

(19)



(11)

EP 2 746 687 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
25.12.2019 Bulletin 2019/52

(51) Int Cl.:
F24F 11/00 ^(2018.01) **F24F 1/0003** ^(2019.01)
F24F 11/30 ^(2018.01) **F24F 11/62** ^(2018.01)
F24F 1/20 ^(2011.01)

(21) Application number: **13191572.0**

(22) Date of filing: **05.11.2013**

(54) **Air conditioner**

Klimaanlage

Climatiseur

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

(30) Priority: **20.12.2012 JP 2012278259**

(43) Date of publication of application:
25.06.2014 Bulletin 2014/26

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(56) References cited:
**EP-A1- 1 795 823 EP-A1- 1 830 138
JP-A- 2012 117 704**

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an air conditioner.

2. Description of the Related Art

[0002] In conventional air conditioners, as a power receiving system for receiving commercial power supply, there are a system (hereinafter, referred to as an "indoor-unit power receiving system") in which commercial power supply supplied to an indoor unit is supplied to an outdoor unit via a power line and a system (hereinafter, referred to as an "outdoor-unit power receiving system") in which commercial power supply is received on an outdoor unit side and then supplied to an indoor unit. Typically, in the indoor-unit power receiving system, in order to reduce power consumption when the air conditioner is on operational standby (hereinafter, referred to as "standby power"), a power relay is provided on the power supply path from the indoor unit to the outdoor unit and, when the air conditioner is on operational standby, the feeding of power to the outdoor unit is stopped. However, in the outdoor-unit power receiving system, a power relay is not necessary.

[0003] An example of a method of switching between the indoor-unit power receiving system and the outdoor-unit power receiving system is a method in which a power-receiving-system data unit, which includes a memory device or a switching unit, such as a jumper wire and a switch, is included and switching is performed between the indoor-unit power receiving system and the outdoor-unit power receiving system on the basis of the information, which is stored in the memory device, for distinguishing between the indoor-unit power receiving system and the outdoor-unit power receiving system, the presence or absence or the position of the jumper wire, or the switching of the switching unit (for example, see Japanese Patent Application Laid-open 2012-117704).

[0004] In conventional air conditioners, representative of which is the air conditioner disclosed in Japanese Patent Application Laid-open 2012-117704, it is necessary to set whether the air conditioner is the indoor power receiving type or the outdoor power receiving type by setting the information, which is stored in the memory device, or setting the jumper wire and the switching unit when the product is shipped, or by the installation technician when the air conditioner is installed.

[0005] In a case where the setting described above is performed when the product is shipped, it is necessary to prepare an indoor unit and an indoor control board for each of the indoor power receiving type or the outdoor power receiving type. Moreover, it is necessary to handle an indoor unit and an indoor control board for each of the

indoor power receiving type or the outdoor power receiving type. Therefore, there is a problem in that the handling cost increases when the product is manufactured or after the product is shipped.

[0006] In a case where the setting described above is performed when the air conditioner is installed, a failure, such as an abnormal operation due to an incorrect setting, may occur. Moreover, when the air conditioner is installed, it is necessary to mount components, such as a jumper wire and a switching unit, in order to perform the setting described above; therefore, there is a problem in that the component cost and the component mounting cost increase.

[0007] Two prior art documents are analyzed below:

EP 1830 138 describes an air conditioner, in which an indoor unit includes an indoor side transmitting and receiving section which is connected to a signal line and employs a photocoupler, a relay which is connected between a power line and a signal line and is put in a closed state in a standby state, and an indoor control section which controls the relay on the basis of an output of the indoor side transmitting and receiving section. An outdoor unit includes an outdoor side transmitting and receiving section which is connected to the signal line and employs a photocoupler, and a power circuit supplied with a power from two power lines. Then, the indoor control section of the indoor unit does not bring the relay into the closed state upon determining that the connection wiring lines which connect the indoor unit with the outdoor unit are miswired on the basis of a reception output of the indoor side transmitting and receiving section when operation starts from a standby state in which the supply of power of the outdoor unit is stopped.

