Scroll Compressor R22 Application Guidelines

Application Bulletin 126
The BRISTOL scroll compressors are available for R22 (HCFC) and some models for R134a (HFC). This Bulletin applies to R22 products only. In the future, models for R407C (HFC) and R410A (HFC) will also be available. As these alternate refrigerants are released, new Bulletins will be issued.

This application manual is comprehensive and is intended to cover the majority of design/manufacturing issues involved in applying the BRISTOL scroll compressor in HVAC systems.

Section 1.0
Describes the operating characteristics of the scroll compressor to familiarize the system designer with its features and key components.

Section 2.0
Provides a detailed explanation of the key features and design specifications of the BRISTOL scroll compressor.

Section 3.0
Contains detailed guidelines for the system designer, to assist in the successful application of the compressor.

Section 4.0
Provides guidelines for incorporating scroll compressors in the assembly process at the manufacturing site.

Section 5.0
Details techniques for servicing scroll compressors in the factory or field environment.

Section 6.0
Describes the excessive liquid floodback test procedure, used to determine the need for suction accumulators.

Section 7.0
Commercial scroll requirements, H**R78 through H**R94.

SYSTEM DESIGN

1.0 Refrigerant Metering Devices
The performance of each system is very dependent on the proper operation of each metering device. Devices such as solenoid valves, capillary tubes, fixed orifice valves, and expansion valves can perform differently if they are not correctly adjusted or properly sized. For example, the port size of a valve may not be correct for the new refrigerant density. Each valve and metering device manufacturer should be consulted, along with the system’s manufacturer, to ensure all components will work properly in the presence of the new refrigerant and lubricant.
SCROLL COMPRESSOR FUNCTIONAL DESCRIPTION

Key Components
1. Discharge plenum
2. Discharge tube
3. Pressure relief valve
4. Fixed scroll
5. Orbiting scroll
6. Terminal cover
7. Electric terminal
8. Counterweight
9. Eccentric shaft
10. Lower bearing
11. Thrust washer
12. Oil tube
13. Lower bearing ring
14. Shell
15. Stator
16. Rotor
17. Crankcase
18. Slider block
19. Thermal valve
20. Check valve
1.0 **Scroll Compressor Components**
A cutaway view of the scroll compressor with key components labeled is shown in Figure 1-1. The motor stator is rigidly attached to the shell. The rotor is shrink-fitted onto the eccentric shaft. The shaft is supported by two bearings, one in the crankcase and the second below the motor.

1.1 **Scroll Compression Process**
The diagram shown in Figure 1-2 (on page 3) describes the scroll compression process. The two components shown are mating involute scrolls. One scroll is fixed in place and the other scroll orbits within this fixed scroll. One part that is not shown in this diagram but is essential to the operation of the scroll is the anti-rotation coupling. This device maintains a fixed angular relation of 180 degrees between the fixed and orbiting scrolls. This fixed angular relation, coupled with the movement of the orbiting scroll, is the basis for the formation of gas compression pockets.

As shown here, the compression process involves three orbits of the orbiting scroll. In the first orbit, the scrolls ingest and trap-off two pockets of suction gas. During the second orbit, the two pockets of gas are compressed to an intermediate pressure. In the final orbit, the two pockets reach discharge pressure and are simultaneously opened to the discharge port.

This simultaneous process of suction, intermediate compression, and discharge leads to the smooth continuous compression process of the scroll compressor.

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**Figure 1-2**

- **Suction**
- **Compression**
- **Discharge**
2.0 **Key Features of Bristol Scroll Compressors**

2.1 **General**
BRISTOL scroll compressors are manufactured in a world-class production facility using the latest state-of-the-art machining, assembly, and process control techniques. During all design phases of both the compressor and the manufacturing facility, careful consideration was given to maintaining high standards of reliability and process control. The key features of the design are described below.

