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(54) AIR CONDITIONING SYSTEM AND CONTROL METHOD FOR THE SAME

KLIMAANLAGENSYSTEM UND STEUERVERFAHREN DAFÜR

SYSTÈME DE CONDITIONNEMENT D'AIR ET PROCÉDÉ DE COMMANDE À CET EFFET

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Description

Technical Field

[0001] The present disclosure relates to an air conditioning system and a control method for the air conditioning system, and more particularly, to an air conditioning system having improved air conditioning efficiency and a control method for the air conditioning system.

Background Art

[0002] In general, air conditioning systems are used to cool or heat indoor air by removing/ supplying heat from/to the indoor air using a circulating refrigerant. US 2004/0144111 A1 relates to an air conditioning system provided with an outdoor unit having a compressor and an outdoor heat exchanger, an indoor unit having an indoor heat exchanger, and a gaseous refrigerant pipe connecting the indoor heat exchanger to the compressor. The air conditioning system is provided with one air-cooled outdoor unit and a plurality of indoor units connected parallel to the outdoor unit. The indoor heat exchangers and the compressor are connected together by the gaseous refrigerant pipe. A pressure adjusting device is installed in the gaseous refrigerant pipe. The pressure adjusting device is a single integral unit equipped with a pressure detecting means, an electric powered expansion valve, and an opening adjusting means and functions to adjust the pressure in the indoor heat exchanger to a higher pressure then the pressure in the indoor heat exchangers of the other indoor units. GB 2 248 494 A discloses du air Conditioning System according to the preamble of claim 1.

[0003] Some air conditioning systems have one or more outdoor units and a plurality of indoor units. Such air conditioning systems are called as multiple air conditioning systems. The multiple air conditioning systems can be classified into single type air conditioning systems and series type air conditioning systems depending on how the indoor units are connected to the outdoor units. In the single type air conditioning system, one outdoor unit is connected to a plurality of indoor units. In the series type air conditioning system, a plurality of outdoor units are connected to a plurality of indoor units. The multiple air conditioning systems can also be classified into switching type air conditioning systems and mutli-mode air conditioning systems according to refrigerant circulating methods. In the switching type air conditioning system, all indoor units simultaneously switch between cooling mode and heating mode. In the multi-mode air conditioning system, indoor unit units can operate simultaneously in different modes. For example, when some indoor units operate in cooling mode, the others can operate in heating mode. The multi-mode air conditioning system can operate in a complete heating mode or a complete cooling mode depending on a method of operating the outdoor units. In the complete heating mode, heat exchangers of all the outdoor units operates as evaporators, and in the complete cooling mode, all the heat exchangers operate as condensers.

[0004] However, such related-art multi-mode air conditioning systems have the following disadvantages.

[0005] All the outdoor units of the multi-mode air conditioning system operate in the same mode. In other words, the outdoor units operate in the complete heating or cooling mode depending on a cooling/heating operation ratio of indoor units. Therefore, it is difficult to match heating/cooling load on the indoor units with heating/cooling load on the outdoor units. That is, in the multi-mode air conditioning system, an excessive amount of refrigerant can be supplied to an indoor unit while an insufficient amount of refrigerant is supplied to another indoor unit. As a result, the refrigerant cycle of the multi-mode air conditioning system can become unstable, and thus the efficiency of the multi-mode air conditioning system can largely decrease.

Disclosure of Invention

Technical Problem

[0006] To provide an air conditioning system capable of matching cooling/ heating load of outdoor units with cooling/heating load of indoor units, and a control method for the air conditioning system.

Technical Solution

[0007] The above problem is solved by an air conditioning system according to claim 1, and by a method according to claim 3.

[0008] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

Advantageous Effects

[0009] As described above, according to the air conditioning system and the control method for the air conditioning system, the cooling/heating operation ratio of the outdoor units can be adjusted according to the cooling/heating operation ratio of the indoor units. Therefore, the air conditioning system can have stable refrigerant cycle and high efficiency.

Brief Description of the Drawings

[0010]

Fig. 1 is a schematic structural view illustrating an air conditioning system according to an embodiment.
Fig. 2 is a flowchart for explaining a control method for an air conditioning system according to an embodiment.

Best Mode for Carrying Out the Invention

[0011] An air conditioning system and a control method for the air conditioning system will now be described in detail with reference to the accompanying drawings, in which exemplary embodiments of the present disclosure are shown.

[0012] Fig. 1 is a schematic structural view illustrating an air conditioning system according to an embodiment.

