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(54) **AIR CONDITIONER STARTING FREQUENCY DETERMINING METHOD AND SYSTEM**

(57) An air conditioner starting frequency determining method and system. The method comprises: comparing an acquired actual temperature value of the outdoor environment with preset first and second temperature thresholds, and determining the starting frequency of an air conditioner on the basis of the comparison result.

The starting frequency of the air conditioner can be adjusted according to the actual temperature value of the outdoor environment, so that the air conditioner can be turned on normally without failure even when the outdoor temperature is high.

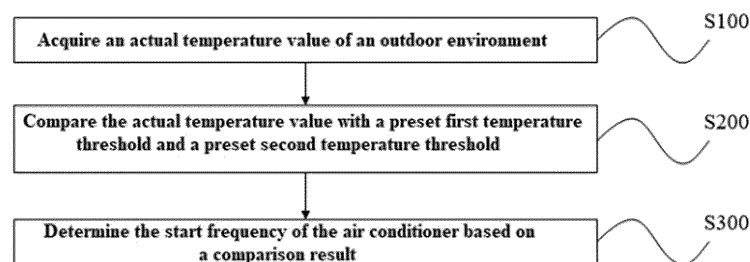


FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The present disclosure relates to the technical field of air conditioning, and in particular to a method and system for determining a start frequency of an air conditioner.

BACKGROUND OF THE INVENTION

[0002] When an air conditioning system is operating in a cooling mode, a refrigerant coming from a compressor reaches a condenser of an outdoor unit after passing through a four-way valve; after being subjected to a throttling effect of an electronic expansion valve of the outdoor unit, the refrigerant enters an indoor side, and after being subjected to a throttling effect of an electronic expansion valve of an indoor unit, the refrigerant enters an evaporator for heat exchange, and then enters the outdoor side; the refrigerant passes through the four-way valve again being flowing into a gas-liquid separator, and finally flows back to the compressor to form a complete cooling cycle.

[0003] In general situations, in order to enable the refrigerant in the air conditioning system to quickly circulate to participate in the cooling or heating of the air conditioner, in a soft-start stage, the compressor is typically started according to a maximum start frequency. However, when the air conditioning system is operating in the cooling mode, if a temperature of an outdoor environment is relatively high, especially in a T3 working condition, under which the temperature of the outdoor environment may reach up to 40-50°C, a discharge pressure of the compressor will be too high if the start frequency is relatively high due to a limited condensing effect of the condenser, which will easily cause a high pressure switch to be turned off so as to protect the air conditioner by shutting down. This will result in a problem that the air conditioning system cannot be turned on normally, thus affecting the normal use by the user.

[0004] Accordingly, there is a need in the art for a new method and system for determining a start frequency of an air conditioner to solve the above problem.

SUMMARY OF THE INVENTION

[0005] In order to solve the above problem in the prior art, that is, to solve the problem in the existing air conditioning systems that the air conditioning systems cannot be turned on normally when the temperature of the outdoor environment is high, the present disclosure provides a method and system for determining a start frequency of an air conditioner, so that the air conditioner can be turned on normally without failure even when the outdoor temperature is high.

[0006] The method for determining a start frequency of an air conditioner provided by the present disclosure includes: acquiring an actual temperature value of an out-

door environment; comparing the actual temperature value with a preset first temperature threshold and a preset second temperature threshold, the first temperature threshold being lower than the second temperature threshold; and determining the start frequency of the air conditioner based on a comparison result.

[0007] As a preferred technical solution of the method for determining the start frequency of the air conditioner provided by the present disclosure, the "determining the start frequency of the air conditioner based on a comparison result" includes: determining the start frequency of the air conditioner as a first start frequency, if the actual temperature value is smaller than or equal to the first temperature threshold.

[0008] As a preferred technical solution of the method for determining the start frequency of the air conditioner provided by the present disclosure, the "determining the start frequency of the air conditioner based on a comparison result" includes: determining the start frequency of the air conditioner according to a preset functional relationship indicating a change of the start frequency with the actual temperature value, if the actual temperature value is between the first temperature threshold and the second temperature threshold.

[0009] As a preferred technical solution of the method for determining the start frequency of the air conditioner provided by the present disclosure, the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value.

[0010] As a preferred technical solution of the method for determining the start frequency of the air conditioner provided by the present disclosure, the "determining the start frequency of the air conditioner based on a comparison result" includes: determining the start frequency of the air conditioner as 0, if the actual temperature value is larger than or equal to the second temperature threshold.