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**Model Number Breakdown**

<table>
<thead>
<tr>
<th>H 2 0 C 343 A B C A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Feet Hole Spacing (A = 7.5 x 7.5)</td>
</tr>
<tr>
<td>Electrical Characteristics (C = 230/208-1-60)</td>
</tr>
<tr>
<td>Internal Line Break Motor Protector</td>
</tr>
<tr>
<td>Motor Type: A = Single Phase; D = Three Phase</td>
</tr>
<tr>
<td>Compressor Rating (343 = 34 + 000 = 34,000 BTU/Hr.)</td>
</tr>
<tr>
<td>Compressor “Family” Series (C = Model “C”)</td>
</tr>
<tr>
<td>Generation (0 = Basic Standard Model)</td>
</tr>
<tr>
<td>Refrigerant Type (2 = R22)</td>
</tr>
<tr>
<td>Application (H = High Temperature)</td>
</tr>
</tbody>
</table>

*Refer to Bristol Specification 530000 for all other designations*

2.2 **Reliability**
A rigorous qualification test program has been completed to ensure that reliability objectives have been met. These compressors have been tested in ambient temperatures ranging from -29°C to 51.6°C (-20°F to 125°F). Field-installed test systems with extensive instrumentation have been continuously monitored.

2.3 **General Compressor Specifications**

2.3.1 **Insulation Resistance**
BRISTOL scroll compressors are configured with the motor below the pump assembly located at the top of the shell. As a result, the motor is partially immersed in refrigerant and oil. The presence of refrigerant around the motor windings will result in lower resistance values and higher leakage current readings. These readings are not cause for concern and do not indicate a faulty compressor. It is recommended to operate the system for a brief period of time to redistribute the refrigerant throughout the system, and then retest the compressor for insulation resistance or current leakage. The insulation resistance shall be greater than 1 megohm when measured with a 500 volt-direct current megohm tester.

2.3.2 **Residual Moisture**
Every compressor is dehydrated, evacuated, and charged with dry nitrogen at the factory prior to shipment. Maximum residual moisture levels for the two families are shown Table 2-3.
2.3.3 **Oil Charge Levels**
The compressors are charged with oil at the factory to the levels shown in Table 2-4. For compressors using Refrigerant 22, the oil used is Zerol 150 with 3% Syn-O-Ad. If additional oil charge is added for in-service conditions, only Zerol 150 with Syn-O-Ad should be used.

Table 2-4 Oil Charge Levels For R-22 Compressors

<table>
<thead>
<tr>
<th>FAMILY</th>
<th>OIL CHARGE ml (fluid oz.)</th>
<th>OIL RECHARGE ml (fluid oz.)</th>
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</thead>
<tbody>
<tr>
<td>H2*C</td>
<td>1065 (36)</td>
<td>976 (33)</td>
</tr>
<tr>
<td>H2*R</td>
<td>1597 (54)</td>
<td>1508 (51)</td>
</tr>
</tbody>
</table>

*0 or 1, standard or high efficiency

2.3.4 **Starting Voltage**
The compressor will start at 90% of the lowest nameplate voltage when measured as near to the compressor terminals as possible, with the compressor energized (except 95% for 230/208-1-60). Voltage should not be measured directly at the compressor terminals under energized conditions with the terminal cover removed. There should be no pressure differential between the low pressure and high pressure side of the system or the compressor. The maximum system equalized pressure should not exceed 170 psig. The starting voltage should be applied for a period of six (6) seconds before rejecting for failure to start. If the protector trips in less than six (6) seconds, three (3) protector resets should be allowed. Single phase 50 Hz compressors may be tested with 50 or 60 Hz power, providing voltage is measured at the compressor terminals at the instant power is applied.

<table>
<thead>
<tr>
<th>Compressor Nominal Voltage</th>
<th>Test Volts</th>
<th>Test Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>220 through 240 volts, 50 Hz</td>
<td>220</td>
<td>198</td>
</tr>
</tbody>
</table>
2.3.5 **PTCR Start Assist**
The standard efficiency, single-phase models do not require start assistance. A 12.5 ohm positive temperature coefficient resistor (PTCR) may be required on some high efficiency, single-phase models only (refer to individual specification sheets). If a unit having a PTCR fails to start on the first attempt, it is necessary to wait 5 to 10 minutes for the device to cool down and reset before attempting to start again.