[0013] Referring to Fig. 1, the air conditioning system includes a plurality of outdoor units 101, 102, and 103, a distributing unit 200, and a plurality of indoor units 301 to 306. The indoor units 301 to 306 are connected to the outdoor units 101, 102, and 103 through the distributing unit 200. The number of the indoor units 301 to 306 can be larger than that of the outdoor units 101, 102, and 103 by n times where n is an integer.

[0014] One of the outdoor units 101, 102, and 103 can be used as a main outdoor unit 101, and the others can be used as sub outdoor units 102 and 103. Each of the outdoor units 101, 102, and 103 includes a compressor 111, a four-way valve 112, and an outdoor heat exchanger 113, and an accumulator 114.

[0015] The four-way valve 112 is disposed at an outlet refrigerant conduit of the compressor 111. A linear expansion valve (LEV) 116, a solenoid valve 117, and a check valve 118 are disposed at an outlet refrigerant conduit of the outdoor heat exchanger 113. In Fig. 1, each of the outdoor units 101, 102, and 103 includes two compressors 111. However, each of the outdoor units 101, 102, and 103 can include one or three compressors. Each of the outdoor units 101, 102, and 103 further includes an outdoor fan (not shown) for blowing outdoor air to the outdoor heat exchanger 113.

[0016] A high-pressure conduit 121 is connected to the outlet refrigerant conduit connected between the compressor 111 and the four-way valve 112. A liquid conduit 122 is connected to the outlet refrigerant conduit of the outdoor heat exchanger 113. A low-pressure conduit 123 is connected to a refrigerant conduit connected between the four-way valve 112 and the accumulator 114. The high-pressure conduits 121, the liquid conduits 122, and the low-pressure conduits 123 of the outdoor units 101, 102, and 103 are connected, respectively.

[0017] A bypass conduit 124 is connected between the liquid conduit 122 and an inlet side of the accumulator 114. An LEV 126 is disposed at the bypass conduit 124. The bypass conduit 124 and the liquid conduit 122 are configured such that heat can be exchanged between the bypass conduit 124 and the liquid conduit 122. For example, the bypass conduit 124 and the liquid conduit 122 can be formed into a double conduct structure. In this case, refrigerant can flow in the bypass conduit 124 and the liquid conduit 122 in opposite directions. Refrigerant introduced into the bypass conduit 124 and expanded at the LEV 126 may exchange heat with refrigerant flowing in the liquid conduit 122, and then the refrigerant may flow to the inlet side of the accumulator 114.

[0018] The high-pressure conduit 121, the liquid conduit 122, and the low-pressure conduit 123 are connected to the distributing unit 200. The distributing unit 200 includes a first distribution part 210, a second distribution part 220, a third distribution part 230, and an over-cooling part 240.

[0019] The first distribution part 210 is connected to the high-pressure conduit 121, and the second distribution part 220 is connected to the liquid conduit 122. The third distribution part 230 is connected to the low-pressure conduit 123. The first to third distribution parts 210, 220, and 230 are connected to the indoor units 301 to 306 through a plurality of branch conduits. The over-cooling part 240 is connected to the second distribution part 220 and the third distribution part 230. A LEV 241 is connected between the over-cooling part 240 and the second distribution part 220. A solenoid valve and a capillary are connected between the first distribution part 210 and the third distribution part 230.

[0020] Each of the indoor units 301 to 306 includes an indoor heat exchanger 311. An LEV 312 is disposed at one side of each of the indoor units 301 to 306. A plurality of valves 313 and a plurality of solenoid valve 314 are disposed at the other side of each of the indoor units 301 to 306. In Fig. 1, hatched valves are in off-positions, and the other valves are in on-positions.

[0021] The air conditioning system may further include a control unit (not shown) for controlling operations of the outdoor units 101, 102, and 103, the distributing unit 200, and the indoor units 301 to 306.

[0022] A control method for an air conditioning system will now be described in detail with reference to the accompanying drawing.

[0023] Fig. 2 is a flowchart for explaining a control method for an air conditioning system according to an embodiment.

[0024] Referring to Fig. 2, in operation S11, a control unit of the air conditioning system receives a multi-operation control signal for operating some of indoor units in cooling mode and the others in heating mode. Hereinafter, according to operational modes, indoor units and outdoor units will be referred to as cooling indoor units, heating indoor units, cooling outdoor units, or heating outdoor units.

