

Search query (3): [SP]: [0001] electronic device and method for control of a building management system [0002] descrd7tion [0003] the present invention relates to an electronic device and a method for regulating thermo- fluidic installations for buildings. [0004] environmental comfort optimization in buildings is a theme that is becoming increasingly important. the scientific literature reports a considerable number of research works that show how several aspects of comfort, particularly thermal comfort and air quality, are directly connected to the occupants' well-being and, in working environments, to their productivity. [0005] very often, maintaining desired values of parameters such as temperature, relative humidity and pollutant concentration in an environment is neither simple nor economical. according to the intended use of the building, to the type of installation installed therein and to the times and modes of occupation thereof, environmental parameters can be controlled in various ways. [0006] although thermo-fluidic systems are available on the market which include state-of-the-art integrated control and regulating systems, most installations installed in tertiary buildings are controlled by control logics based on standard values, as opposed to actual environmental requirements. [0007] very often, in fact, indoor air temperatures are regulated on the basis of the value of the outdoor air temperature (open loop control). [0008] in these cases, the hot water produced by a generation system associated with the building to control is mixed with recirculation water in order to supply the distribution system of the building with water at a temperature determined on the basis of outdoor temperatures. thus, the generation system requires the presence of an external temperature sensor and a mixing valve located downstream of hot water generation and upstream of water distribution in the distribution system of the building. [0009] in case of water installations with thermal control only, i.e. heating or cooling through emission systems such as radiators, fan coil units, radiating panels, etc., the typical operation of the thermo-fluidic installations follows the above-described logics. [0010] in the case of combined air-water systems or air-only systems, wherein thermal control is supplemented with air quality control, the regulation is much more complex. the external or recirculation air, prior to being delivered into the environment, needs to be appropriately treated, i.e. heated, cooled or dehumidified as necessary. [0011] in these cases, the regulation is carried out on two levels: the first level relates to heating/cooling the fluids to be supplied to heating/cooling batteries of atus (air treatment units) via mixing valves. [0012] the second level concerns the supply of treated air into an environment through adjustable gates. [0013] from a thermal viewpoint, the fluids follow control logics that are similar to those employed for water installations. [0014] regarding the regulation of the air flows into the environment, the control acts both upon gates for inlet of external air (which determine the fractions of fresh and recirculated air) and upon gates for recovery of exhausted air coming from the same environment, and upon gates placed on the ducts that lead to air inlet terminals present in the environment. currently, in most cases the regulation devices (mixing valves and gates) are integrated into the installations themselves, but their operation is dictated by standard practices wherein fixed values based on design data and not on actual environmental requirements are set. since these are power-consuming systems, a wrong approach to installation regulation implies higher energy costs. [0015] closed-loop control of environmental conditions from the building itself would allow, on one hand, to keep the comfort in the building under control more effectively, while on the other hand it would allow taking into account any free energy contributions (solar irradiation, illumination, number of people in the building, presence of computers and/or printers, etc.) in the environment under treatment. [0016] this closed-loop control is currently not being effected because it would require excessively complex and expensive modifications to the control units of such systems. object of the present invention is therefore to propose an electronic device and a method for controlling thermo-fluidic installations used in buildings which allows controlling in closed-loop mode the environmental conditions of a building without requiring complex interventions on existing systems. [0017] this and other objects are achieved by means of an electronic device for controlling a thermo-fluidic installation whose features are defined in claim 1, and a method for regulating