![Wiring Diagram for a Typical Positive Temperature Coefficient Resistor (PTCR)](image)

2.3.6 **Overload Protection**
BRISTOL scroll compressors are protected by internal line break overload protectors that sense motor winding temperature and current. These protectors are automatic reset devices containing a snap action bimetal switch.

Internal protectors respond to over current and high temperature. They are designed to interrupt motor current under a variety of fault conditions such as: failure to start, running overload, fan failure and loss of charge. In single-phase compressors, internal protectors provide protection against external miswiring, such as reversing electrical connections to the Run (R) and Start (S) terminals. In three-phase compressors these devices provide protection during transformer primary and secondary single-phase conditions.

3.0 **System Design Considerations**

3.1 **General**
The successful application of scroll compressors is dependent on a good match between the system design and the compressor. A poorly matched system will result in the compressor running beyond the limitations specified in this manual. This may result in poor performance and/or reduced reliability.

3.2 **Sound Levels**

3.2.1 **At Start-Up**
During the start-up transient it is natural for the compressor sound levels to be slightly higher. Both the H2°C and H2°R scroll compressor models exhibit very little start-up transient sound. If the compressor is miswired in 3-phase models, the compressor will run in the reverse direction. The reverse rotation is characterized by an objectionable sound from the compressor. This can be corrected by disconnecting power and switching any two power leads at the unit contactor. Never switch leads directly at the compressor.

3.2.2 **Normal Running**
BRISTOL scroll compressors are designed with optimized discharge ports and wrap geometry to control the sound levels of each compressor.

3.2.3 **At Shutdown**
Many scroll compressors can operate in the reverse direction unless a suitable reverse rotation...
device is installed. The BRISTOL scroll compressor is equipped with a patented internal check valve. This check valve virtually eliminates the reverse flow condition, and as a result the scroll element clatter at shutdown is virtually nonexistent.

3.3 **Voltage Range**
Running voltage measured at the compressor between common and run terminals should be within +10% of the highest and -10% of the lowest rated voltage (except -5% for 230/208-1-60 products) as noted on the individual compressor specification sheet to ensure continued operation.

For three-phase applications the voltage measured at the compressor terminals for any phase should be within ±2% of the average for all phases.

3.4 **Condensing and Evaporating Temperature Ranges**
The steady state temperature range and operating envelope for BRISTOL scroll compressors are shown in Table 3-2 and Figure 3-1. Under transient conditions, such as start-up and defrost conditions (for heat pump applications), the compressor may operate outside this envelope for short periods. Sustained operation outside the envelope is not recommended.

<table>
<thead>
<tr>
<th>TEMPERATURE RANGE</th>
<th>°F</th>
<th>°C</th>
<th>PRESSURE RANGE (PSIG)</th>
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<tr>
<td>Evaporating</td>
<td>-20 to 55</td>
<td>-28.9 to 12.8</td>
<td>10.1 to 92.6</td>
</tr>
<tr>
<td>Condensing</td>
<td>80 to 150</td>
<td>26.7 to 65.6</td>
<td>143.6 to 381.5</td>
</tr>
<tr>
<td>Maximum Discharge</td>
<td>280</td>
<td>137.8</td>
<td>NA</td>
</tr>
</tbody>
</table>

![Table 3-2 Operating Ranges](image)

Figure 3-1
Operating Envelope
3.5 **Maximum Discharge Gas Temperature**
Discharge gas temperature should be measured with an insulated thermocouple attached to the discharge line 15.3 cm (6 inches) from the shell of the compressor. Maximum discharge gas must not exceed 137.8°C (280°F) when measured within the compressor operating envelope.

3.6 **Maximum Suction Gas Temperature**
Maximum suction gas temperature under steady-state operating conditions is 41°C (105°F).