[0011] In addition, the present disclosure correspondingly also provides a system for determining a start frequency of an air conditioner, which includes: an acquisition module, which is configured to acquire an actual temperature value of an outdoor environment; a comparison module, which is configured to compare the actual temperature value with a preset first temperature threshold and a preset second temperature threshold, the first temperature threshold being lower than the second temperature threshold; and a determination module, which is configured to determine the start frequency of the air conditioner based on a comparison result.

[0012] As a preferred technical solution of the system for determining the start frequency of the air conditioner provided by the present disclosure, the determination module determines the start frequency of the air conditioner based on the comparison result in the following way: if the actual temperature value is smaller than or equal to the first temperature threshold, the start frequency of the air conditioner is determined as a first start fre-

quency.

[0013] As a preferred technical solution of the system for determining the start frequency of the air conditioner provided by the present disclosure, the determination module determines the start frequency of the air conditioner based on the comparison result in the following way: if the actual temperature value is between the first temperature threshold and the second temperature threshold, the start frequency of the air conditioner is determined according to a preset functional relationship indicating a change of the start frequency with the actual temperature value.

[0014] As a preferred technical solution of the system for determining the start frequency of the air conditioner provided by the present disclosure, the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value.

[0015] As a preferred technical solution of the system for determining the start frequency of the air conditioner provided by the present disclosure, the determination module determines the start frequency of the air conditioner based on the comparison result in the following way: if the actual temperature value is larger than or equal to the second temperature threshold, the start frequency of the air conditioner is determined as 0.

[0016] In the method and system for determining the start frequency of the air conditioner provided by the present disclosure, the acquired actual temperature value of the outdoor environment is compared with a preset first temperature threshold and a preset second temperature threshold, and the start frequency of the air conditioner is determined based on a comparison result. In this way, for different actual temperature values of the outdoor environment, the start frequency of the air conditioner is determined respectively, so that the air conditioner can be turned on normally without failure even when the outdoor temperature is high, which further optimizes the performance of the air conditioner and improves the user's experience in use.

[0017] Further, in the method and system for determining the start frequency of the air conditioner provided by the present disclosure, when the actual temperature value of the outdoor environment is between the first temperature threshold and the second temperature threshold, the start frequency of the air conditioner is determined according to a preset functional relationship indicating a change of the start frequency with the actual temperature value, and the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value. In this way, when the actual temperature value of the outdoor environment exceeds the first temperature threshold, with the increase of the actual temperature value of the outdoor environment, it can still be ensured that the air conditioner will be started quickly at a frequency as high as possible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The method and system for determining a start frequency of an air conditioner of the present disclosure will be described below with reference to the accompanying drawings. In the drawings:

FIG. 1 is the schematic flow chart of the method for determining a start frequency of an air conditioner of the present embodiment;

FIG. 2 is a first function image of the method for determining a start frequency of an air conditioner of the present embodiment;

FIG. 3 is a second function image of the method for determining a start frequency of an air conditioner of the present embodiment; and

FIG. 4 is a schematic structural diagram of an air conditioning system of the present embodiment.

List of reference signs:

[0019] 1: compressor; 2: high pressure sensor; 3: high pressure switch; 4: four-way valve; 5: condenser; 6: outdoor electronic expansion valve; 7: indoor electronic expansion valve; 8: evaporator; 9: low pressure sensor; 10: gas-liquid separator.

DETAILED DESCRIPTION OF THE EMBODIMENT(S) OF THE INVENTION

[0020] Preferred embodiments of the present disclosure will be described below with reference to the accompanying drawings. It should be understood by those skilled in the art that these embodiments are only used to explain the technical principle of the present disclosure, and are not intended to limit the scope of protection of the present disclosure. For example, although the present embodiment is described in connection with the air conditioning system shown in FIG. 4, this is not intended to limit the scope of protection of the present disclosure, and those skilled in the art can apply the present disclosure to air conditioning systems with other structures without departing from the principle of the present disclosure.

[0021] In the air conditioning system as shown in FIG. 4, when the air conditioning system is operating in a cooling mode, an end *d* of a four-way valve is conducted with an end *c* of the four-way valve, and an end *e* of the four-way valve is conducted with an end *s* of the four-way valve. A refrigerant coming out of a compressor 1 reaches an outdoor condenser 5 after passing through the four-way valve 4; after being subjected to a throttling effect of an outdoor electronic expansion valve 6, the refrigerant enters an indoor side, and after being subjected to a throttling effect of an indoor electronic expansion valve 7, the

refrigerant enters an evaporator 8 for heat exchange, and then enters the outdoor side; the refrigerant passes through the four-way valve 4 again being flowing into a gas-liquid separator 10, and finally flows back to the compressor 1 to form a complete cooling cycle. A high pressure sensor 2 and a high pressure switch 3 are also arranged between the compressor 1 and the four-way valve, and a low pressure sensor 9 is also connected to a refrigerant inlet side of the gas-liquid separator 10.