the temperature and carbon dioxide level of a thermo-fluidic installation as set out in claims 4 and 5. [0018] particular embodiments are set out in dependent claims, whose contents is to be understood as an integrating part of the present description. [0019] further characteristics and advantages of the invention will become apparent from the following detailed description, given merely by way of non-limiting example with reference to the annexed drawings, wherein: [0020] figure 1 shows a block diagram of the electronic device according to the present invention [0021] - figure 2 shows a diagram of a building wherein climatic conditions are controlled by means of an open-loop system [0022] figure 3 shows a diagram of an air treatment unit and [0023] figure 4 show a block diagram of the method for regulating the temperature/carbon dioxide level carried out by the device of figure 1. [0024] figure 1 shows a device for controlling the climatic conditions of a building according to the present invention. [0025] the device 1 is adapted to be associated with a traditional heating/cooling system of a building (of the type including a heating or cooling unit that sends hot or cold water towards a distribution system of a building by opening/closing a mixing valve), or more in general with an hvac (heating, ventilation and air conditioning) system also comprising, as aforementioned, an air treatment unit. [0026] figure 2 shows a traditional heating system comprising a heating unit 50 (or, as an alternative, a cooling unit), a mixing valve 52 and a heating device 54 (or, as an alternative, a cooling device) of a building 56. hot (or cold) water is delivered by the unit 50 towards the building 56 in the direction shown by the arrow a by opening/closing the mixing valve 52. [0027] figure 3 shows an atu 80 including a heating battery 82, a cooling battery 84 and a post-heating battery 85. [0028] a first duct 86 allows external air to enter and flow, through a first gate 88, towards the atu 80, while a second duct 90 ensures recirculation of air coming from a building (not shown in the drawing) towards the atu 80, through a second gate 92. [0029] mixing valves 52', similar to the mixing valve 52, are associated with the heating battery 82, the cooling battery 84 and the post-heating battery 85, which valves are adapted to control the hot/cold water flows within the atu 80 in order to heat/cool outside air or recirculated air. [0030] the treated air then flows out of the atu 80 and is sent, through a third duct 94, towards the building to control. [0031] referring back to figure 1, the device 1 comprises a control unit 2, e.g. a microprocessor, which is adapted to receive: [0032] - a main signal 4 coming from a per se known building management system (bms) [0033] - a reference signal 6, preferably a temperature signal, set by a user and representative of a desired parameter for the building involved [0034] - environmental signals 8, coming from environmental sensors located in the building (not shown in the drawing), which are adapted to measure environmental parameters such as temperature, humidity, carbon dioxide level, etc. [0035] the building management system is an existing system associated with the controlled building and adapted to supply control signals to the mixing valves 52, 52' and/or to the gates 88, 92 for opening/closing the air ducts 86, 90 of the atu 80. [0036] the control unit 2 is adapted to issue a control signal 10 towards an actuator of a respective mixing valve 52, 52' or gate 88, 92. in particular, such control signals 10 are sent to respective actuators of the valves 52, 52' and of the gates 88, 92, which respectively open/close the valves 52, 52' and the gates 88, 92. [0037] the control unit 2 is powered in a per se known manner, e.g. via a 24v or 220v power signal. [0038] in order to obtain the control signal 10, the control unit 2 carries out a temperature regulation process and/or a carbon dioxide level regulation process, respectively, which will be described more in detail below. [0039] the device 1 according to the present invention is an electronic device capable of creating a closed-loop system in a heating/cooling system of a building by integrating the information coming from the environmental sensors. [0040] the actuators that receive a respective control signal 10 are adapted to change the percentage of opening of a three-way mixing valve 52, 52' or the percentage of opening of a gate 88, 92. [0041] the device 1 is installed upstream of each actuator, between the cable that carries the main signal 4 and the actuator itself. [0042] in a preferred embodiment of the invention, the control signal 10 proposes a modification to the main signal 4 to be applied to the actuator. [0043] through the control actuators, one can regulate th

