

Title (en)  
HEAT PUMP WITH EXPANDED MODULATION OF THE EXPANSION DEVICE

Title (de)  
WÄRMEPUMPE MIT ERWEITERTER MODULATION DER EXPANSIONSVORRICHTUNG

Title (fr)  
POMPE À CHALEUR À MODULATION ÉTENDUE DU DISPOSITIF D'EXPANSION

Publication  
**EP 4361531 A1 20240501 (EN)**

Application  
**EP 23201646 A 20231004**

Priority  
IT 202200022080 A 20221026

Abstract (en)  
A heat pump (1) comprises a circuit (2) for circulating a refrigerant fluid, a first heat exchanger (3) placed in the circuit (2) and forming an evaporator (4), a compressor (5) placed in the circuit (2) downstream of the first heat exchanger (3), a second heat exchanger (6) placed in the circuit (2) downstream of the compressor (5) and forming a condenser (7), an expansion device (8) placed in the circuit (2) downstream of the second heat exchanger (6), an electronic control system (9) which controls the compressor (5) and the expansion device (8), where the electronic control system (9) and the expansion device (8) are configured so as to achieve a ratio ( $A_{exv\_max} / A_{exv\_min}$ ) between the upper total opening area limit ( $A_{exv\_max}$ ) and the lower total opening area limit ( $A_{exv\_min}$ ) of the expansion device (8) greater than 15, or in the range from 22 to 70, or greater than 70.

IPC 8 full level  
**F25B 41/31** (2021.01); **F25B 49/02** (2006.01)

CPC (source: EP)  
**F25B 41/31** (2021.01); **F25B 49/02** (2013.01); **F25B 2600/2513** (2013.01)

Citation (search report)  
• [X] EP 3499148 A1 20190619 - MITSUBISHI HEAVY IND THERMAL SYSTEMS LTD [JP]  
• [I] GB 2588714 A 20210505 - MITSUBISHI ELECTRIC CORP [JP]  
• [I] JP H09229495 A 19970905 - SAGINOMIYA SEISAKUSHO INC  
• [A] EP 3633290 A1 20200408 - DAIKIN IND LTD [JP]  
• [A] WO 2021223481 A1 20211111 - QINGDAO HAIER AIR CONDITIONING ELECTRONIC CO LTD [CN], et al  
• [A] US 2017167762 A1 20170615 - KATO YOHEI [JP], et al

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

Designated extension state (EPC)  
BA

Designated validation state (EPC)  
KH MA MD TN

DOCDB simple family (publication)  
**EP 4361531 A1 20240501**; CN 117928124 A 20240426

DOCDB simple family (application)  
**EP 23201646 A 20231004**; CN 202311397020 A 20231025