XT Panel and the ER-110 EPR
APP– 030

EPR (Electronic Pressure Regulator):
The EPR valve is normally used with multiple evaporators at different temperatures using one rack type condenser unit. The EPR has a lot of similarities to using suction control on a screw compressor or VFD compressor. Each allow the control of the suction pressure. In the case of the EPR, it is powwible that the control signal could pull the suction pressure very low in an attempt to pull down a room quickly. The problem is that the EEV may not be able to supply enough refrigerant and the superheat of the coil could go quite high. Once the superheat of the coil goes above 12 degrees, the efficiency of the coil gets very low. The ER-110 can compensate for this in a number of ways. In each case the suction pressure needs to be raised so that the superheat can be brought down. This app note will also cover the floating suction setpoint feature of the ER card.

Theory:
On a conventional system the temperature controller would output a 0-20ma signal based on the temperature difference between the Setpoint and room temp. This output would drive the EPR valve and in a direct correlation. For a 20 ma signal the EPR would be wide open providing the lowest possible suction pressure and disregard the superheat. The ER card looks at the temperature controller output signal and converts it to a pressure range. The ER card will create a Floating Suction Setpoint based on a number of other values. The EPR valve is driven by a PID loop to maintain this Floating Suction Setpoint (FSP).

How It Works:
The idea is to use the XT temperature Setpoint and a number of other parameters to calculate the ideal suction pressure.

The first calculation is to determine the lowest temperature needed to maintain the XT setpoint. This is done by subtracting the Coil DT from the XT Setpoint. Each time the XT panel updates the refrigeration parameters, it passes its temperature setpoint.

Example:

XT Setpoint = 55 degrees F.

Coil DT = 8 degrees F.

55 - 8 = 47 degrees F = 79 psi using R22 This is the highest pressure in the range.

Range = 15 psi 79 - 15 = 64 psi. This is the lowest pressure in the range.

For a XT signal of 0 to 100 percent the FSP would vary from 79 to 64 psi.

As the XT setpoint changes, the range will also change. It may still be possible at times to pull to hard on the suction and have high superheat on the evaporator suction. An example would be if you had product at 60 degrees and had a panel setpoint of 38 degrees. Doing the math:

Coil DT = 8
38 - 8 = 30 degrees = 55 psi
Range = 15
55 - 15 = 40psi suction pressure at 100% cooling demand.

Sixty degree product would produce approximately 80 psi suction at 10 degree superheat. In this example, it would be very difficult for the EEV to supply enough refrigerant to keep the superheat on the evaporator at an efficient level.

The SH_Diff setting is used to raise the suction pressure in this case. A setting of 3 degrees would start to increment the FSP as soon as the superheat was greater than the superheat setpoint plus 3 degrees. It would increment the FSP one psi every four minutes until the superheat dropped below the superheat setpoint.

Using the terminal screen on Xbase you can watch the pressure offset value to determine how this is working.