Results: 5

1) Family number: 48390136 (US2011054701A)

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Title: ENERGY SAVING METHOD AND SYSTEM FOR CLIMATE CONTROL SYSTEM**Priority:** US20090583962 20090827 US20110930691 20110112

Family:	Publication number	Publication date	Application number	Application date
	■ CN102022800 A	20110420	CN201010150340	20100308
	■ US2011054701 AA	20110303	US20090583962	20090827
	■ US2011112693 AA	20110512	US20110930691	20110112
	■ WO11025517 A1	20110303	WO2010US01213	20100423

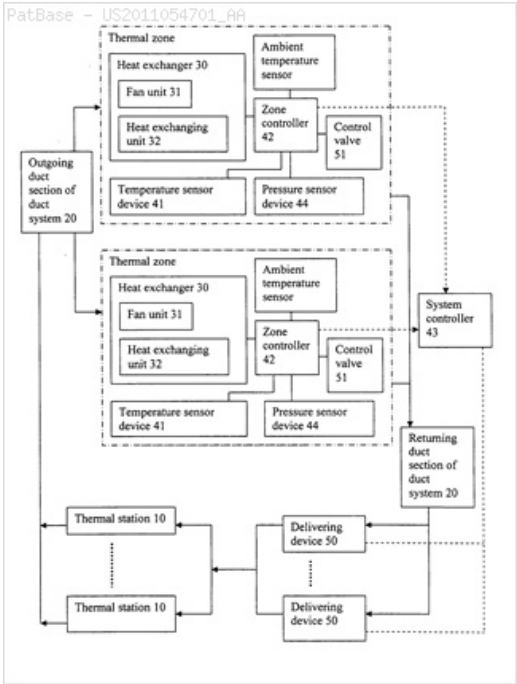
Probable Assignee: LANSPIN INC**Assignee(s):(std):** BLUEAIR CONTROLS INC ; LANSPIN INC ; WANG ADAM XIAONANG ; YE JIM JIAMING**Inventor(s):(std):** YE JIM JIAMING ; WANG ADAM XIAONONG ; WANG ADAM XIAONANG ; JIAMING YE JIM ; XIAONONG WANG ADAM**Agent(s):** CHAN RAYMOND Y**Designated states:** AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW**International class** F24F11/00 F25B29/00 G05B15/00 G05D23/00 G05D7/00 (Advanced/Invention)
(IPC 8-9):

CPC: G05B15/02 G05B2219/2639 G05B2219/2642
European class: G05B15/02 S05B219/2639 S05B219/2642
US class: 700/277 700/277P 700/278 700/278P 700/282 700/282S

Classification Explorer

Cited documents: WO09123095 A1, US8185246 BB, US8170724 BB, US8047011 BB, US7890215 BB, US7707880 BB, US7418825 BA, US7411785 BB, US7315448 BA, US7051946 BB, US6957696 BA, US6854287 BB, US6196469 BA, US6109533 A, US6102114 A, US5769315 A, US5540555 A, US2011054701 AA, US2010219135 AA, US2010100246 AA, US2009205416 AA, US2009201644 AA, US2009044550 AA, US2008051840 AA, US2007279861 AA, US2004238653 AA, US2004194484 AA, US2003042012 AA,
Forward Citations: WO13048613, US9874880, US9772633, US9267694, US2016062374, US2014277760, US2013220590, US2011112693, US10242129, US10151502, US10126009, US10101048, EP3379158, EP3379158, EP3255520, EP3211340, EP2778821, EP2778821, EP2761383, EP2761383, CN105378575, CN103900209, CN103900209, AU2012316722,

Abstract:
An energy saving system for a climate control system includes zone controllers which poll temperature difference of each heat exchanger downstream of the thermal station, and a system controller which polls degree of opening of all control valves from zone controllers associated with the heat exchangers downstream of the thermal station. Each zone controller configures degree of opening of the valve to regulate the medium flow in response to the temperature difference of the heat exchanger in its respective thermal zone to maintain medium at optimum flow rate to provide a thermal comfort at the thermal zone while being energy efficient. The system controller sends command to the thermal station control system to regulate the outlet temperature of the thermal station to ensure the thermal station consuming the least amount energy to provide the medium to each thermal zone to meet the thermal comfort need at the thermal zones.