[0022] In general situations, in order to enable the refrigerant in the air conditioning system to quickly circulate to participate in the cooling or heating of the air conditioner, the frequency of the compressor 1 in a soft-start stage is typically set relatively high, and is a fixed value (such as 40Hz). When the air conditioning system is implementing cooling in a case where the temperature of the outdoor environment is relatively high, due to the limited condensing effect of the condenser 5, if the start frequency is still 40Hz at this time, a discharge pressure of the compressor 1 detected by the high pressure sensor 2 will be too high, which will easily cause the high pressure switch 3 to be turned off, thus making the air conditioning system enter a shutdown protection state.

[0023] Taking the R410A refrigerant as an example, a turn-off value of the high pressure switch is generally 4.15MPa, and a corresponding saturation temperature is 64.7°C. When the temperature of the outdoor environment is high, the pressure of the refrigerant in the air conditioning system will also increase accordingly.

[0024] Generally speaking, there are typically three types of air conditioners: cold air type, heat pump type, and electric heating type, etc. Under different climate conditions, the applicable environmental temperature ranges are not the same. According to the provisions in the national standard GB/T7725-1996 "Room Air Conditioner", the climate is divided into three types, namely, T1, T2, T3. Air conditioners for T3 climate type have a highest working environment temperature of 52°C, and they can adapt to a tropical climate; therefore, they are called tropical air conditioners. Air conditioners for T2 climate type are called cold-zone air conditioners. Air conditioners for T1 climate type are called temperate air conditioners.

[0025] Taking an air conditioner for T3 climate type as an example, when the specified highest outdoor environment temperature at which the air conditioner can operate is 52°C, the corresponding system pressure is 3.2MPa. If the start frequency of the compressor is unreasonably set at this time (for example, it is still 40Hz), then the discharge pressure 2 can easily reach 4.15MPa, which will further trigger the turn-off failure of the high pressure switch 3, so that the air conditioning system cannot be turned on normally, thus affecting the normal use by the user.

[0026] In order to solve the above problem in the prior art, that is, to solve the problem in the existing air conditioning systems that the air conditioning systems cannot be turned on normally when the temperature of the out-

door environment is high, the present embodiment provides a method and system for determining a start frequency of an air conditioner, so that the air conditioner can be turned on normally without failure even when the outdoor temperature is high.

[0027] As shown in FIG. 1, the method for determining a start frequency of an air conditioner provided by the present embodiment includes:

S100: acquiring an actual temperature value of an outdoor environment;

S200: comparing the actual temperature value with a preset first temperature threshold and a preset second temperature threshold, the first temperature threshold being lower than the second temperature threshold; and

S300: determining the start frequency of the air conditioner based on a comparison result.

[0028] Exemplarily, a temperature sensor may be provided in the outdoor environment to detect the actual temperature value of the outdoor environment. The temperature sensor may be communicatively connected to a controller of the air conditioning system, and the temperature sensor can feed the acquired actual temperature value of the outdoor environment back to the controller of the air conditioning system. The controller of the air conditioning system compares the actual temperature value with the preset first temperature threshold and the preset second temperature threshold, and determines the start frequency of the air conditioner based on the comparison result.

[0029] In the method for determining the start frequency of the air conditioner provided by the present embodiment, the acquired actual temperature value of the outdoor environment is compared with a preset first temperature threshold and a preset second temperature threshold respectively, and the start frequency of the air conditioner is determined based on a comparison result. In this way, for different actual temperature values of the outdoor environment, the start frequency of the air conditioner is determined respectively, so that the air conditioner can be turned on normally without failure even when the outdoor temperature is high, which further optimizes the performance of the air conditioner and improves the user's experience in use.

[0030] As a preferred implementation of the above method for determining the start frequency of the air conditioner provided by the present embodiment, in the above step S300, the "determining the start frequency of the air conditioner based on a comparison result" includes: determining the start frequency of the air conditioner as a first start frequency, if the actual temperature value is smaller than or equal to the first temperature threshold.

