

This Greenheck unit has been supplied with a Copeland Digital Scroll™ compressor. The following information is provided to the owner as a supplement.

**Refrigeration Modulation**

Digital Scroll™ compressors modulate the refrigeration system, producing significant performance benefits. The compressor output can be modulated from 10% to 100% of capacity by means of “loading” or “unloading” the refrigerant compression scroll.

A conventional fixed scroll compressor runs at full load and then shuts down when user set points are reached. The Digital Scroll™ compressor modulates its cooling capacity by means of cycling through rapid load/no-load cycles without shutting down the compressor motor (digital control). Because it can operate at less than full load, evaporator coil temperatures are much more constant as hysteresis is improved and humidity control is enhanced.

**Compressor Cycling**

The use of a Copeland Digital Scroll™ compressor in the refrigeration circuit provides energy savings during normal operation of the unit and also improves the life expectancy of the system by avoiding on/off cycling. One of the primary causes of early failure of a refrigeration system is excessive cycling on and off. The Digital Scroll™ compressor eliminates excessive cycling by allowing the compressor to continue to run, but internal compression is eliminated in brief cycles. Depending on the control signal received from the Digital Scroll™ controller, each 15 second interval is assigned a varying load/no load run time.

**Configuration**

In Greenheck units with more than one compressor, only the lead compressor will be Digital Scroll™ type. Digital Scroll™ compressors can be identified by the label on the compressor. If the third character of the model number is a “D”, the compressor is Digital Scroll™ type (see Fig. A).



Fig. A  
Typical Compressor Label

Digital Scroll™ compressors are very similar in appearance to conventional scroll compressors, but they will also have an unloader solenoid mounted either on the side of the compressor (see Fig. B) or on a tube connected to the refrigerant suction line (see Fig. C). When the unloader solenoid is energized, the compressor will go into an unloaded state.

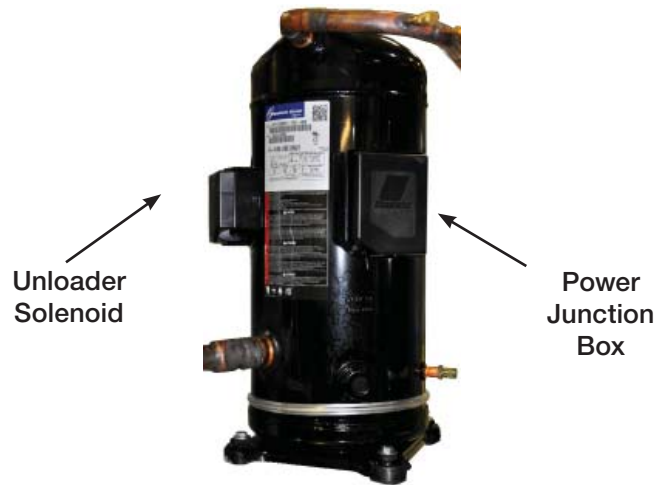


Fig. B  
Typical Copeland Digital Scroll™ Compressor  
With Surface Mounted Unloader Solenoid

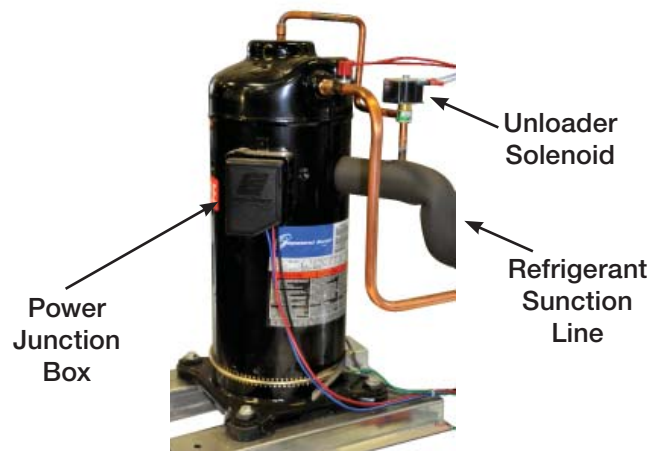


Fig. C  
Typical Copeland Digital Scroll™ Compressor  
With External Unloader Solenoid

## Electronic Control

A Copeland Digital Scroll™ compressor also requires the use of a Digital Scroll™ compressor controller (see Fig. D).