2) Family number: 66771174 (WO17145129A1) © PatBase

Title: ELECTRONIC DEVICE AND METHOD FOR CONTROL OF A BUILDING MANAGEMENT SYSTEM
Priority: EP20160157732 20160226 WO2017IB51131 20170227
Family:

Publication number	Publication date	Application number	Application date
AU2017223347 AA	20180823	AU20170223347	20170227
BR112018067348 A2	20190129	BR20181167348	20170227
CA3014742 AA	20180815	CA20173014742	20170227
CN108779931 A	20181109	CN201780013120	20170227
CO20180008676 A2	20181214	CO20180008676	20180817
EP3211340 A1	20170830	EP20160157732	20160226
IN201847035781 A	20180928	IN201847035781	20180924
JP2019507858 T2	20190322	JP20180541354T	20170227
KR20180118694 A	20181031	KR20187027241	20170227
MX2018009636 A1	20190131	MX20180009636	20170227
WO17145129 A1	20170831	WO2017IB51131	20170227

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Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KH KM KN KP KR KW KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

International class (IPC 8-9): F24F11/00 F24F11/30 F24F11/62 F24F11/81 F24F11/83 F24F11/84 F24F11/00 F24F11/70 G05D23/13 G05D23/19 (Advanced/Invention); F24F11/00 F24F11/70 (Advanced/Non-invention)

International class (IPC 1-7): F24F11/00 G05D23/13 G05D23/19

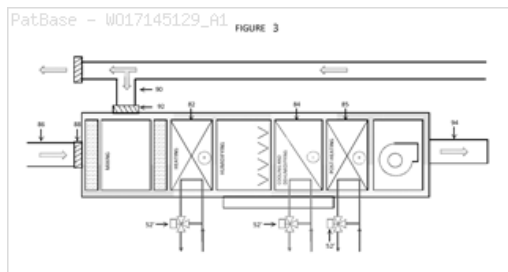
CPC: F24F2110/00 G05D23/1919 F24F11/30 F24F11/62 F24F11/84 F24F2110/70 F24F2221/54 F24F2221/56 G05D23/138 G05D23/1393

[Classification Explorer](#)

Cited documents: WO08085153 A2, US2011112693 AA, US2005278069 AA, JP2012047412 A2,

Abstract:

Electronic device (1) for regulating a thermo-fluidic system for a building (56), comprising a heating/cooling system (50, 54; 80, 82, 84, 85) including mixing valves (52, 52') adapted to control flows of hot/cold water within said heating/cooling system (50, 54; 80, 82, 84, 85), the device (1) comprising a control unit (2) adapted to: - receive a main signal (4) from a building management system (56); - receive a predefined reference signal (6) representative of a desired parameter for the building (56); - receive environmental signals (8) from environmental sensors placed in the building (56) and adapted to measure environmental parameters of said building (56); - issue a control signal (10) towards an actuator associated with a respective mixing valve (52, 52') in order to modify the opening or closing thereof.



3) Family number: 32486334 (US2005278069A)

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Title: ENERGY EFFICIENT CRAC UNIT OPERATION USING HEAT TRANSFER LEVELS

Priority: US20040853522 20040526 WO2005US18298 20050524 US20060594721 20061108

Family:

Publication number	Publication date	Application number	Application date
■ CN101032196 A	20070905	CN200580023995	20050524
■ CN101032196 B	20110413	CN200580023995	20050524
■ US2005278069 AA	20051215	US20040853522	20040526
■ US7010392 BB	20060307	US20040853522	20040526
■ USRE42195 E	20110301	US20060594721	20061108
■ WO05120144 A1	20051215	WO2005US18298	20050524

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Agent(s): HEWLETT PACKARD COMPANY; HEWLETT PACKARD CO; RICHARD P

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KM KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SM SN SY SZ TD TG TI TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

International class (IPC 8-9): F24F11/00 G05D23/00 H05K7/20 (Advanced/Invention); G05D23/00 (Core/Invention)