[0031] Exemplarily, the first temperature threshold is

a critical value of the temperature of the outdoor environment, which has a negligible influence on the start frequency of the air conditioner; for example, it may be 35°C. Moreover, a rated value for performing cooling by the air conditioners for T1 climate type is also 35°C, and most air conditioning systems are developed from this rated value. In a specific application, the first temperature threshold may be any value between 32°C and 38°C; the first start frequency may be the maximum start frequency of the air conditioner, such as 40Hz; when the actual temperature value of the outdoor environment is lower than or equal to the first temperature threshold, the air conditioner can be started according to the maximum start frequency value, so as to ensure that the air conditioner is started quickly at a frequency as high as possible.

[0032] As a preferred implementation of the above method for determining the start frequency of the air conditioner provided by the present embodiment, in the above step S300, the "determining the start frequency of the air conditioner based on a comparison result" includes: determining the start frequency of the air conditioner according to a preset functional relationship indicating a change of the start frequency with the actual temperature value, if the actual temperature value is between the first temperature threshold and the second temperature threshold.

[0033] Exemplarily, the second temperature threshold may be the highest temperature value of the outdoor environment when the air conditioner operates normally. In a case where the actual temperature value of the outdoor environment is between the first temperature threshold and the second temperature threshold, if the start frequency of the air conditioner is high, it is easy to cause the air conditioner to fail to adapt to the actual temperature of the outdoor environment, resulting in an overly high discharge pressure of the compressor to trigger the shutdown protection of the air conditioning system. Therefore, when the environmental temperature is high, the start frequency of the air conditioner can be appropriately reduced to ensure that the air conditioner is turned up normally. It is a convenient and practical method to determine the start frequency of the air conditioner through the preset functional relationship indicating a change of the start frequency with the actual temperature value.

[0034] As a preferred implementation of the above method for determining the start frequency of the air conditioner provided by the present embodiment, the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value.

[0035] Exemplarily, the functional relationship can generally characterize the relationship that the start frequency decreases with the increase of the actual temperature value, and the functional relationship may be a linear relationship corresponding to a straight line A as shown in FIG. 2, or a nonlinear relationship correspond-

ing to a concave curve B as shown in 2, or a nonlinear relationship corresponding to a convex curve C as shown in FIG. 2, and a nonlinear relationship corresponding to a stepped fold line D as shown in FIG. 3. Those skilled in the art can make specific settings according to differences in the performance of the compressor, the type of the refrigerant, etc. Further, when the functional relationship is the linear relationship corresponding to the straight line A as shown in FIG. 2, in an example in which the first temperature threshold is 35°C, the second temperature threshold is 54°C, the maximum start frequency of the air conditioner is 40Hz and the lowest effective start frequency of the air conditioner is 10Hz, the corresponding functional relationship is $f = (-1.58 \cdot T_{ao} + 95.26) \text{Hz}$, where T_{ao} represents the actual temperature value of the outdoor environment.

[0036] In addition, the minimum start frequency (or the lowest effective start frequency) is generally recorded in the compressor specification book, so when the start frequency of the air conditioner is determined according to the actual temperature value of the outdoor environment, it should be ensured that the start frequency of the air conditioner is not lower than the minimum start frequency so that the air conditioner can be started normally. In both the function images shown in FIGS. 2 and 3, 10Hz is used as the lowest effective start frequency of the air conditioner.

[0037] As a preferred implementation of the above method for determining the start frequency of the air conditioner provided by the present embodiment, in the above step S300, the "determining the start frequency of the air conditioner based on a comparison result" includes: determining the start frequency of the air conditioner as 0, if the actual temperature value is larger than or equal to the second temperature threshold.

[0038] Exemplarily, the second temperature threshold may be the highest temperature value of the outdoor environment when the air conditioner operates normally. For example, as to the air conditioners for T3 climate type, the highest working environment temperature is 52°C. In both FIG. 2 and FIG. 3, the second temperature threshold of 54°C is taken as an example. When the actual temperature of the outdoor environment is higher than or equal to the second temperature threshold, in order to protect the air conditioning system from accidents, the air conditioner may be prohibited from starting.

[0039] It should be noted that although the specific steps of the method of the present disclosure have been described in detail above, those skilled in the art can combine and split these steps and modify the order of these steps without departing from the basic principle of the present disclosure. The thus-amended technical solutions do not change the basic concept of the present disclosure, and therefore also fall within the scope of protection of the present disclosure.

[0040] It should be understood by those skilled in the art that the method for determining the start frequency of the air conditioner provided by the present embodi-

ment may be stored as a program in a computer-readable storage medium. The storage medium includes several instructions for causing a computer device (which may be a personal computer, a server, or a network device, etc.) or a processor to execute some steps of the methods of various embodiments of the present disclosure. The above storage medium includes: a U disk, a mobile hard disk, a read-only memory (ROM), a random access memory (RAM), a magnetic disk or an optical disk, and other media that can store program codes.