[0025] In operation S 13, the control unit checks a ratio of cooling indoor units to heating indoor units and a ratio of cooling outdoor units to heating outdoor units. That is, the control unit checks cooling/heating operation ratios of the indoor units and outdoor units. In detail, the cooling/heating operation ratio of the indoor units may be a ratio of the number of cooling indoor units to the number of heating indoor units, and the cooling/heating operation ratio of the outdoor units may a ratio of the number of cooling outdoor units to the number of heating outdoor units. Alternatively, the cooling/heating operation ratio of the indoor units can be calculated as a ratio of total cooling load on cooling indoor units to total heating load on heating indoor units, and the cooling/heating operation

ratio of the outdoor units can be calculated as a ratio of the total capacity of cooling outdoor units to the total capacity of heating outdoor units. Here, the total cooling or heating load on the indoor units can be determined by outdoor temperature, indoor temperature, selected temperature, and the cooling/heating operation ratio of the indoor units. If the outdoor units have the same capacity, the ratio of the total capacity of cooling outdoor units to the total capacity of heating outdoor units can be equal to the ratio of the number of cooling outdoor units to the number of heating outdoor units.

[0026] In operation S 15, the control unit determines whether the cooling/heating operation ratio of the indoor units differs from that of the outdoor units. For this, the control unit can compare a ratio of the number of cooling indoor units to the number of heating indoor units with a ratio of the number of cooling outdoor units to the number of heating outdoor units. Alternatively, the control unit can compare a ratio of total cooling load on cooling indoor units to total heating load on heating indoor units with a ratio of the total capacity of cooling outdoor units to the total capacity of heating outdoor units.

[0027] If it is determined that the cooling/heating operation ratio of the indoor units differs from that of the outdoor units, the control unit adjusts the cooling/heating operation ratio of the outdoor units to a ratio corresponding to the cooling/heating operation ratio of the indoor units in operation S17. For example, the control unit can control the outdoor units in a manner such that the ratio of the number of cooling outdoor units to the number of heating outdoor units corresponds to the ratio of the number of cooling indoor units to the number of heating outdoor units. Alternatively, the control unit can control the outdoor units in a manner such that the ratio of the total capacity of cooling outdoor units to the total capacity of heating outdoor units corresponds to the ratio of total cooling load on cooling indoor units to total heating load on heating indoor units.

[0028] After the cooling/heating operation ratio of the outdoor units is adjusted to a ratio corresponding to that of the outdoor units in operation S 17, the control unit controls the air conditioning system to operate in cooling and heating modes simultaneously (operation S19). Meanwhile, if it is determined in operation S15 that the cooling/ heating operation ratio of the indoor units does not differ from that of the outdoor units (that is, if the cooling/heating operation ratio of the indoor units corresponds to that of the outdoor units), the control unit operates the air conditioning system according to the multi-operation control signal received in operation S11.

[0029] A method of controlling the air conditioning system of Fig. 1 using the above-described control method will now be described in detail according to an embodiment.

[0030] Referring again to Fig. 1, two indoor units 301 and 302 of the air conditioning system operate in cooling mode. That is, the indoor units 301 and 302 operate as cooling indoor units. The other indoor units 303 to 306 operate in heating mode as heating indoor units. In this case, since the ratio of cooling indoor units to heating indoor units is 1:2, the control unit can control one of the outdoor units 101, 102, and 103 (for example, the outdoor unit 101) to operate in cooling mode as a cooling outdoor unit and the other outdoor units 102 and 103 to operate in heating mode as heating outdoor units.

[0031] Refrigerant discharged from the compressor 111 of the cooling outdoor unit 101 is directed to the outdoor heat exchanger 113 of the cooling outdoor unit 101 and the high-pressure conduit 121. The refrigerant directed to the outdoor heat exchanger 113 changes heat with air and thus condenses. At this time, the LEV 116 and the solenoid valve 117 disposed at a side of the outdoor heat exchanger 113 are opened. Then, the refrigerant is discharged from the outdoor heat exchanger 113 to the liquid conduit 122.

[0032] Refrigerant discharged from the compressors 111 of the heating outdoor units 102 and 103 is directed to the high-pressure conduit 121. That is, the high-pressure conduit 121 receives refrigerant from all of the outdoor units 101, 102, and 103. A portion of refrigerant flowing in the liquid conduit 122 flows to the bypass conduit 124 and expands at the LEV 126 and then is directed to the outdoor heat exchangers 113 of the heating outdoor units 102 and 103. Here, the outdoor heat exchangers 113 of the heating outdoor units 102 and 103 function as evaporators.

[0033] The refrigerant of the high-pressure conduit 121 flows to the first distribution part 210 and is distributed from the first distribution part 210 to the heating indoor units 303 to 306. Thereafter, the refrigerant is discharged from the heating indoor units 303 to 306 to the second distribution part 220.