3.7 **Minimum Sump and Discharge Superheat**
The minimum sump temperature is to be 16.7°C (30°F) above saturated suction temperature and the minimum discharge temperature is to be 27.8°C (50°F) above the saturated condensing temperature. Refer to Section 6.0 for floodback test criteria and procedures.

3.8 **Maximum Housing (Bottom Center) Temperature**
The housing temperature should be measured with an insulated thermocouple and must not exceed 225°F.

3.9 **Maximum Refrigerant Charge Without Suction Accumulators**
Maximum refrigerant nameplate charge for the H2*C family is 3.63 kg (8 lbs.) and 5.44 kg (12 lbs.) for the H2*R family. Refer to Section 6.0 for suction accumulator requirements when maximum charge levels are exceeded.

3.10 **Maximum Operating Angle Of Inclination**
The inclination from the vertical plane shall not exceed 7 degrees.

3.11 **Maximum Operating Condition**
The maximum load condition for long-term operation is 92.6 psig suction pressure and 382 psig discharge pressure, and 90% (except 95% for 230/208-1-60) rated voltage.

3.12 **Crankcase Heater**
The BRISTOL scroll compressor is liquid refrigerant tolerant and does not require a crankcase heater (except for commercial compressor models, for these see section 7.0).

3.13 **Loss Of Charge Protection**
An internal thermal valve will protect the compressor during a loss of charge situation. A low pressure switch is not required. We do recommend a manual reset low pressure control on commercial applications due to isolation of unit (with multiple unit installations, the loss of refrigerant may go unnoticed until compressor failure).

3.14 **High Pressure Protection**
The compressor is equipped with an internal pressure relief valve. A high pressure switch is not required. We do recommend a manual reset high pressure control on commercial applications, again due to isolation of unit.

3.15 **Mounting Hardware**
Bristol recommends the use of a neoprene grommet with a durometer range of 35-45. Mounting hardware; bolts, nuts, washers, and sleeve should be low carbon steel that is treated to withstand at least 100 hours salt spray testing, part numbers listed below:

- 202069 Bolt/sleeve assembly
- 236228 Grommet
- 236437 Grommet spacer (separate sleeve)

3.16 **Deep Vacuum Operation**
BRISTOL scroll compressors should never be used to evacuate an air conditioning or refrigeration system. This is due to the high volumetric efficiency which will allow extremely low vacuums when the
suction side of the compressor is closed or restricted. The low vacuum pressures may cause internal arcing at the electrical terminal which can result in tripping of circuit breakers and blown fuses. This practice will result in a damaged or failed compressor.

3.17 **Brief Power Interruptions**

Brief power interruptions can cause powered reverse rotation of single-phase scroll compressors. When the power is reapplied, the compressor may continue to run in the reverse direction for several minutes. In this situation the internal line break will shut the compressor off. After tripping on the line break, it will operate in the correct direction once the power is restored. This reverse rotation will have no adverse effects on compressor reliability.

4.0 **System Assembly and Process Considerations**

4.1 **Compressor Holding Charge**

Each compressor is shipped with a dry nitrogen nominal holding charge between 10 psig and 15 psig and is sealed with elastomer plugs. The plugs should be removed with care to avoid the loss of oil when the holding charge is released.

4.2 **Tube Brazing Procedure**

During brazing the unit piping to the compressor, a nitrogen purge must be used. Do not bend the discharge or suction lines or force the unit piping into the compressor connections since this will increase stress and potential for failure. For brazing procedures and recommended material, see Figure 4-1 and the procedures listed below.

![Figure 4-1](attachment:image.png)

**Figure 4-1**

**Tube Brazing**

1. Recommended brazing material: A 15% silver brazing material is recommended for copper plated steel suction and discharge fittings.
2. Clean the compressor tubing and system piping prior to assembly.
3. A double-tipped torch is recommended during brazing.
   a. Apply heat to Area 1, moving the torch up and down and rotating around the tube in order to heat the tube evenly. It will become a dull orange color.
   b. Move the torch to Area 2 until it reaches a dull orange color. Move the torch up and down and rotate it around tube in order to heat the tube evenly.
   c. Add braze material to the joint while moving the torch around joint to flow braze material evenly around the circumference.
   d. After braze material flows around the joint, move torch to Area 3. This will draw the braze material into the joint. The time spent heating Area 3 should be minimal, in order to keep excess braze material from entering the compressor.