International class (IPC 1-7): F24F11/00 G05B13/00 H05K7/20

CPC: F24F11/62 F24F11/83 F24F11/30 F24F2110/10 H05K7/207

European class: F24F11/00R3A F24F11/00R5

US class: 454/239 454/239S 62/177 700/276 700/276P 700/278 700/291 700/291S 700/300

[Classification Explorer](#)

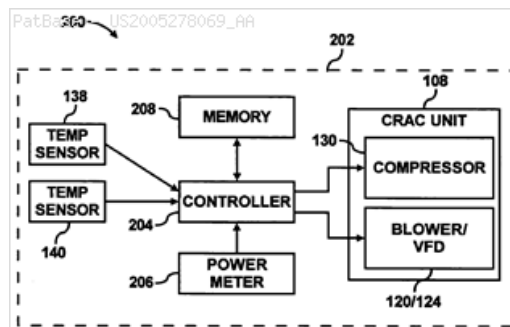
Cited documents: US6732540 BB, US6732540 BA, US6732540 B1, US5538471 A, US5390505 A, US2005023363 AA, US2004141542 AA, JP1219434 A2, JP1219434,

Forward Citations: WO18152816, WO13048613, WO09108043, WO09000165, WO07095846, US9992913, US9939796, US9918412, US9894809, US9894808, US9867318, US9822989, US9791903, US9726393, US9680324, US9658662, US9632517, US9622387, US9585289, US9519295, US9516793, US9501918, US9485887, US9459668, US9453656, US9451730, US9426903, US9410339, US9395974, US9372516, US9363925, US9345173, US9258930, US9250663, US9198310, US9183719, US9101080, US9055698, US9009061, US8995123, US8988874, US8984897, US8983675, US8885548, US8873235, US8833001, US8811377, US8761084, US8755192, US8744631, US8743542, US8737059, US8721409, US8672733, US8655492, US8639651, US8638553, US8600560, US8584477, US8578726, US8561418, US8538584, US8532003, US8473898, US8351369, US8331282, US8185246, US8164897, US8160838, US8154870, US8151578, US8141374, US8140195, US8029189, US7995467, US7969727, US7895855, US7895854, US7826216, US7730731, US7472558, US7315448, US2017248340, US2016258639, US2014290928, US2014049913, US2013297077, US2013222139, US2013190941, US2013188311, US2013151019, US2013010422, US2013003296, US2012205089, US2012078438, US2012052785, US2011205705, US2011172828, US2011120156, US2011106314, US2011093121, US2011016893, US2010317278, US2010280796, US2010277864, US2010177708, US2010154448, US2010134972, US2010107658, US2010100246, US2010082309, US2010082178, US2009327012, US2009302996, US2009302994, US2009296342, US2009216381, US2009211773, US2009175311, US2009168796, US2009154481, US2009154343,

US2008092577, US2006272342, US2005278070, US10556485, US10531597, US10492331, US10317099, US10225957, US10197300, US10154614, US10132553, US10098265, US10082857, US10060646, US10030383, JP6106177, JP2015502510, EP3255520, EP3211340, EP2917649, EP2761383, EP2761383, EP2660529, EP2660529, EP2162870, EP2162870, EP2096369, EP1989051, EP1989051, CN103766015, CN103766015, CN102436296,

Abstract:

A method for controlling one or more computer room air conditioning (CRAC) units for energy efficient operation, in which, the temperature of the air returned (Trat) into the one or more CRAC units and the temperature of the air supplied (Tsat) by the one or more CRAC units is detected. The caloric heat transfer level (Q) is calculated based upon the Trat and the Tsat and it is determined whether the Q is within a predetermined setpoint caloric heat transfer range. In addition, at least one operation of the one or more CRAC units is reduced in response to the Q being within the predetermined setpoint caloric heat transfer range to thereby increase the efficiencies of the one or more CRAC units.



