CLAIMS:

1. A refrigeration system comprising:

a refrigerant vapor compression unit including a compressor;

one or more current sensors to determine a current draw on the unit;

one or more pressure sensors to determine a refrigerant pressure in the refrigerant vapor compression unit; and

a controller to compare the current draw on the unit and the refrigerant pressure to selected acceptable ranges and determine a level of refrigerant charge in the refrigerant vapor compression unit.

2. The refrigeration system of Claim 1, further comprising one or more sight glasses disposed at a receiver of the refrigerant vapor compression unit.

3. The refrigeration system of Claim 1, wherein the controller is configured to compare the level of refrigerant charge to preselected limits.

4. The refrigeration system of Claim 3, wherein the controller triggers an alarm when the level of refrigerant charge is above or below the preselected limits.

5. The refrigeration system of Claim 1, further comprising a valve to regulate a flow of refrigerant to the compressor, a percent open area of the suction modulation valve utilized to determine the acceptable ranges.

6. The refrigeration system of Claim 5, wherein the valve is a suction modulation valve.

7. The refrigeration system of Claim1, wherein the refrigeration system is a transport refrigeration system.

8. A method of determining a level of refrigerant charge in a refrigeration system comprising:

measuring a refrigerant pressure in the refrigeration system;

sensing a current draw of the refrigeration system; and

calculating a level of refrigerant charge in the refrigeration system from the refrigerant pressure and the current draw.

9. The method of Claim 8, further comprising comparing the level of refrigerant charge to an acceptable range of refrigerant charge.

10. The method of Claim 9, further comprising regulating a flow of refrigerant into the compressor via a valve.

11. The method of Claim 9, further comprising utilizing a percent open area of the valve to determine the acceptable range.

12. The method of Claim 11, further comprising:

measuring an air or refrigerant temperature in the refrigeration system; and

utilizing the measured temperature to determine the percent open area.

13. The method of Claim 9, further comprising triggering an alarm when the level of refrigerant charge is outside of the acceptable range.

14. The method of Claim 8, wherein the refrigerant pressure is measured via one or more pressure sensors.

15. The method of Claim 14, wherein the one or more pressure sensors operate substantially continuously.

16. The method of Claim 8, further comprising verifying the level of refrigerant charge via one or more sight glasses disposed at a receiver of the refrigeration unit.

17. The method of Claim 8, wherein the refrigeration system is a transport refrigeration system.

CLAIMS:

1. A transport refrigeration system comprising:

a refrigerant vapor compression unit including a compressor;

one or more current sensors to determine a current draw on the unit;

one or more pressure sensors to determine a refrigerant pressure in the refrigerant vapor compression unit;

a controller to compare the current draw on the unit and the refrigerant pressure to selected acceptable ranges and determine a level of refrigerant charge in the refrigerant vapor compression unit;

one or more sight glasses disposed at a receiver of the refrigerant vapor compression unit; and

wherein the controller is configured to compare the level of refrigerant charge to preselected limits and the controller is adapted to trigger an audible alarm when the level of refrigerant charge is above or below the preselected limits.

2. The refrigeration system of Claim 1, further comprising a valve to regulate a flow of refrigerant to the compressor, a percent open area of a suction modulation valve utilized to determine the acceptable ranges.

3. The refrigeration system of Claim 2, wherein the valve is a suction modulation valve.

4. A method of determining a level of refrigerant charge in a transport refrigeration system comprising:

measuring a refrigerant pressure in the refrigeration system;

sensing a current draw of the refrigeration system; and

calculating a level of refrigerant charge in the refrigeration system from the refrigerant pressure and the current draw;

triggering an audible alarm when the level of refrigerant charge is outside of the acceptable range; and

verifying the level of refrigerant charge via one or more sight glasses disposed at a receiver of the refrigeration unit.

5. The method of Claim 4, further comprising comparing the level of refrigerant charge to an acceptable range of refrigerant charge.

6. The method of Claim 5, further comprising regulating a flow of refrigerant into the compressor via a valve.

7. The method of Claim 5, further comprising utilizing a percent open area of the valve to determine the acceptable range.

8. The method of Claim 7, further comprising:
measuring an air or refrigerant temperature in the refrigeration system; and
utilizing the measured temperature to determine the percent open area.

9. The method of Claim 4, wherein the refrigerant pressure is measured via one or more pressure sensors.

10. The method of Claim 9, wherein the one or more pressure sensors operate substantially continuously.