4.3 **System Evacuation**

The system must be evacuated to a vacuum level of at least 200 microns of mercury to remove residual moisture.

4.4 **System Charging**

It is recommended that system charging be done using the weighed charge method, by adding refrigerant to the high side of the system. Charging the high and low sides of a system with gas simultaneously is also an acceptable method. Do not exceed the recommended unit charge and never charge liquid to the low side.
4.5 **Wiring Connections**

The BRISTOL scroll compressors will only compress gas in the counterclockwise direction when viewed from the top. Since single-phase motors will start and run in only one direction, reverse rotation is not a concern. Three-phase motors will start and run in either direction depending on the phase angles of the supplied power. *This requires care during installations to ensure the compressor is operating in the proper direction.* Verification of proper rotation is done by observing suction and discharge pressures when the compressor is energized. Reverse rotation is indicated by a decrease in discharge pressure and an increase in suction pressure. Reverse rotation has no negative impact on BRISTOL scroll compressors. However, after several minutes of operation the compressor line break will shut the compressor off. In order to correct this, disconnect power and switch any two power leads at the unit contactor. Never switch leads directly at the compressor.

Internal wiring of the BRISTOL three-phase scroll compressor is consistent with the direction of rotation. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same power terminals should maintain proper rotation direction. Figure 4-2A shows the electrical terminal labeling for reference when wiring the compressor. For three phase applications the terminals are labeled T1, T2 and T3. For single-phase applications the terminals are labeled C (common), S (start), and R (run). Each compressor is labeled with both sets of labels as shown in Figure 4-2A. Some compressors may be provided with screw type (ring) terminals, see Figure 4-2B.

![Figure 4-2A](image)

*Figure 4-2A*  
Compressor Power Terminal Diagram (Push-on)

![Figure 4-2B](image)

*Figure 4-2B*  
Compressor Power Terminal (Ring) - T Block

4.6 **Terminal Cover and Gasket**

The terminal cover and gasket must be installed prior to operation of the compressor. The terminal cover has two tabs on the outside diameter 180° apart which engage into the terminal fence. To ensure the cover is installed properly, check that the lead wires are not pinched under it. To avoid placing the cover upside-down, check the inside of the terminal cover for the arrow which indicates the top of the terminal cover. Please refer to Figure 4-3. The power terminal pins C (common), R (run), and S (start) are labeled inside the terminal cover and on the gasket.

![Figure 4-3](image)

*Figure 4-3*  
Inside of the Terminal Cover
5.0 Service Considerations

5.1 System Evacuation
When evacuating a system in the field, it is extremely important to use a vacuum manifold set with at least 2 vacuum lines connected to the system. One line must be connected to the high side of the system and one line must be connected to the low side of the system. This procedure is necessary to ensure that the system is completely evacuated, since the scroll sets can seal under some non-energized conditions and in turn isolate the high and low sides from each other. If this situation occurs and only a single evacuation line is used, it is possible to unknowingly leave some charge in the system. This could create a hazard if the system was unbrazed with a refrigerant charge still present in the system. Whenever the compressor is replaced, the filter drier should be replaced at the same time. Please be sure to follow all local, state, and federal laws or regulations regarding refrigerant recovery, reclamation, recycling and storage.

5.2 Unbrazing System Components
Before unbrazing any system component, it is extremely important to check both the high and low sides of the system with manifold gauges to ensure that all refrigerant has been recovered. A refrigerant and oil mixture can ignite if it comes in contact with a flame. This hazard dictates the caution that must be taken when unbrazing system components.