4) Family number: 42019451 (US2010100246A)

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Title: AIR-CONDITIONING CONTROL ALGORITHM EMPLOYING AIR AND FLUID INPUTS

Priority: US20060521320 20061229 WO2006US49629 20061229

Family:	Publication number	Publication date	Application number	Application date
	CN101600916 A	20091209	CN200680056835	20061229
	CN101600916 B	20140507	CN200680056835	20061229
	EP2137471 A2	20091230	EP20060848369	20061229
	EP2137471 A4	20150506	EP20060848369	20061229
	EP2137471 B1	20180613	EP20060848369	20061229
	US2010100246 AA	20100422	US20060521320	20061229
	US8185246 BB	20120522	US20060521320	20061229
	WO08085153 A2	20080717	WO2006US49629	20061229
	WO08085153 A3	20081106	WO2006US49629	20061229

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Inventor(s): PRENAULT ; EROYET ; OJOSSERAND ; RKOLK

Agent(s): TAYLOR ADAM DAVID; MARJAMA MULDOON BLASIAK AND SULLIVAN LLP; CANTOR COLBURN LLP; MULLOY MICHAEL D

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD MG MK ML MN MR MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

International class (IPC 8-9): F24D19/10 F24F11/00 F24F11/053 F24F11/76 F25B1/00 F25B29/00 F25B49/00 F25D17/04 F25D3/02 G01K13/00 G01M1/38 G05B13/00 G05B15/00 G05B21/00 G05D23/00 G05D23/19 G05D23/32 G05D7/06 (Advanced/Invention); F25B1/00 F25D3/00 G05D23/19 G05D7/06 (Core/Invention)

CPC: F24F11/30 F24F11/77 F24F11/83 F24F2110/10

European class: F24F11/00R F24F11/00R3A F24F11/00R7D R24F11/00R7B Y02B30/74H

US class: 165/289 165/291 165/293 236/1.00B 236/1.00C 236/1B 236/1C 236/91.00D 236/91.00E 236/91D 236/91E 62/126 62/129 62/157 62/159 62/176.6 700/278 700/282 700/282P 700/300 700/300S

[Classification Explorer](#)

Cited documents: WO05116541 A1, WO05116541 A1, WO02066902 A1, USRE42195 E, US8019477 BB, US7857233 BB, US7819334 BB, US6981385 BB, US6634422 BB, US6352106 BA, US6269650 BA, US6219590 BA, US6176095 BA, US6176095 B1, US5444436 A, US5444436 A, US5276630 A, US5276630 A, US5156203 A, US5156203 A, US5138845 A, US4807445 A, US4807445 A, US4487028 A, US4487028 A, US4376510 A, US4376510 A, US4320870 A, US2008006044 AA, US2006042278 AA, US2006042277 AA, US2006042277 AA, US2005091021 AA, US2005023363 AA, US2004148950 AA, US2004093881 AA, US2004093881 AA, JP894151, JP8094151 A2, JP2743595 B2, JP2743595 A2, JP2002267233 A2, EP0321670 A2, EP0321670 A2, CN1423740, CN1200462,

Forward Citations: WO17145129, WO13048613, US9874367, US9696054, US9581255, US9519295, US9104792, US9053223, US9002532, US8931440, US8774978, US8660704, US8527098, US8417392, US8275483, US8229597, US2017082312, US2015120008, US2014100818, US2014026831, US2013191072, US2012016526, US2011112693, US2011054701, US2011022241, US2011022236, US10436488, US10126176, US10037499, JP2017138095, JP2012047412, EP3255520, EP3211340, EP2761383, EP2761383, CN105393182, CN102147628, CN102147628,

Abstract:

Sensing, actuation of apparatus, and a control algorithm for use in automatically controlling an air-conditioning system by sensing multiple conditions and responding by actuating the mechanical components of the air-conditioning system to optimize the temperature of the coolant fluid, provide improved zone temperature control, provide status of system components, and provide an alert if there is overheating of a supply side system mechanical component.