[0034] The refrigerant of the liquid conduit 122 flows to the second distribution part 220. That is, the second distribution part 220 receives refrigerant from the heating indoor units 303 to 306 and the liquid conduit 122.

[0035] A portion of refrigerant introduced into the liquid conduit 122 is distributed to the cooling indoor units 301 and 302, and the other portion of the refrigerant introduced into the liquid conduit 122 is directed to the over-cooling part 240 through the LEV 241. The refrigerant directed to the over-cooling part 240 is discharged to the third distribution part 230.

[0036] The refrigerant of the third distribution part 230 is guided to the outdoor units 101, 102, and 103 through the low-pressure conduit 123. In detail, the refrigerant flows from the low-pressure conduit 123 to the respective compressors 111 of the outdoor units 101, 102, and 103 through the accumulators 114.

[0037] As explained above, when heating load on the indoor units 301 to 306 is high, refrigerant of the cooling outdoor unit 101 and the heating outdoor units 102 and 103 is directed to the high-pressure conduit 121 and the first distribution part 210. Therefore, the amount of refrigerant supplied from the heating outdoor units 102 and 103 can increase, and thus the pressure of refrigerant in

the high-pressure conduit 121 and the first distribution part 210 can be adjusted to a level suitable for heating operations. In addition, the heating outdoor units 102 and 103 can have sufficient refrigerant discharging pressures.

[0038] A pressure drop can occur when refrigerant discharged from the cooling outdoor unit 101 flows through the liquid conduit 122 to the second distribution part 220. However, the pressure drop can be compensated for by refrigerant discharged from the indoor units 303 to 306 to the second distribution part 220. Therefore, the cooling indoor units 301 and 302 can have sufficient pressures for sucking and discharging refrigerant.

[0039] If the number of the indoor units is not integer times the number of the outdoor units, the cooling/heating operation ratio of the outdoor units may be adjusted close to the cooling/heating operation ratio of the indoor units. For example, if the cooling/heating operation ratio of the outdoor units is larger than the cooling/heating operation ratio of the indoor units, the cooling/heating operation ratio of the outdoor units can be reduced close to the cooling/heating operation ratio of the indoor units by adjusting operational speeds of the compressors of the outdoor units. In addition, if the cooling/heating operation ratio of he outdoor units is smaller than the cooling/heating operation ratio of the indoor units, the cooling/heating operation ratio of the outdoor units can be increased close to the cooling/heating operation ratio of the indoor units by adjusting the operational speeds of the compressors of the outdoor units. Meanwhile, prior to adjusting the operational speeds of the compressors of the outdoor units, the cooling/ heating operation ratio of the outdoor units can be adjusted close to the cooling/heating operation ratio of the indoor units by adjusting the ratio of the number of cooling outdoor units to the number of heating outdoor units close to the ratio of the number of cooling indoor units to the number of heating indoor units.

Claims

1. An air conditioning system comprising:

a plurality of indoor units (301, 302, 303, 304, 305, 306) each including an indoor heat exchanger (311) and capable of operatihg in a cooling or heating mode individually;
a plurality of outdoor units (101, 102, 103) each including an outdoor heat exchanger (113) and capable of operating in a cooling or heating mode individually, a compressor (111), a four-way valve (112), and an accumulator (114);
a distributing unit (200) configured to distribute refrigerant between the indoor heat exchangers (311) and the outdoor heat exchangers (113); and
a control unit configured to operate the outdoor units (101, 102, 103) at a cooling/heating operation ratio corresponding to a cooling/heating operation ratio of the indoor units (301, 302, 303, 304, 305, 306), **characterized in that**
the control unit is adapted to control the indoor units (301, 302, 303, 304, 305, 306) and the outdoor units (101, 102, 103) such that a ratio of the number of the indoor units (301, 302, 303, 304, 305, 306) operating in the cooling mode to the number of indoor units (301, 302, 303, 304, 305, 306) operating in the heating mode is equal to a ratio of the number of the outdoor units (101, 102, 103) operating in the cooling mode to the number of the outdoor units (101, 102, 103) operating in the heating mode.

2. The air conditioning system according to claim 1, wherein the control unit controls the distributing unit (200) according to the cooling/heating operation ratio of the indoor units (301, 302, 303, 304, 305, 306) such that the distributing unit (200) allows circulations of refrigerant between the indoor units (301, 302, 303, 304, 305, 306) and the outdoor units (101, 102, 103) that operate in a cooling mode, and circulations of refrigerant between the indoor units (301, 302, 303, 304, 305, 306) and the outdoor units (101, 102, 103) that operate in a heating mode.