[0041] In addition, the present disclosure correspondingly also provides a system for determining a start frequency of an air conditioner, which includes: an acquisition module, which is configured to acquire an actual temperature value of an outdoor environment; a comparison module, which is configured to compare the actual temperature value with a preset first temperature threshold and a preset second temperature threshold, the first temperature threshold being lower than the second temperature threshold; and a determination module, which is configured to determine the start frequency of the air conditioner based on a comparison result.

[0042] As a preferred implementation of the system for determining the start frequency of the air conditioner provided by the present embodiment, the determination module determines the start frequency of the air conditioner based on the comparison result in the following way: if the actual temperature value is smaller than or equal to the first temperature threshold, the start frequency of the air conditioner is determined as a first start frequency.

[0043] As a preferred implementation of the system for determining the start frequency of the air conditioner provided by the present embodiment, the determination module determines the start frequency of the air conditioner based on the comparison result in the following way: if the actual temperature value is between the first temperature threshold and the second temperature threshold, the start frequency of the air conditioner is determined according to a preset functional relationship indicating a change of the start frequency with the actual temperature value.

[0044] As a preferred implementation of the system for determining the start frequency of the air conditioner provided by the present embodiment, the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value.

[0045] As a preferred implementation of the system for determining the start frequency of the air conditioner provided by the present embodiment, the determination module determines the start frequency of the air conditioner based on the comparison result in the following way: if the actual temperature value is larger than or equal to the second temperature threshold, the start frequency of the air conditioner is determined as 0.

[0046] The system for determining the start frequency of the air conditioner provided by the present embodi-

ment corresponds to the method for determining the start frequency of the air conditioner that has been described above, so the system for determining the start frequency of the air conditioner in the present embodiment will not be described repeatedly. Those skilled in the art can still clearly understand the present embodiment, and can implement it smoothly on the basis of the understanding.

[0047] In the system for determining the start frequency of the air conditioner provided by the present embodiment, the comparison module compares the acquired actual temperature value of the outdoor environment with a preset first temperature threshold and a preset second temperature threshold, and the determination module determines the start frequency of the air conditioner based on a comparison result of the comparison module. In this way, for different actual temperature values of the outdoor environment, the start frequency of the air conditioner can be determined respectively by the system for determining the start frequency of the air conditioner provided by the present embodiment, so that the air conditioner can be turned on normally without failure even when the outdoor temperature is high, which further optimizes the performance of the air conditioner and improves the user's experience in use.

[0048] It should be noted that, the system for determining the start frequency of the air conditioner provided by the present embodiment is only illustrated through the division of the above functional modules (such as the acquisition module, the comparison module, the determination module, etc.). In practical applications, the above functional modules can be completed by different functional modules as required, that is, the functional modules in the embodiments of the present disclosure can be further decomposed or combined. For example, the functional modules in the above embodiment can be combined into one functional module, or can be further split into several sub-modules, so as to complete all or part of the functions described above. The names of the functional modules involved in the embodiments of the present disclosure are only provided for distinguishing, and should not be regarded as improper limitations to the present disclosure.

[0049] Various embodiments of the present disclosure may be implemented in hardware, or in software modules running on one or more processors, or in a combination thereof. It should be understood by those skilled in the art that a microprocessor or a digital signal processor (DSP) may be used in practice to implement some or all the functions of some or all of the components in the server and client according to the embodiments of the present disclosure. The present disclosure may also be implemented as a device or apparatus program (e.g., a PC program and a PC program product) for executing a part or entirety of the method described herein. Such a program for implementing the present disclosure may be stored on a PC-readable medium, or may be in the form of one or more signals. Such signals may be downloaded from Internet websites, or provided on carrier signals, or

provided in any other form.

[0050] Furthermore, it can be understood by those skilled in the art that although some of the embodiments described herein include some features included in other embodiments rather than other features, the combination of features of different embodiments is meant to be within the scope of the present disclosure, and different embodiments can be formed. For example, in the claims of present disclosure, any of the claimed embodiments may be used in any combination.

[0051] Hitherto, the technical solutions of the present disclosure have been described in connection with the preferred embodiments shown in the accompanying drawings, but it is easily understood by those skilled in the art that the scope of protection of the present disclosure is obviously not limited to these specific embodiments. Without departing from the principles of the present disclosure, those skilled in the art can make equivalent changes or replacements to relevant technical features, and all the technical solutions after these changes or replacements will fall within the scope of protection of the present disclosure.