Fig. D

Copeland Digital Scroll™ Compressor Controller

This controller may be found in either the compressor compartment of the unit or in the main control center. The digital controller works in conjunction with a DDC controller or possibly with a BMS and it requires an analog input. The controller is already programmed and wired and does not require any further servicing by the owner. Detailed information on the electronic control circuitry will be found on the unit-specific wiring diagram found in the control center. The Digital Scroll™ controller constantly monitors and controls the operation of the Digital Scroll™ compressor. LED indicator lights verify the presence of power, operation of the unloader solenoid and also indicate various alarm conditions. See Fault Code chart below (Fig. E).

Copeland Digital™ Compressor Controller Fault Codes			
Alert Code	System Condition	Diagnostic Alert Light	Action
Code 2*	High Discharge Temp Trip	Blinks 2 Times	Lockout
Code 3	Compressor Protector Trip	Blinks 3 Times	Lockout
Code 4*	Locked Rotor	Blinks 4 Times	Lockout
Code 5	Demand Signal Loss	Blinks 5 Times	Lockout
Code 6	Discharge Thermistor Fault	Blinks 6 Times	Reduce Capacity
Code 7	Future	N/A	N/A
Code 8	Welded Contractor	Blinks 8 Times	Unload Compressor
Code 9	Low Voltage	Blinks 9 Times	Trip Compressor
*Protective Faults that Require Manual Reset			

Fig. E

The Fault Code chart is also printed on the back of the controller. Note that if the controller generates either a Code 2 or a Code 4 Lockout, a manual reset must be performed. Manual Reset is accomplished by shutting off main power to the unit and then turning it back on.

## Two Compressor Operation Concept

Whenever two compressors are used in a unit, the Digital Scroll™ compressor is part of refrigerant circuit “A”. A conventional fixed scroll compressor is used for circuit “B”. When the unit is at rest and there is no call for cooling, a constant 1 volt signal is sent to the Digital Scroll™ controller from the DDC to keep it from going into lockup mode. The minimum input signal that will cause the compressor to run is 1.9 volts and the maximum is 5 volts (100% cooling). Whenever there is a call for cooling, circuit A will be activated first. Circuit A will provide all necessary cooling until the call for cooling exceeds 50%. When the call for cooling reaches 50%, the Digital Scroll™ will shut down and the fixed scroll compressor will begin running. Once the call for cooling exceeds 70%, then the Digital Scroll™ will begin running again, in conjunction with the fixed scroll compressor (see Fig. F).

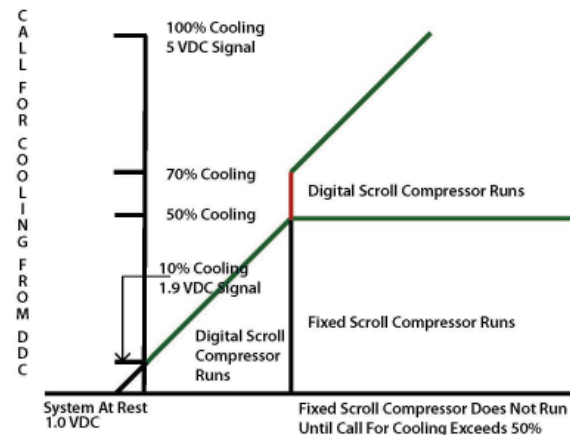


Fig. F

## System Start-Up

During unit start-up, amperage draw readings are to be taken on all three electric supply phases when the unit is running. Because the Digital Scroll™ can run without compressing the refrigerant, this can lead to false amperage-draw readings during start-up of the unit. Make certain that the amperage readings are taken when the compressor is actually running under load. Refer to the Refrigeration Start-Up portion of the unit Installation, Operation and Maintenance manual (IOM). All other temperature and pressure readings should be taken as shown in the IOM, taking care that refrigerant temperature and pressure readings on the Digital Scroll™ compressor are taken while the compressor is loaded.

## Troubleshooting

If it is necessary to troubleshoot the refrigeration system, the first step is always to check the alarm indicators on both the DDC and the Digital Scroll™ compressor controller. Remember that the Digital Scroll™ compressor may be running in a “no-load” state.