3. A method for controlling an air conditioning system using a control unit, the air conditioning system including a plurality of indoor units (301, 302, 303, 304, 305, 306) and a plurality of outdoor units (101, 102, 103) each including an outdoor heat exchanger (113) and capable of operating in a cooling or heating mode individually, a compressor (111), a four-way valve (112), and an accumulator (114),
the method comprising:

receiving a control signal for operating the air conditioning system simultaneously in cooling and heating modes;
determining a cooling/heating operation ratio of a plurality of indoor units (301, 302, 303, 304, 305, 306)and a cooling/heating operation ratio of a plurality of outdoor units (101, 102, 103) according to the control signal;
comparing the cooling/heating operation ratio of the indoor units (301, 302, 303, 304, 305, 306) with the cooling/heating operation ratio of the outdoor unit (101, 102, 103); and
if the cooling/heating operation ratio of the indoor units (301, 302, 303, 304, 305, 306) is different from the cooling/heating operation ratio of the outdoor units (101, 102, 103), adjusting the cooling/heating operation ratio of the outdoor units (101, 102, 103) to a ratio corresponding to the cooling/heating operation ratio of the indoor units (301, 302, 303, 304, 305, 306),
wherein the control unit controls the indoor units

(301, 302, 303, 304, 305, 306) and the outdoor units (101, 102, 103) such that a ratio of the number of the indoor units (301, 302, 303, 304, 305, 306) operating in a cooling mode to the number of the indoor units (301, 302, 303, 304, 305, 306) operating in a heating mode is equal to a ratio of the number of the outdoor units (101, 102, 103) operating in a cooling mode to the number of outdoor unit (101, 102, 103) operating in a heating mode.

Patentansprüche

1. Klimaanlagensystem mit:

mehreren Innen-Einheiten (301, 302, 303, 304, 305, 306), die jeweils einen Innen-Wärmeaustauscher (311) aufweisen und individuell in einem Kühlmodus oder einem Heizmodus arbeiten können;
mehreren Außen-Einheiten (101, 102, 103), die jeweils einen Außen-Wärmeaustauscher (113), einen Kompressor (111), ein Vierwege-Ventil (112) und einen Akkumulator (114) aufweisen und individuell in einem Kühlmodus oder einem Heizmodus arbeiten können;
einer Verteilereinheit (200) zum Verteilen von Kältemittel zwischen den Innen-Wärmeaustauschern (311) und den Außen-Wärmeaustauschern (113); und
einer Steuereinheit, die konfiguriert ist, die Außen-Einheiten (101, 102, 103) mit einem Kühlbetrieb/Heizbetrieb-Verhältnis arbeiten zu lassen, das einem Kühlbetrieb/Heizbetrieb-Verhältnis der Innen-Einheiten (301, 302, 303, 304, 305, 306) entspricht,
dadurch gekennzeichnet, dass
die Steuereinheit angepasst ist, die Innen-Einheiten (301, 302, 303, 304, 305, 306) und die Außen-Einheiten (101, 102, 103) derart zu steuern, dass ein Verhältnis der Anzahl der in dem Kühlmodus arbeitenden Innen-Einheiten (301, 302, 303, 304, 305, 306) zu der Anzahl der in dem Heizmodus arbeitenden Innen-Einheiten (301, 302, 303, 304, 305, 306) gleich einem Verhältnis der Anzahl der in dem Kühlmodus arbeitenden Außen-Einheiten (101, 102, 103) zu der Anzahl der in dem Heizmodus arbeitenden Außen-Einheiten (101, 102, 103) ist.

2. Klimaanlagensystem nach Anspruch 1, wobei die Steuereinheit die Verteilereinheit (200) gemäß dem Kühlbetrieb/Heizbetrieb-Verhältnis der Innen-Einheiten (301, 302, 303, 304, 305, 306) steuert, derart, dass die Verteilereinheit (200) Kältemittelzirkulationen zwischen den in einem Kühlmodus arbeitenden Innen-Einheiten (301, 302, 303, 304, 305, 306) und Außen-Einheiten (101, 102, 103) und Kältemittelzirkulationen zwischen den in einem Heizmodus arbeitenden Innen-Einheiten (301, 302, 303, 304, 305, 306) und Außen-Einheiten (101, 102, 103) erlaubt.

