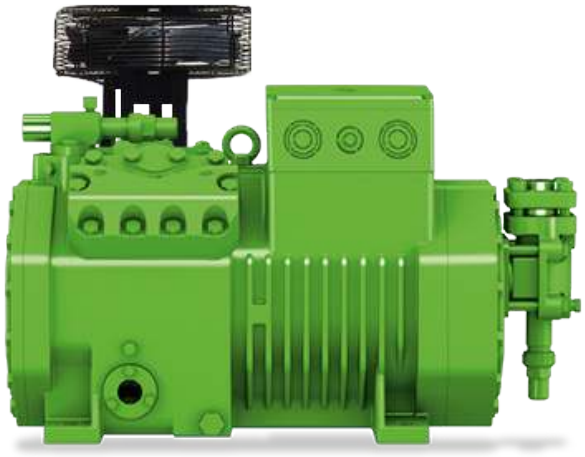
COMPRESSOR OVERHEATING PROTECTION FOR R-404A, R-407A, R-407F, R448A & R-449A REFRIGERANTS

In order to ensure proper compressor cooling, prevent overheating and meet the requirements brought about by new refrigerants, RefPlus® is providing its low temperature and extended-medium temperature condensing units with overheating protection devices. These devices will keep discharge temperatures reduced to a safe level without inhibiting the operating limits of compressors. This applies to the following compressors:

1- Bitzer Semi-Hermetic - Low & Extended-Medium Temperature
2- Emerson Semi-Hermetic - Low Temperature
3- Emerson Scroll - Extended-Medium Temperature
4- Emerson Scroll - Low Temperature

1- BITZER SEMI-HERMETIC - LOW & EXTENDED-MEDIUM TEMPERATURE

Cooling Device :	Head Cooling Fan
Unit Type:	Low & Extended-Medium Temperature Condensing Units
Unit Models:	OM, ON, SE, WE & XE
Applications:	Bitzer - Low Temperature R-404A (5L4)
	Bitzer - Low Temperature R-448A / R-449A (5LA)
	Bitzer - Low Temperature R-407A / R-407F (5L6)
	Bitzer - Extended-Medium Temperature R-404A (5E4)
	Bitzer - Extended-Medium Temperature R-448A / R-449A (5EA)
	Bitzer - Extended-Medium Temperature R-407A / R-407F (5E6)



Bitzer Semi-Hermetic Compressor With Head Cooling Fan (generic model shown)

