Advanced Scroll Temperature Protection

**Goals**

Discharge temperature (overheat) protection that is:

**Internal**
- In direct contact with key components
- Unable to be bypassed

**Automatic**
- No wires, relays, or circuitry to deal with

**Reliable**
- Protects against all typical causes of scroll overheating
Advanced Scroll Temperature Protection

Causes of Scroll Overheating

Typical Causes of Scroll Overheating:

System Malfunctions

→ Fan failures, loss of charge, blocked expansion devices

Low Suction Pressures (No gas flow; Heat not carried Away)

→ Improper system charging (see page 8)
→ Out of envelope operation
→ Bypassed low pressure controls

Missing, bypassed, or poorly placed external protection devices

→ External devices inaccurate, internal temps. Often much higher
→ Temporarily bypassing devices leads to damage
→ Initial damage results in failures later
Advanced Scroll Temperature Protection

*Internal View*
Advanced Scroll Temperature Protection

Bi-metal Disk Positions

Closed

Open
Advanced Scroll Temperature Protection

Operation

1. Bi-metal disk opens when critical internal temperature is reached [around 300°F/150°C]
2. Compressor “unloads” but continues to run
   • “Balanced pressure” operation
   • Motor heat builds inside compressor
   • No refrigerant flow to carry motor heat away
3. Motor protector opens
   • Compressor turns off, cools
4. Motor protector resets, compressor restarts
   • Bi-metal disk resets before motor protector
   • Cycle will continue until cause of overheat is fixed
Advanced Scroll Temperature Protection

What to do?

If a protected compressor is identified:
1. Stop the compressor
2. Allow to cool thoroughly
3. Restart pump and check for normal operation

DO NOT ASSUME A COMPRESSOR RUNNING UNLOADED (BALANCED PRESSURES) IS A FAILURE.
Advanced Scroll Temperature Protection

**Recommended Cool-Down Time**

The longer the compressor runs unloaded, the longer it must cool before the bi-metal disk resets.

![Graph showing recommended minimum cool down time](image)

*Times Are Approximate.*

Various factors, including high humidity, high ambient temperature, and the presence of a sound blanket will increase cool-down times.
Advanced Scroll Temperature Protection
Possible Field Scenarios

Likely situations where protection may activate:

1. **Initial system charging (or recharging after servicing)**
   - Compressor is run with too little system charge
     → Very common on split systems
     → Will result in very low suction pressures (< 25 PSIG)
     → Do not disable low pressures cutouts while charging

2. **Field servicing (system problem causes overheating)**
   - Technician will observe “balanced pressures”
   - Risk of misdiagnosis as failed compressor
   - Must stop pump, cool thoroughly, reset
Advanced Scroll Temperature Protection

Availability

• Available on the following commercial scroll models:
  → ZR84 – ZR190KC/E
  → ZP90 – ZP182KCE
• Compressors will be labeled to identify new feature
• ASTP Overview Video:
  https://www.youtube.com/watch?v=BhKNVR-8vDs

Compressor Label: