

Title (en)  
HEAT PUMP

Title (de)  
WÄRMEPUMPE

Title (fr)  
POMPE À CHALEUR

Publication  
**EP 2612084 A4 20170118 (EN)**

Application  
**EP 10836576 A 20101207**

Priority  
• US 28205709 P 20091208  
• US 2010059344 W 20101207

Abstract (en)  
[origin: WO2011071959A2] The geothermal heat pump has a programmable logic controller (PLC) that provides real time control and monitoring of a water-to-water geothermal heat pump system to effect simultaneous heating and cooling. Directing water flow from an evaporative exchanger or a condensing exchanger achieves temperature control without the need for a conventional reversing valve. To provide system scalability, the PLC can be connected to modular units in a master/slave control configuration. Combinations of units having different refrigerant physical properties provide a "fusion" of adaptability, thereby eliminating difficulties in using carbon dioxide (CO<sub>2</sub>) in home and commercial markets. Various operating refrigerant units (CO<sub>2</sub>, R410a, and the like) may be combined for optimization of overall performance. Hybrid units include solar panels to preheat water. The PLC allows integration of alternative heat/cooling sources to form the hybrid units.

IPC 8 full level  
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CPC (source: EP)  
**F25B 29/003** (2013.01); **F25B 30/06** (2013.01); **F25B 2339/047** (2013.01); **F25B 2400/06** (2013.01); **Y02A 30/272** (2017.12); **Y02B 10/20** (2013.01)

Citation (search report)  
• [X1] JP 2004132658 A 20040430 - DAIKIN IND LTD  
• [X1] US 2006218949 A1 20061005 - ELLIS DANIEL L [US], et al  
• [X1] DE 60102185 T2 20041014 - VALEO CLIMATISATION [FR]  
• [A] US 3378062 A 19680416 - RINGQUIST CLARENCE L, et al  
• See references of WO 2011071959A2

Cited by  
CN106288598A

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 MK MT NL NO PL PT RO RS SE SI SK SM TR

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**WO 2011071959 A2 20110616; WO 2011071959 A3 20111103**; CA 2820869 A1 20110616; EP 2612084 A2 20130710; EP 2612084 A4 20170118

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**US 2010059344 W 20101207**; CA 2820869 A 20101207; EP 10836576 A 20101207