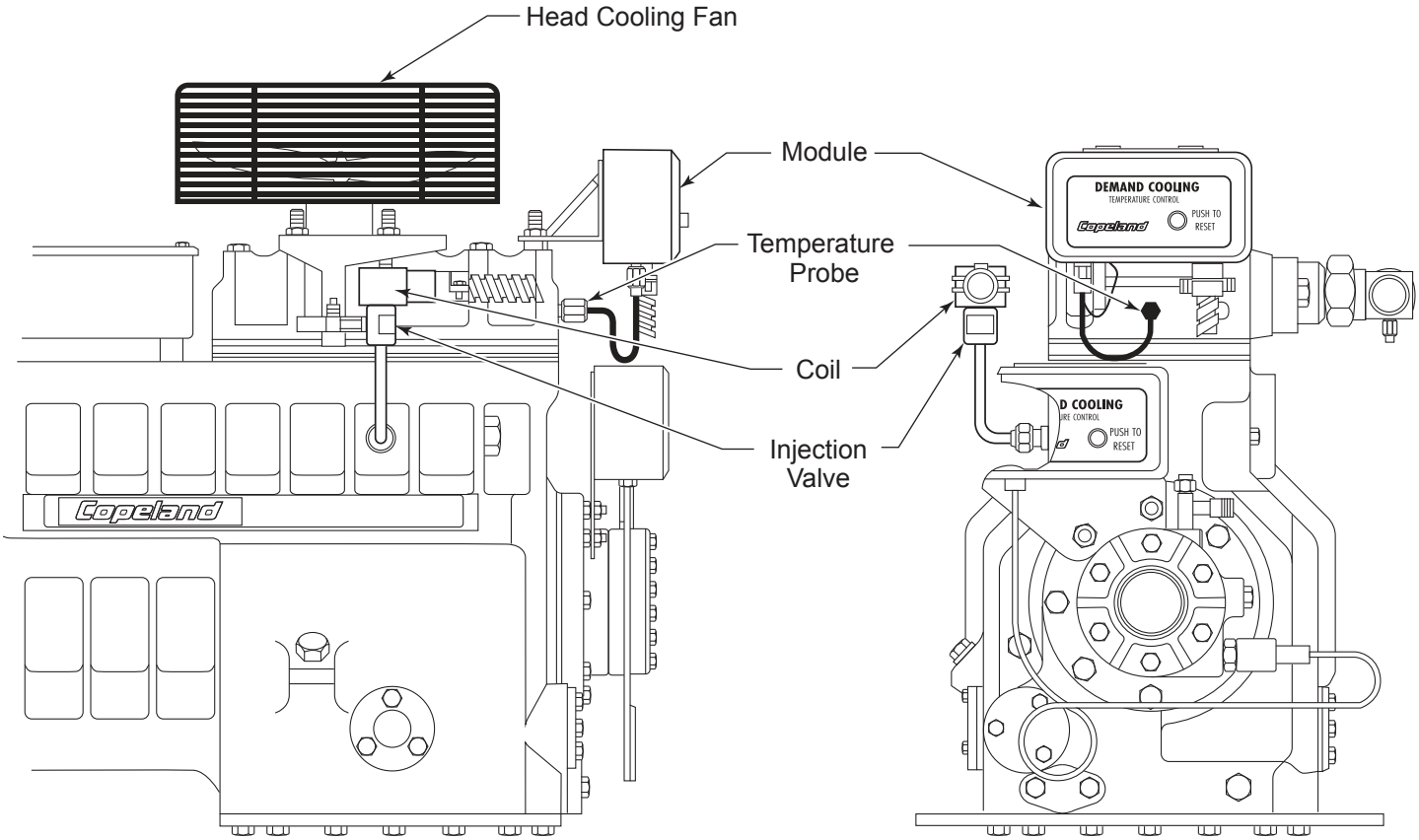
2- EMERSON SEMI-HERMETIC - LOW TEMPERATURE

Cooling Device:	Demand Cooling / Head Cooling Fan
Unit Type:	Low Temperature Condensing Units
Unit Models:	OM, ON, SE, WE & XE at R-404A (Head Cooling Fan only)
	OM, ON, SE, WE & XE at R448A / R449A (1LA) (Demand Cooling & Head Cooling Fan)
	OM, ON, SE, WE & XE at R407A / R407F (1L6) (Demand Cooling & Head Cooling Fan)
	IE & OE at R448A / R449A (1LA) (Demand Cooling only)
	IE & OE at R407A / R407F (1L6) (Demand Cooling only)
Applications:	Emerson - Low Temperature R-404A (1L4)
	Emerson - Low Temperature R-448A / R-449A (1LA)
	Emerson - Low Temperature R-407A / R-407F (1L6)

Demand Cooling System For Semi-Hermetic Compressors

The Demand Cooling module uses the signal of a discharge head temperature sensor to monitor discharge gas temperature. If a critical temperature is reached, the module energizes a long life injection valve which meters a controlled amount of saturated refrigerant into the compressor suction cavity to cool the suction gas. This process controls the discharge temperature to a safe level. If, for some reason, the discharge temperature rises above a preset maximum level, the Demand Cooling module will turn the compressor off (requiring a manual reset) and actuate its alarm contact. To minimize the amount of refrigerant which must be injected, the suction gas cooling process is performed after the gas has passed around and through the motor.

A 20°F superheat limit is recommended and can be mandatory in specific cases.



Emerson Semi-Hermetic Compressor (generic model shown)
with Demand Cooling System and Head Cooling Fan

3- EMERSON SCROLL - EXTENDED-MEDIUM TEMPERATURE

Overheating Prevention Device:	Discharge Line Thermostat
Unit Type:	Extended-Medium Temperature Condensing Units
Unit Models:	IE & OE
Applications:	Emerson - Extended-Medium Temperature R-404A (1E4)
	Emerson - Extended-Medium Temperature R-448A / R-449A (1EA)
	Emerson - Extended-Medium Temperature R-407A / R-407F (1E6)