3. Verfahren zur Steuerung eines Klimaanlagensystems unter Verwendung einer Steuereinheit, wobei das Klimaanlagensystem aufweist: mehrere Innen-Einheiten (301, 302, 303, 304, 305, 306) und mehrere Außen-Einheiten (101, 102, 103), die jeweils einen Außen-Wärmeaustauscher (113), einen Kompressor (111), ein Vierwege-Ventil (112) und einen Akkumulator (114) aufweisen und individuell in einem Kühlmodus oder einem Heizmodus arbeiten können,
wobei das Verfahren aufweist:

Empfangen eines Steuersignals, um das Klimaanlagensystem gleichzeitig in einem Kühlmodus und einem Heizmodus arbeiten zu lassen;
Bestimmen eines Kühlbetrieb/Heizbetrieb-Verhältnisses für mehrere Innen-Einheiten (301, 302, 303, 304, 305, 306) und eines Kühlbetrieb/Heizbetrieb-Verhältnisses für mehrere Außen-Einheiten (101, 102, 103) gemäß dem Steuersignal;
Vergleichen des Kühlbetrieb/Heizbetrieb-Verhältnisses der Innen-Einheiten (301, 302, 303, 304, 305, 306) mit dem Kühlbetrieb/Heizbetrieb-Verhältnis der Außen-Einheiten (101, 102, 103); und
falls das Kühlbetrieb/Heizbetrieb-Verhältnis der Innen-Einheiten (301, 302, 303, 304, 305, 306) sich von dem Kühlbetrieb/Heizbetrieb-Verhältnis der Außen-Einheiten (101, 102, 103) unterscheidet, Anpassen des Kühlbetrieb/Heizbetrieb-Verhältnisses der Außen-Einheiten (101, 102, 103) an ein Verhältnis, das dem Kühlbetrieb/Heizbetrieb-Verhältnis der Innen-Einheiten (301, 302, 303, 304, 305, 306) entspricht,
wobei die Steuereinheit die Innen-Einheiten (301, 302, 303, 304, 305, 306) und die Außen-Einheiten (101, 102, 103) derart steuert, dass ein Verhältnis der Anzahl der in einem Kühlmodus arbeitenden Innen-Einheiten (301, 302, 303, 304, 305, 306) zu der Anzahl der in einem Heizmodus arbeitenden Innen-Einheiten (301, 302, 303, 304, 305, 306) gleich einem Verhältnis der Anzahl der in einem Kühlmodus arbeitenden Außen-Einheiten (101, 102, 103) zu der Anzahl der in einem Heizmodus arbeitenden Außen-Einheiten (101, 102, 103) ist.

