CARLO GAVAZZI
Automation Components

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Compressing the current in scroll compressors

Scroll compressors are widely used within the HVAC and Refrigeration markets. They have replaced traditional piston compressors in some applications because of their more compact size and ability to withstand liquids.

The challenge

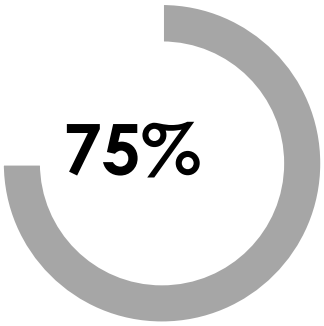
Scroll compressors must start within 800 msec to avoid excessive wear and tear on the orbiting scrolls.

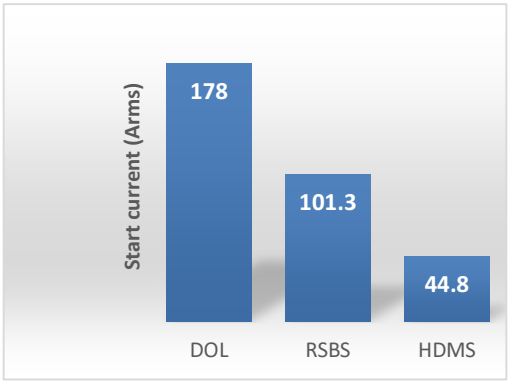
With direct on-line start (DOL), the start current is about 5 to 6 times the compressor rated current.

HDMS solution

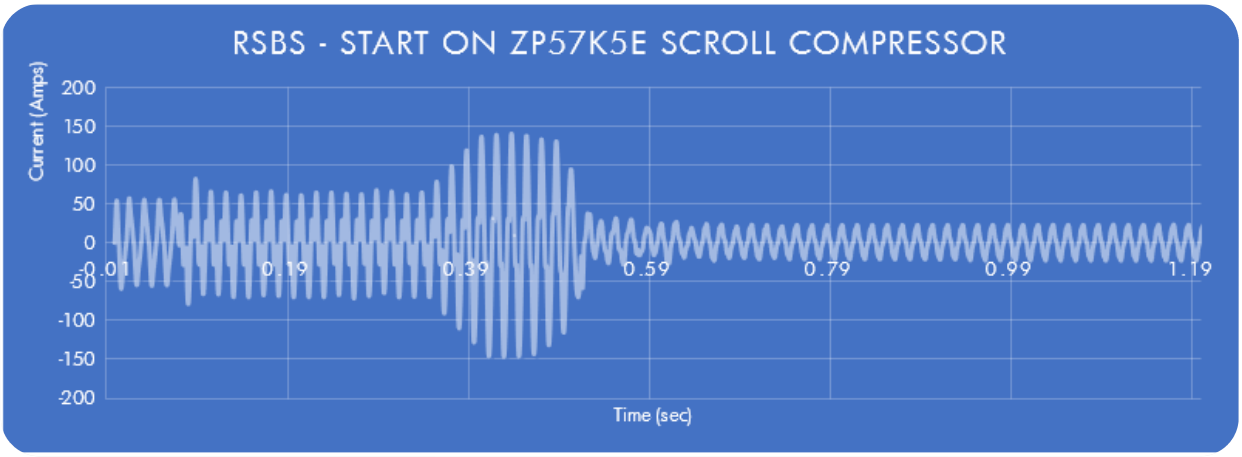
With HDMS we can start a scroll compressor with <1.5 times its rated current (at balanced pressure conditions). Furthermore, we achieve this result **without any start capacitor** thereby eliminating the weakest component from the installation.

