

Accepted Manuscript

Comparison of the operation performance of split and integrated type air source heat pump water heater via modelling and simulation

Stephen Loh Tangwe, Michael Simon

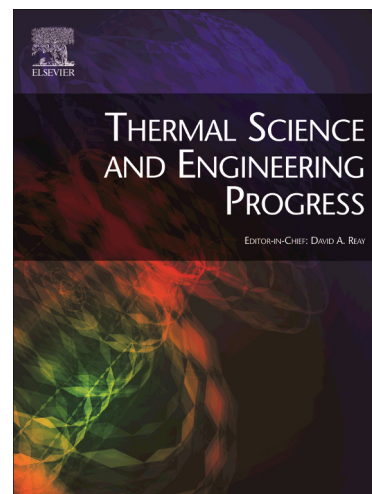
PII: S2451-9049(18)30106-9
DOI: <https://doi.org/10.1016/j.tsep.2018.08.017>
Reference: TSEP 227

To appear in: *Thermal Science and Engineering Progress*

Received Date: 7 February 2018
Revised Date: 20 August 2018
Accepted Date: 26 August 2018

Please cite this article as: S.L. Tangwe, M. Simon, Comparison of the operation performance of split and integrated type air source heat pump water heater via modelling and simulation, *Thermal Science and Engineering Progress* (2018), doi: <https://doi.org/10.1016/j.tsep.2018.08.017>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Comparison of the operation performance of split and integrated type air source heat pump water heater via modelling and simulation

Stephen Loh Tangwe^{1,2} and Michael Simon¹

1. Fort Hare Institute of Technology, University of Fort Hare, PB X1314, 5700 Alice, South Africa
 2. University of Sunderland, Faculty of Engineering and Advanced Manufacturing, United Kingdom
- Corresponding Author Email: stangwe@ufh.ac.za; stephenloh2001@yahoo.com

Abstract

Modelling and simulating the performance of air source heat pump water heaters can guarantee better operation and routine maintenance of the system. The primary data used in the development of the models were collected from data acquisition system that was designed and employed to monitor the COP of installed 150 L integrated and split type ASHP water heaters under three scenarios of controlled volume of hot water drawn off. The study presents both mathematical models and simulation application developed for the COP of the two systems; using the temperature difference of the refrigerant at the compressor suction and discharge ends, the temperature difference of the refrigerant at the inlet and outlet of the condenser, the ambient temperature and the relative humidity as predictors. The results revealed that the split type performed better than the integrated type with significant difference in both summer and winter with a p-value of 1.34×10^{-10} and 0.0167, respectively. In addition, the derived models for the both systems had very good predictions for both the trained and validated dataset with determination coefficient of over 0.9. Furthermore, heat pump manufacturers and energy service company can easily use the derived models in the developed two dimensional multi-contour simulation plots and the simulation applications to show the variation and the impact of the COP with the various predictors for both systems.

Keywords: Air source heat pump (ASHP); Coefficient of performance (COP); Mathematical model; significant difference; Simulation application; p-value

Download English Version:

<https://daneshyari.com/en/article/11033002>

Download Persian Version:

<https://daneshyari.com/article/11033002>

[Daneshyari.com](https://daneshyari.com)