5.3 Brazing Procedures
Please note Figure 5-1 and the procedures listed for field servicing of system components.

![Figure 5-1: Field Service Brazing](image)

To Disconnect:
1. Disconnect power and remove wires from junction box.
2. Insure all pressure is out of the system (check high and low sides).
3. Heat Areas 2 and 3 slowly and uniformly until braze material softens and the tube can be pulled from the compressor fitting.

To Reconnect:
1. Recommended brazing material: See Section 4.2
2. Clean tube and fitting.
3. Reinsert tube into fitting.
4. Heat tube uniformly in Area 1, moving slowly to Area 2. When joint reaches brazing temperature (a dull orange color), apply the brazing material.
5. Heat joint uniformly around the circumference to flow the braze material completely around the joint.
6. Slowly move the torch into Area 3 to draw the braze material into the joint.
7. Do not overheat the joint. In some applications a cherry red color is indicative of overheating of the joint, which can weaken the joint and fittings.

5.4 Bristol Scroll Compressor Functional Check
In order to evaluate whether the BRISTOL scroll compressor is functioning properly, the following procedures should be observed:

1. Voltage of the unit should be measured and verified as being correct.
2. An evaluation of the electrical system should be performed next. The status of the motor should then be checked by using continuity and short to ground testing. The internal overload motor protector should be given time to reset if a continuity break is found in the motor windings.
3. Operation of indoor and outdoor fan/blower should be measured and verified as being correct.
4. Check charge levels by connecting service gauges to the suction and discharge service valves and then turning on the compressor. If suction pressure is lower than system pressure specifications, then the system is low on charge or there is a flow blockage. Please refer to pressure charge on side of unit.
5. After checking the reversing valve and determining the operation is acceptable, verify that the compressor current is within the published compressor specifications at the proper operating conditions. If significant deviations from published specifications occurs (± 15 %), this may indicate a defective compressor.

5.5 Compressor Replacement - Motor Burn Out
If a motor burn out is present, follow the evacuation procedure, section 5.1. Remove and replace the liquid line filter drier, and install properly sized suction line filter drier. Be sure to use the proper clean out procedures. The suction line filter drier should be checked within 48 hours to check the pressure drop across it. If a pressure drop exists that exceeds the filter drier recommendations, the liquid line and suction line filter driers must be replaced.

6.0 Floodback Test Procedure
The following test procedures are provided for determining the need for suction accumulators. Refer to Figure 6-1 and Figure 6-2 to determine when to apply the following tests.

6.1 Excessive Liquid Floodback Test

6.1.1 Split Unit Cooling Mode
Set up a system with the smallest rated indoor section for the tested outdoor section. Charge the system with nameplate charge using 7.62 m (25 ft.) of interconnecting tubing. The outdoor section is to be operated with full airflow and the indoor section is to be operated with 50% airflow (optional: lowest expected airflow with 120% system nameplate charge). Operate the system at 35°C (95°F) dry bulb outdoor and 19.4°C (67°F) dry bulb, 13.9°C (57°F) wet bulb indoor for a minimum of one hour. The compressor sump temperature minus saturated suction temperature must be a minimum of 16.7°C (30°F) and the discharge temperature minus saturated condensing temperature must be a minimum of 27.8°C (50°F). If these criteria are not met, a suction accumulator is required.

6.1.2 Split Unit Heating Mode
Set up a system with the largest rated indoor section for the tested outdoor section. Charge the system with 120% of nameplate charge using 7.62 m (25 ft.) of interconnecting tubing. The indoor section is to be operated with full airflow and the outdoor section air is to be reduced to the lowest expected level to simulate coil icing, etc. Operate the system at 21.1°C (70°F) dry bulb indoor and -8.3°C (17°F) dry bulb, -9.4°C (15°F) wet bulb outdoor for a minimum of one hour. The compressor sump temperature minus saturated suction temperature must be a minimum of 16.7°C (30°F) and the discharge temperature minus saturated condensing temperature must be a minimum of 27.8°C (50°F). If these criteria are not met, a suction accumulator is required.