Revendications

1. Système de climatisation qui comprend :

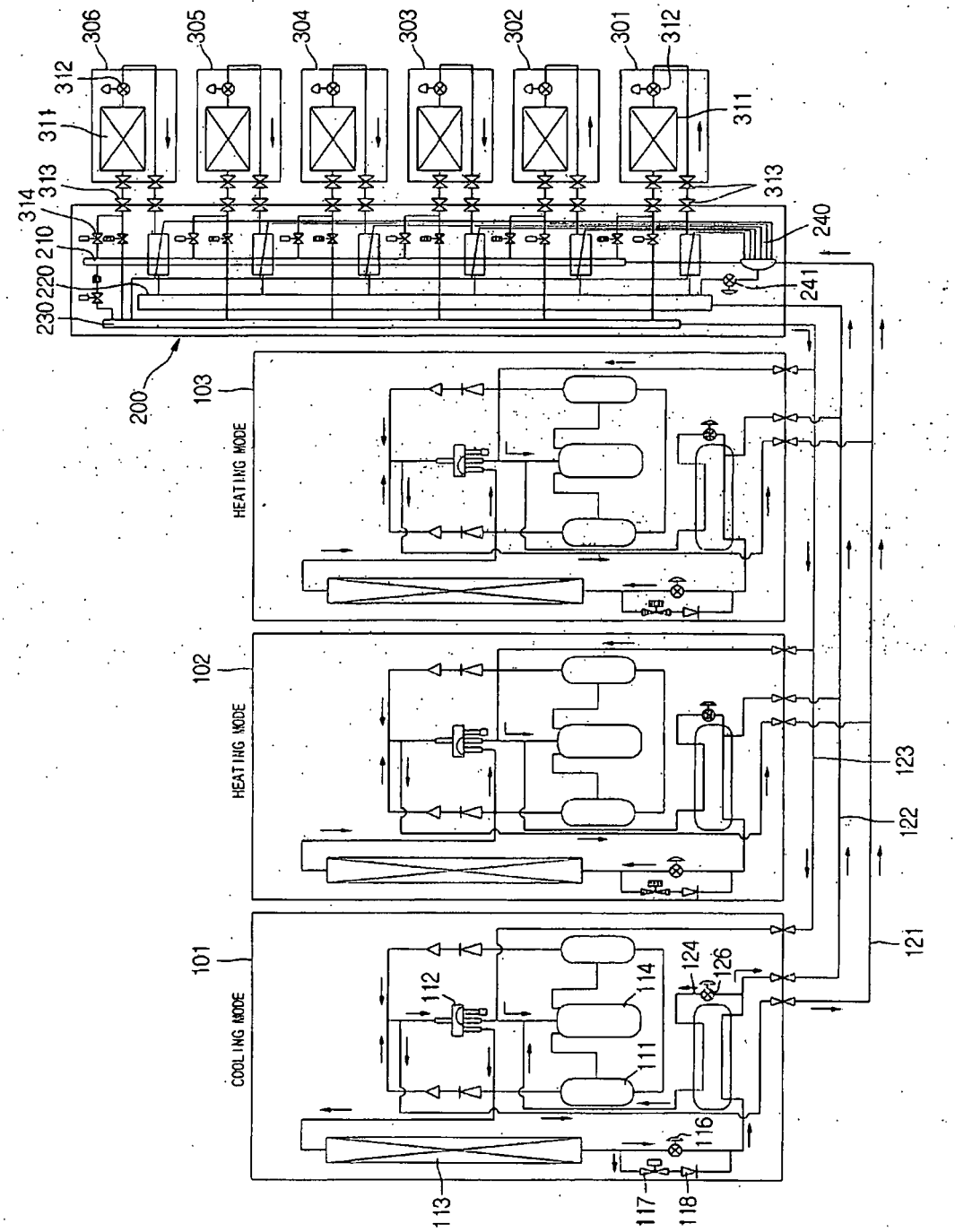
une pluralité d'unités d'intérieur (301, 302, 303, 304, 305, 306) qui comprennent chacune un échangeur thermique d'intérieur (311), et capables de fonctionner individuellement en mode de refroidissement ou en mode de chauffage ;
une pluralité d'unités d'extérieur (101, 102, 103) qui comprennent chacune un échangeur thermique d'extérieur (113), et capables de fonctionner individuellement en mode de refroidissement ou en mode de chauffage, un compresseur (111), un clapet à quatre voies (112), et un accumulateur (114) ;
une unité de distribution (200) configurée pour distribuer un réfrigérant entre les échangeurs thermiques d'intérieur (311) et les échangeurs thermiques d'extérieur (113) ; et
une unité de commande configurée pour faire fonctionner les unités d'extérieur (101, 102, 103) à un rapport de fonctionnement refroidissement/chauffage qui correspond à un rapport de fonctionnement refroidissement/chauffage des unités d'intérieur (301, 302, 303, 304, 305, 306), **caractérisé en ce que**
l'unité de commande est adaptée pour contrôler les unités d'intérieur (301, 302, 303, 304, 305, 306) et les unités d'extérieur (101, 102, 103) de sorte qu'un rapport entre le nombre d'unités d'intérieur (301, 302, 303, 304, 305, 306) qui fonctionnent en mode de refroidissement et le nombre d'unités d'intérieur (301, 302, 303, 304, 305, 306) qui fonctionnent en mode de chauffage soit égal à un rapport entre le nombre d'unités d'extérieur (101, 102, 103) qui fonctionnent en mode de refroidissement et le nombre d'unités d'extérieur (101, 102, 103) qui fonctionnent en mode de chauffage.

2. Système de climatisation selon la revendication 1, dans lequel l'unité de commande contrôle l'unité de distribution (200) selon le rapport de fonctionnement refroidissement/chauffage des unités d'intérieur (301, 302, 303, 304, 305, 306) de sorte que l'unité de distribution (200) permette la circulation d'un réfrigérant entre les unités d'intérieur (301, 302, 303, 304, 305, 306) et les unités d'extérieur (101, 102, 103) qui fonctionnent en mode de refroidissement, et la circulation d'un réfrigérant entre les unités d'intérieur (301, 302, 303, 304, 305, 306) et les unités d'extérieur (101, 102, 103) qui fonctionnent en mode de chauffage.

