

Title (en)  
HEAT PUMP AND AIR CONDITIONER OR WATER HEATER HAVING THE SAME

Title (de)  
WÄRMEPUMPE UND KLIMAANLAGE ODER WASSERERHITZER DAMIT

Title (fr)  
POMPE À CHALEUR ET CLIMATISEUR OU CHAUFFE-EAU ÉQUIPÉS DE CELLE-CI

Publication  
**EP 2980497 A1 20160203 (EN)**

Application  
**EP 15180055 A 20080121**

Priority  

- EP 15180055 A 20080121
- EP 08703521 A 20080121
- JP 2008050671 W 20080121

Abstract (en)  
A heat pump that can accurately detect a frost formation state on an evaporator without being affected by changes in an indoor environment and changes in a compressor frequency, and an air conditioner or water heater on which the heat pump is mounted are provided. In the heat pump having a refrigerant circuit in which a compressor 3, an indoor heat exchanger 8 (condenser), an expansion valve 5, and an outdoor heat exchanger 6 (evaporator) are sequentially connected, evaporator refrigerant saturation temperature detecting means 10 for detecting an evaporation temperature  $T_e$  of the outdoor heat exchanger 6, evaporator sucked air temperature detecting means 11 for detecting an evaporator sucked air temperature  $T_a$  of the outdoor heat exchanger 6, compressor frequency detecting means 12 for detecting a compressor frequency  $f$  of the compressor 3, and frost formation state detecting means 103 for detecting a frost formation state on the outdoor heat exchanger 6 are provided, and the frost formation state detecting means 103 detects a drop in heat exchange performance caused by a frost formation on the outdoor heat exchanger 6 on the basis of a characteristic amount  $T_1$ , which is a calculation value obtained by dividing a difference between the evaporator sucked air temperature  $T_a$  and the evaporation temperature  $T_e$  by a compressor frequency  $f$ .

IPC 8 full level  
**F24F 11/00** (2006.01); **F24F 11/02** (2006.01); **F25B 47/00** (2006.01); **F25B 47/02** (2006.01); **F25D 21/00** (2006.01)

CPC (source: EP US)  
**F25B 47/025** (2013.01 - EP US); **F25D 21/006** (2013.01 - EP); **F24F 11/42** (2017.12 - EP US); **F24F 2140/20** (2017.12 - EP US); **F25B 2500/19** (2013.01 - EP); **F25B 2600/23** (2013.01 - EP); **F25B 2700/11** (2013.01 - EP); **F25B 2700/171** (2013.01 - EP); **F25B 2700/197** (2013.01 - EP); **F25B 2700/2117** (2013.01 - EP); **F25B 2700/21172** (2013.01 - EP)

Citation (applicant)  

- JP 2001099529 A 20010413 - HITACHI LTD
- JP S6219656 A 19870128 - TOSHIBA CORP

Citation (search report)  

- [X1] EP 1855064 A1 20071114 - DAIKIN IND LTD [JP]
- [A] EP 1254618 A2 20021106 - CARRIER CORP [US]
- [A] US 6715304 B1 20040406 - WYCOFF LYMAN W [US]

Cited by  
CN115183408A

Designated contracting state (EPC)  
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

DOCDB simple family (publication)  
**EP 2157380 A1 20100224**; **EP 2157380 A4 20150218**; **EP 2157380 B1 20191002**; EP 2980497 A1 20160203; EP 2980497 B1 20220914; EP 2980498 A1 20160203; EP 2980498 B1 20220907; JP 5528119 B2 20140625; JP WO2009093297 A1 20110526; WO 2009093297 A1 20090730

DOCDB simple family (application)  
**EP 08703521 A 20080121**; EP 15180055 A 20080121; EP 15180070 A 20080121; JP 2008050671 W 20080121; JP 2009550383 A 20080121