Discharge Line Thermostat For Overheating Protection

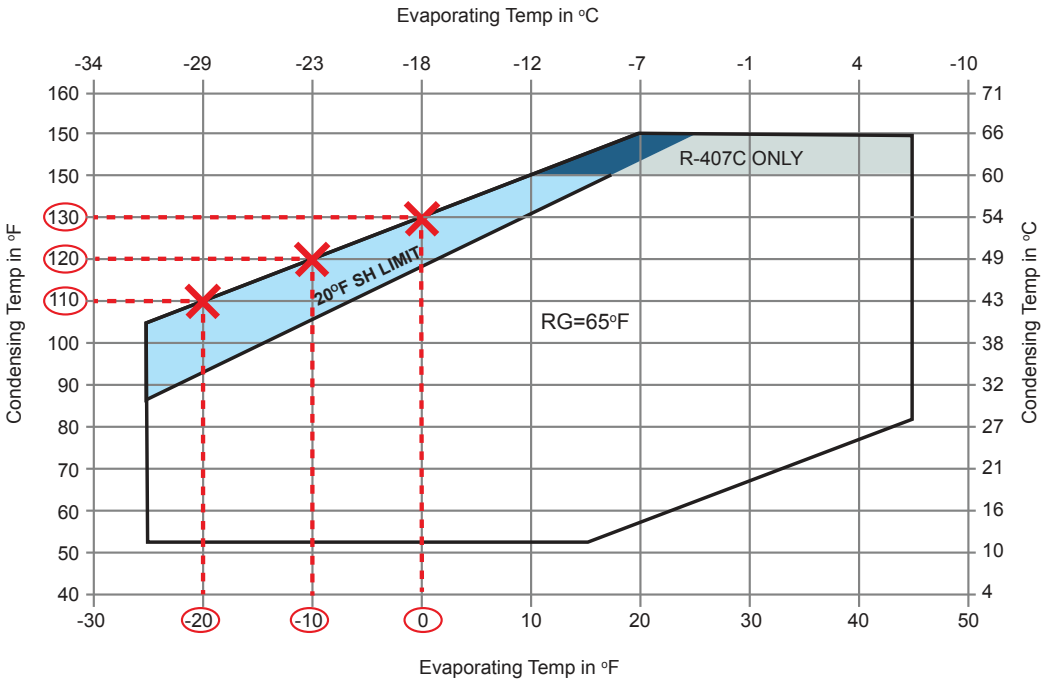
Due to the thermodynamic properties of R-407A / R-407F / R-448A / R-449A refrigerants, the superheat at the compressor inlet must be at 20°F. The graph below shows the application envelope for these refrigerants.

To protect the compressor from overheating, RefPlus installs a standard discharge line thermostat on all extended-medium temperature condensing units equipped with Emerson Scroll compressors. Such thermostats are also installed on low temperature units even though they are not required.

The thermostat has a cut-out setting that will ensure the external discharge line temperature does not exceed the 260°F limit. **A 20°F superheat limit at the compressor is mandatory.**

- **Suction accumulator must be insulated.**
- **No heat exchanger should be installed in suction accumulators or on the suction line.**
- **RefPlus units are designed for the following ambient temperature limits at the <u>lower end</u>:**

SATURATED SUCTION TEMPERATURE	MAX. AMBIENT TEMPERATURE
0°F	110°F
-10°F	103°F
-20°F	95°F



Application Envelope for R-407A/R-407F/R-448A/R-449A (Extended-Medium Temp)

4- EMERSON SCROLL - LOW TEMPERATURE

Overheating Prevention Device:	Liquid Injection Valve
Unit Type:	Low Temperature Condensing Units
Unit Models:	OM, SE, WE, XE, IE & OE
Applications:	Emerson - Low Temperature R-448A / R-449A (1LA)
	Emerson - Low Temperature R-407A / R-407F (1L6)
	Emerson - Low Temperature R-404A (1L4)

Liquid Injection

To prevent overheating, RefPlus installs a mechanical DTC liquid injection valve on all low temperature Scroll compressors.

The advantage of this type of injection system is that it tends to be self regulating i.e., as the pressure differential across the capillary tube increases, the amount of liquid fed to the compressor also increases. Since more cooling is needed at high compression ratio conditions, this “automatic” increase in liquid feed is exactly what is needed.

For the liquid injection system to be effective, a minimum of 5°F sub-cooled liquid at the capillary inlet is required. However, DO NOT use mechanically sub-cooled liquid. The cap tube will be oversized under this condition and will dilute the oil in the compressor crankcase.

Scroll Compressor with mechanical liquid injection valve