Claims

1. A method for determining a start frequency of an air conditioner, comprising:

acquiring an actual temperature value of an outdoor environment;
 comparing the actual temperature value with a preset first temperature threshold and a preset second temperature threshold, the first temperature threshold being lower than the second temperature threshold; and
 determining the start frequency of the air conditioner based on a comparison result.

2. The method for determining a start frequency of an air conditioner according to claim 1, wherein the "determining the start frequency of the air conditioner based on a comparison result" comprises:
 determining the start frequency of the air conditioner as a first start frequency, if the actual temperature value is smaller than or equal to the first temperature threshold.

3. The method for determining a start frequency of an air conditioner according to claim 1, wherein the "determining the start frequency of the air conditioner based on a comparison result" comprises:
 determining the start frequency of the air conditioner according to a preset functional relationship indicating a change of the start frequency with the actual temperature value, if the actual temperature value is between the first temperature threshold and the second temperature threshold.

4. The method for determining a start frequency of an air conditioner according to claim 3, wherein the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value.

5. The method for determining a start frequency of an air conditioner according to claim 1, wherein the "determining the start frequency of the air conditioner based on a comparison result" comprises:
 determining the start frequency of the air conditioner as 0, if the actual temperature value is larger than or equal to the second temperature threshold.

6. A system for determining a start frequency of an air conditioner, comprising:

an acquisition module, which is configured to acquire an actual temperature value of an outdoor environment;
 a comparison module, which is configured to compare the actual temperature value with a preset first temperature threshold and a preset second temperature threshold, the first temperature threshold being lower than the second temperature threshold; and
 a determination module, which is configured to determine the start frequency of the air conditioner based on a comparison result.

7. The system for determining a start frequency of an air conditioner according to claim 6, wherein the determination module determines the start frequency of the air conditioner based on the comparison result in the following way:
 if the actual temperature value is smaller than or equal to the first temperature threshold, the start frequency of the air conditioner is determined as a first start frequency.

8. The system for determining a start frequency of an air conditioner according to claim 6, wherein the determination module determines the start frequency of the air conditioner based on the comparison result in the following way:
 if the actual temperature value is between the first temperature threshold and the second temperature threshold, the start frequency of the air conditioner is determined according to a preset functional relationship indicating a change of the start frequency with the actual temperature value.

9. The system for determining a start frequency of an air conditioner according to claim 8, wherein the functional relationship is configured to characterize a general trend of a decrease of the start frequency with an increase of the actual temperature value.

10. The system for determining a start frequency of an air conditioner according to claim 6, wherein the determination module determines the start frequency of the air conditioner based on the comparison result in the following way:

if the actual temperature value is larger than or equal to the second temperature threshold, the start frequency of the air conditioner is determined as 0.

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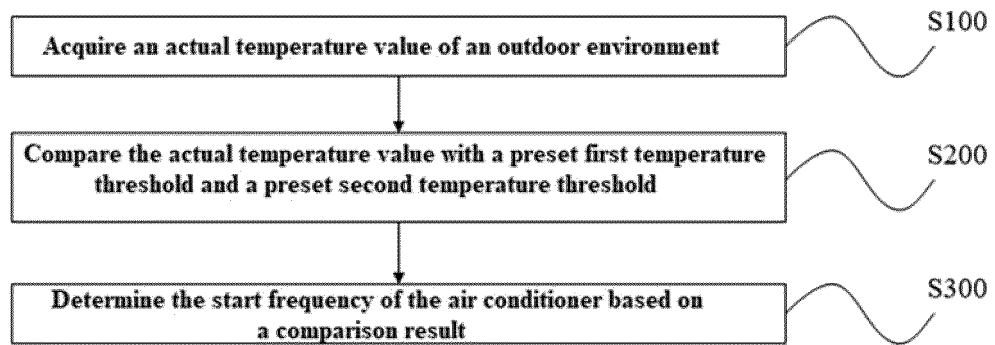