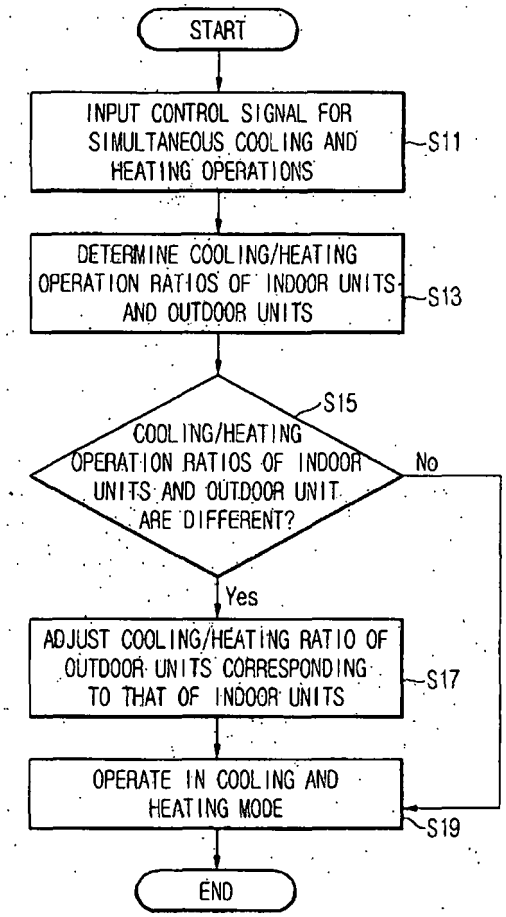
3. Procédé de commande d'un système de climatisation à l'aide d'une unité de commande, le système de climatisation comprenant une pluralité d'unités d'intérieur (301, 302, 303, 304, 305, 306) et une pluralité d'unités d'extérieur (101, 102, 103) qui comprennent chacune un échangeur thermique d'extérieur (113), et qui sont capables de fonctionner individuellement en mode refroidissement ou de chauffage, un compresseur (111), un clapet à quatre voies (112), et un accumulateur (114),
le procédé comprenant :

la réception d'un signal de commande destiné à faire fonctionner le système de climatisation simultanément en mode de refroidissement et en mode de chauffage ;
la détermination d'un rapport de fonctionnement refroidissement/chauffage d'une pluralité d'unités d'intérieur (301, 302, 303, 304, 305, 306) et d'un rapport de fonctionnement refroidissement/chauffage d'une pluralité d'unités d'extérieur (101, 102, 103) selon le signal de commande ;
la comparaison du rapport de fonctionnement refroidissement/chauffage des unités d'intérieur (301, 302, 303, 304, 305, 306) avec le rapport de fonctionnement refroidissement/chauffage des unités d'extérieur (101, 102, 103) ; et
si le rapport de fonctionnement refroidissement/chauffage des unités d'intérieur (301, 302, 303, 304, 305, 306) est différent du rapport de fonctionnement refroidissement/chauffage des unités d'extérieur (101, 102, 103), l'ajustement du rapport de fonctionnement refroidissement/chauffage des unités d'extérieur (101, 102, 103) sur un rapport qui correspond au rapport de fonctionnement refroidissement/chauffage de unités d'intérieur (301, 302, 303, 304, 305, 306),
dans lequel l'unité de commande contrôle les unités d'intérieur (301, 302, 303, 304, 305, 306) et les unités d'extérieur (101, 102, 103) de sorte qu'un rapport entre le nombre d'unités d'intérieur (301, 302, 303, 304, 305, 306) qui fonctionnent en mode de refroidissement et le nombre d'unités d'intérieur (301, 302, 303, 304, 305, 306) qui fonctionnent en mode de chauffage soit égal à un rapport entre le nombre d'unités d'extérieur (101, 102, 103) qui fonctionnent en mode de refroidissement et le nombre d'unités d'extérieur (101, 102, 103) qui fonctionnent en mode de chauffage.

[Fig. 1]


306
305
304
303
302
301
312
311
313
314
210
220
230
240
241
200
103
102
101
HEATING MODE
HEATING MODE
COOLING MODE
112
114
111
116
113
117
118
124
126
123
122
121

[Fig. 2]


START
INPUT CONTROL SIGNAL FOR SIMULTANEOUS COOLING AND HEATING OPERATIONS
S11
DETERMINE COOLING/HEATING OPERATION RATIOS OF INDOOR UNITS AND OUTDOOR UNITS
S13
S15
COOLING/HEATING OPERATION RATIOS OF INDOOR UNITS AND OUTDOOR UNIT ARE DIFFERENT?
No
Yes
ADJUST COOLING/HEATING RATIO OF OUTDOOR UNITS CORRESPONDING TO THAT OF INDOOR UNITS
S17
OPERATE IN COOLING AND HEATING MODE
S19
END

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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