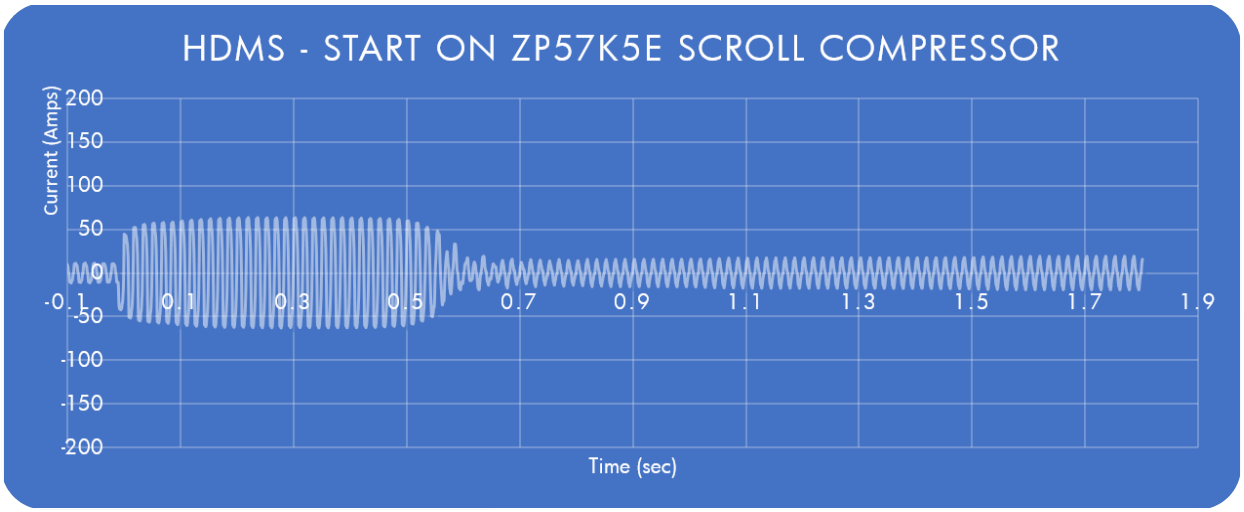
Field test results – Scroll compressor



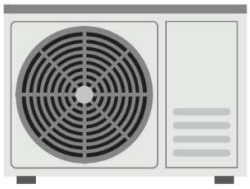


Actual HDMS current reduction vs DOL & RSBS on ZP57K5E scroll compressor





Typical applications

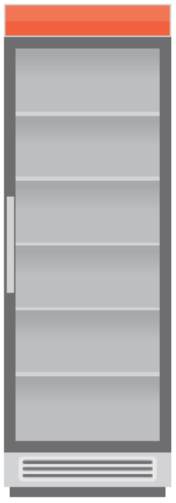


Heat pumps

- With HDMS you will **eliminate start capacitor** failures in weak voltage grids
- Customers can apply for less expensive contracts with utility thanks to a **lower starting current**
- Quicker troubleshooting with NFC and Modbus **history data download**

Refrigeration cabinets

- Refrigeration cabinets can be installed in areas with **poor power quality**
- Failure of the refrigeration system carries huge costs due to food waste
- **Benefit**: **Preventive maintenance** activities can be planned in a timely fashion thanks to the real time variable monitoring through Modbus port on HDMS



Air-conditioning in recreational vehicles

- Typically driven by a DC/AC inverter
- DOL start may cause **inverter trip**
- High DOL start current causes **light flickering**
- **Benefit**: No light flicker and no inverter trip with HDMS **unmatched current reduction** capability (just 1.5 x rated compressor current)

Piston compressors

- Piston compressors are a little harder to start than scroll compressors and deep-well pumps
- We did not manage to eliminate completely the start capacitor on piston compressors with HDMS….so far!
- We would like to extend our tests further with interested customers to find out how we can also start such loads without start capacitor
- Although we do not eliminate the start capacitor, with HDMS the value of the start capacitor that is required would be much smaller than the one that is normally used
- This means that a run capacitor may be used as "start capacitor". Run capacitors are by far more reliable than start capacitors but have larger dimensions
- Typical applications for piston compressors: refrigerators, cooling cabinets