FIG. 1

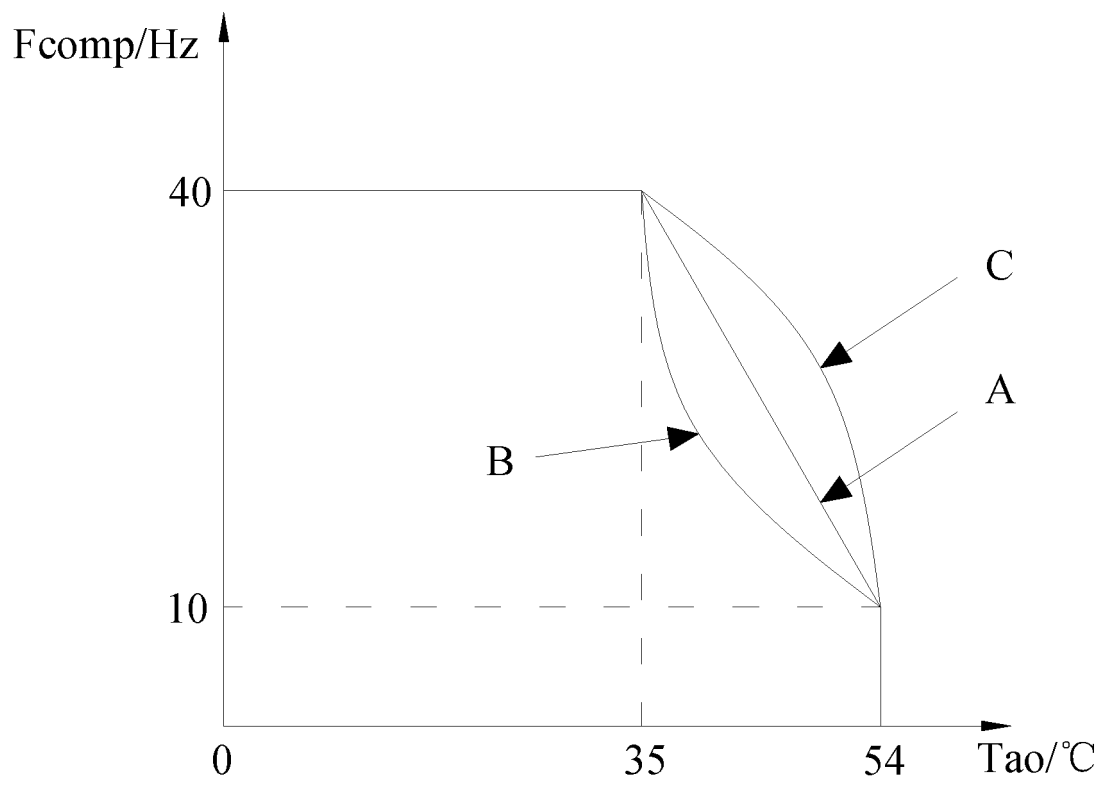


FIG. 2

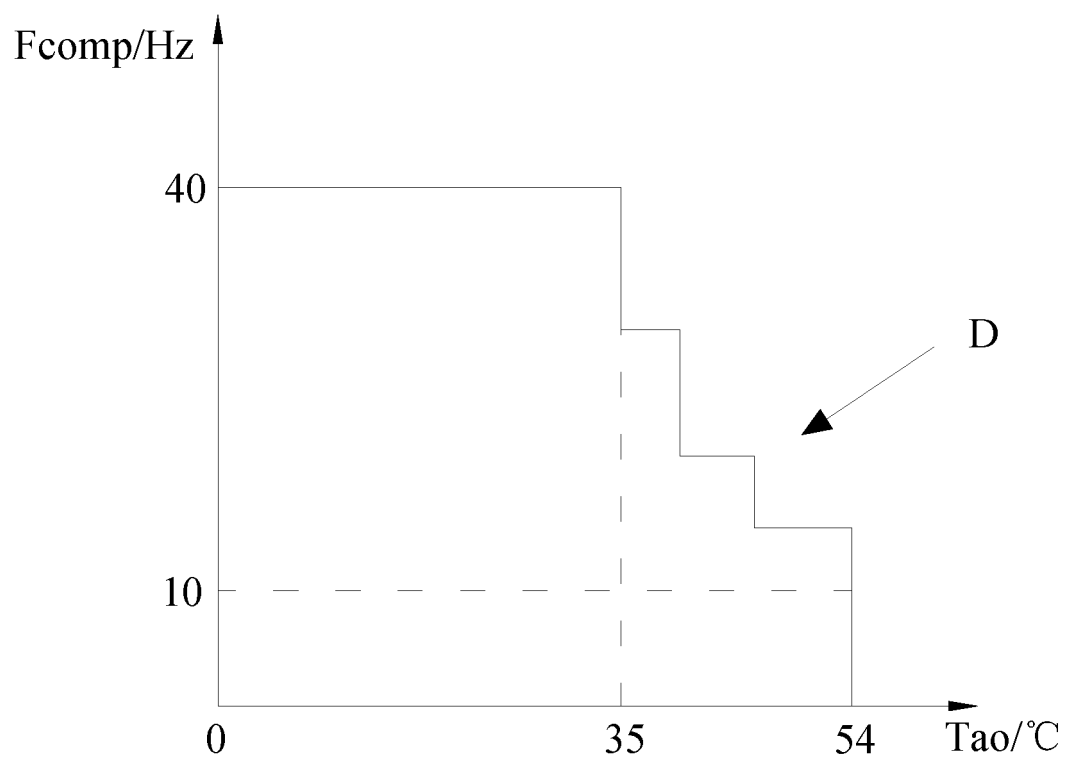


FIG. 3

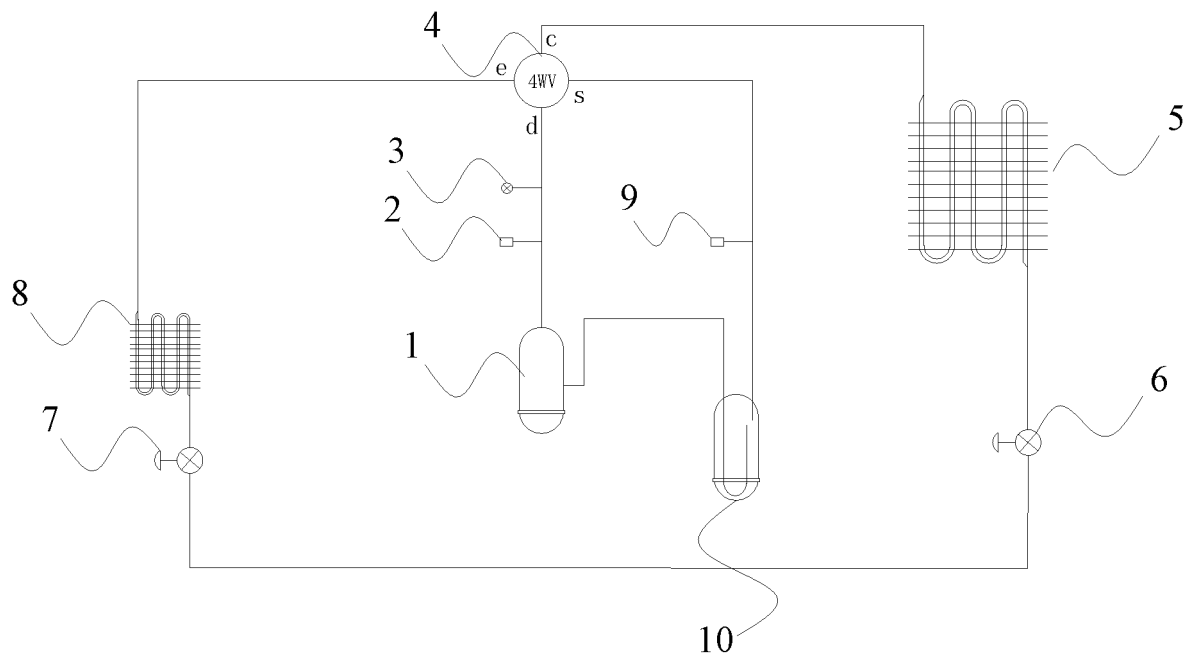


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/100513

A. CLASSIFICATION OF SUBJECT MATTER

F24F 11/00(2018.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI, CNPAT, DWPI, VEN, SIPOABS; (空调, 启动, 频率, 室外, 温度, 第一, 第二, 比较, 阈值; air conditioner, frequency, outdoor, temperature, first, second, compare, threshold)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 108534320 A (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 14 September 2018 (2018-09-14) description, paragraphs [0040]-[0053], and figures 1-8	1-10
X	CN 106642579 A (GUANGDONG MIDEA REFRIGERATION EQUIPMENT CO., LTD. et al.) 10 May 2017 (2017-05-10) description, paragraphs [0010]-[00113], and figures 1-4	1-10
A	US 2008028780 A1 (DAEWOO ELECTRONICS CORP) 07 February 2008 (2008-02-07) entire document	1-10
A	CN 108278742 A (AUX AIR CONDITIONER CO., LTD.) 13 July 2018 (2018-07-13) entire document	1-10
A	KR 20050100795 A (LG ELECTRONICS INC.) 20 October 2005 (2005-10-20) entire document	1-10

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

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“P” document published prior to the international filing date but later than the priority date claimed

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“&” document member of the same patent family

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 108534320 A	14 September 2018	None	
CN 106642579 A	10 May 2017	None	
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		WO 2008016227 A1	07 February 2008
		KR 100766177 B1	10 October 2007
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