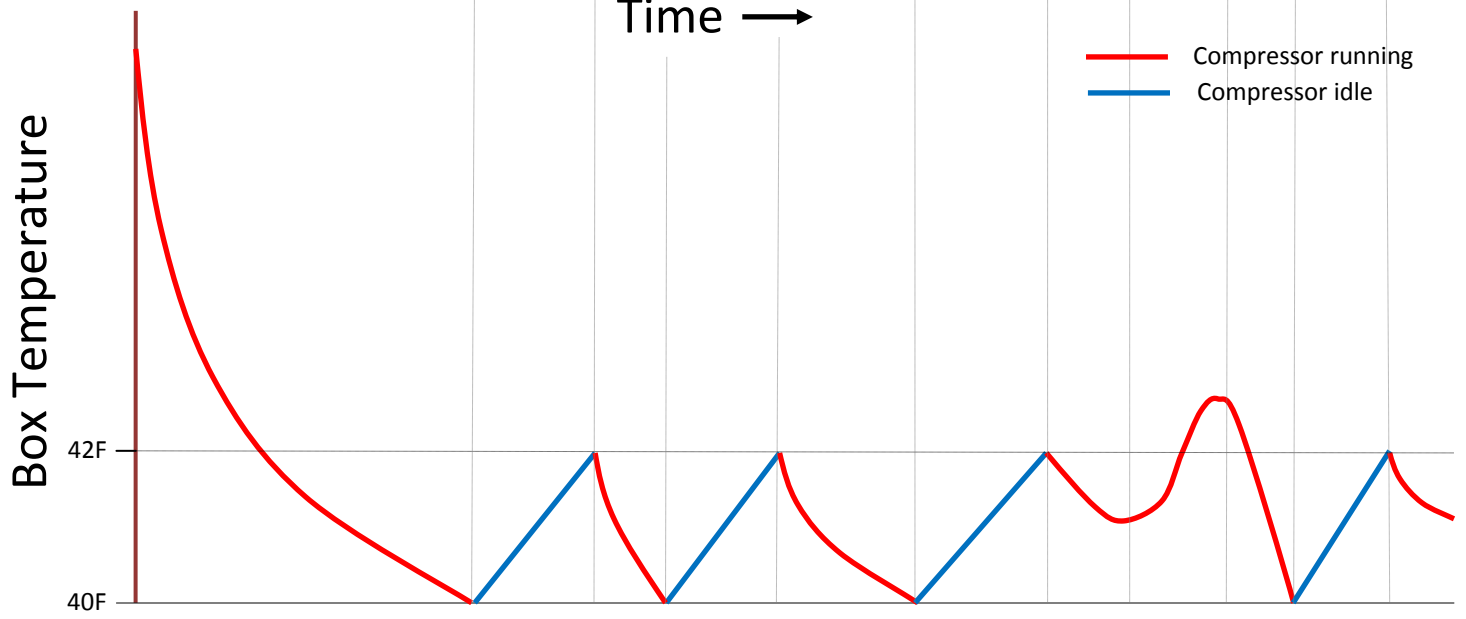
(3) **Status LED**: A green LED is provided on Merlin II SSC to give visual indication of compressor status. When the thermostat is open circuit and not calling for the compressor to run, the LED will be steady. When the compressor is operating, the LED will flash corresponding to the speed at which the compressor is being operated. This is an indispensible tool for troubleshooting thermostat issues, as well as for periodic system operational checks.

(4) **Compressor Fault Diagnostic LED:** A red compressor diagnostic LED is provided that will flash a code for one of five compressor alarms: Low Voltage; Fan/Pump Fault; Compressor Non-Start; Compressor Minimum Speed Alert; and Electronics Overload. Provision is provided for a second, remote diagnostic LED to be connected.

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Example of *Automagic* speed control by **Merlin II 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.

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