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SMART ACCUMULATOR WITH OIL CIRCULATION RATIO SENSING

Smart accumulator measures oil circulation in refrigeration systems in real time, protecting compressors from flooding and starvation.

Researchers at Purdue University have developed a new method to determine oil circulation in refrigeration systems that employ lubricated compressors. Oil lubricates the bearings and other contact surfaces in compressors. The current method to measure oil circulation ratio (OCR) involves transferring solvent and oil out of the system. Practically, it's impossible to measure more than 3-4 samples at a time using this method. The Purdue researchers' method determines OCR in-situ. The method also allows multiple samples of oil to be taken in succession, allowing the low frequency dynamic behavior of OCR to be distinguished. Additionally, by separating the solvent and oil flows, the method is able to measure OCR for immiscible refrigerant/lubricant pairs. The OCR values predicted by the researchers' method were within 12% of the values predicted by the ASHRAE standard method. Finally, with a smart accumulator, the system protects the compressor from liquid flooding and oil starvation.

Advantages

- Real-time

- In-situ

- Automated

- Minimizes human error

- Does not require calibration

- Continuous operation

Applications

- Measuring OCR in refrigeration systems employing lubricated compressors

Technology ID

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Category

Buildings, Infrastructure, & Construction/HVAC & Building Energy Efficiency

Buildings, Infrastructure, & Construction/Demand-Responsive Heating & Cooling Systems

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Technology Validation: The method was experimentally validated with the ASHRAE standard method, a standard method to measure OCR.

Related Publication:

Shah VM, Braun JE, PhD., Groll EA, PhD. Measuring oil retention in unitary split system gas lines. ASHRAE Trans. 2021;127:327-336.

TRL: 3

Intellectual Property:

Provisional-Patent, 2021-06-04, United States

Utility Patent, 2022-05-31, United States

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