Repeat the test in paragraph 6.1.2 with the outdoor temperature at -17.8°C (0°F) dry bulb. If the minimum sump and discharge temperature criteria as outlined in 6.1.1 and 6.1.2 are not met, a suction accumulator is required.

7.0 Commercial Scroll Requirements
This covers R models from H**R78 - 94.

7.1 General
The 6.5 through 7.8 ton commercial scroll, while based on the H**R platform, has several unique design changes and requirements. For applications of this product line, the information in this section supersedes that in other sections, unless noted.

7.2 High Pressure Control
The commercial product line is not equipped with internal pressure relief, therefore, a high pressure
switch set no higher than 2932 kPa ± 35 kPa (425 psig ± 5 psig) for R-22 and R-407C, and 4690 kPa ± 35 kPa (680 psig ± 5 psig) for R-410A must be installed in the unit system.

7.3 Crankcase Heat
To prevent excessive refrigerant migration during off-cycles, a 70-watt minimum crankcase heater is required for this product line. For initial installation of precharged systems and any extended power interruptions, the heater should be energized for 24 hours prior to compressor start-up.

The Tutco CH230 type (bellyband style) heater is approved for the Infinity scroll.

7.4 Filter/Drier
A properly sized filter/drier is required for all commercial scroll applications. Filter/driers are to be located in the liquid line.

7.5 Reverse Rotation Protection
Three-phase miswire protection is required for all applications. The selected phase sensing device must lockout the compressor to keep it from operating in reverse.

7.6 Loss of Charge Protection
The commercial scroll does not include the use of the thermal valve referenced in section 3.13; therefore, all applications require loss of charge protection per sections 7.6.1 and 7.6.2 below.

7.6.1 Air Conditioning
A low pressure switch in the low pressure side of the system set at 172 kPa (25 psig) nominal for R-22 and R-407C and 345 kPa (50 psig) nominal for R-410A with automatic reset or A discharge line thermostat set no higher than 150°C (300°F). The thermostat must be a manual lockout type device (or electrical lockout circuit) and located within 152 mm (6 inches) of the compressor discharge connection.

7.6.2 Heat Pump
A discharge line thermostat set no higher than 150°C (300°F). The thermostat must be a manual lockout type device (or electrical lockout circuit) and located within 152 mm (6 inches) of the compressor discharge connection.
Figure 6-1
Floodback Test Procedure

*REQ = Requirements for sump and discharge superheat as defined in Section 6.1.1

NOTE: System charge limits without an accumulator are 3.63 kg (8 lbs.) for H2°C products and 5.44 kg (12 lbs.) for H2°R products.
HEAT PUMPS

INDOOR COIL ▶
NON-BLEED

OUTDOOR COIL ▶
NON-BLEED

SYSTEM CHARGE ▶

<8 LBS ≤12 LBS
<8 LBS >12 LBS

TEST REQUIRED ▶
NO

<REQ

YES

SUMP AND DISCHARGE SUPERHEAT TEMPERATURES ▶

NO

YES

ACCUMULATOR REQUIRED ▶

<REQ

YES

>REQ

NO

YES

INDOOR COIL ▶
BLEED

OUTDOOR COIL ▶
NON-BLEED

SYSTEM CHARGE ▶

≤8 LBS ≤12 LBS
>8 LBS >12 LBS

TEST REQUIRED ▶
YES

<REQ

YES

>REQ

NO

YES

SUMP AND DISCHARGE SUPERHEAT TEMPERATURES ▶

<REQ

YES

>REQ

NO

YES

ACCUMULATOR REQUIRED ▶

Figure 6-2
Floodback Test Procedure

*REQ = Requirements for sump and discharge superheat as defined in Section 6.1.2

NOTE: System charge limits without an accumulator are 3.63 kg (8 lbs.) for H2*C products and 5.44 kg (12 lbs.) for H2*R products.
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<td></td>
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<td>10/2/15</td>
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Release EN Number C20203

Release Date 2/8/96

Revision Z27301