EP 1795 823 describes a separate type air conditioner, in which an indoor unit has first, second indoor side terminals to which first, second interconnection lines, respectively, are connected at their one end, a third indoor side terminal to which a third interconnection line is connected at its one end, a relay whose one end is connected to the second indoor side terminal and whose other end is connected to the third indoor side terminal, and a CPU. The outdoor unit has first, second outdoor side terminals, as outdoor side power-receiving terminals to which the first, second interconnection lines, respectively, are connected at their other end, a third outdoor side terminal to which the third interconnection line is connected as its other end, and an outdoor control section to which electric power is supplied via the first, third outdoor side terminals. The CPU of the indoor unit turns off the switch part in the standby state EP 1 795 823 A1 thereby discloses an air conditioner according to the preamble of claim 1.

[0008] The present invention is achieved in view of the

above and has an object to provide an air conditioner capable of automatically switching between the indoor-unit power receiving system and the outdoor-unit power receiving system in accordance with the situation when the air conditioner is installed without requiring components for setting whether the air conditioner is the indoor power receiving type or the outdoor power receiving type and without requiring a setting operation when the product is shipped or when the product is installed.

SUMMARY OF THE INVENTION

[0009] It is an object of the present invention to at least partially solve the problems in the conventional technology.

[0010] According to an aspect of the present invention, an air conditioner comprises the features of claim 1. Such an air conditioner includes an indoor unit and an outdoor unit, and is capable of using both an indoor-unit power receiving system, in which a commercial power supply supplied to the indoor unit is supplied to the outdoor unit via a power line, and an outdoor-unit power receiving system, in which the commercial power supply supplied to the outdoor unit is supplied to the indoor unit via the power line, wherein the indoor unit includes a communication circuit that performs a predetermined communication with the outdoor unit via a communication line, and a power-supply control circuit that performs power-supply control in accordance with whether communication with the outdoor unit by the communication circuit is possible, and when power starts to be received, if communication with the outdoor unit by the communication circuit is possible, the power-supply control circuit determines that the outdoor-unit power receiving system is used and performs power-supply control, and, if communication with the outdoor unit by the communication circuit is not possible, the power-supply control circuit determines that the indoor-unit power receiving system is used and performs power-supply control. Preferred embodiments are defined in the dependent claims.

[0011] The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

FIG. 1 is a diagram illustrating an example of wiring of an indoor-unit power receiving system in one example configuration of an air conditioner according to an embodiment;

FIG. 2 is a diagram illustrating an example of wiring of an outdoor-unit power receiving system in one example configuration of the air conditioner according

to the embodiment; and

FIG. 3 is a diagram illustrating an example of a power-receiving-system determination flow in an indoor unit of the air conditioner according to the embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] Exemplary embodiments of an air conditioner according to the present invention will be explained below in detail with reference to the accompanying drawings. The present invention is not limited to the embodiments.

15 Embodiment

<Configuration>

[0014] FIG. 1 is a diagram illustrating an example of wiring of an indoor-unit power receiving system in one example configuration of an air conditioner according to the embodiment. FIG. 2 is a diagram illustrating an example of wiring of an outdoor-unit power receiving system in one example configuration of the air conditioner according to the embodiment. As illustrated in FIG. 1 and FIG. 2, the air conditioner according to the present embodiment includes an indoor unit 1 and an outdoor unit 2.

[0015] The indoor unit 1 includes an indoor-unit-side control board 3 and an indoor-unit-side terminal block 5. The indoor-unit-side control board 3 includes an indoor-unit-side power-supply control circuit 7, an indoor-unit-side communication circuit 9, and a relay for supplying commercial power supply (hereinafter, simply referred to as a "relay") 11. In a case where the air conditioner is operated under the indoor-unit power receiving system, the relay 11 has a function of stopping the supply of a commercial power supply 12 to the outdoor unit 2 when the air conditioner is on operational standby.

[0016] The indoor-unit-side terminal block 5 includes an S1 terminal (first terminal) 21 that is connected to the ungrounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit 7 via the relay 11; an S2 terminal (second terminal) 22 that is connected to the grounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit 7; an S3 terminal (third terminal) 23 that is connected to the grounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit 7 via the indoor-unit-side communication circuit 9; an L terminal (fourth terminal) 24 that is connected to the ungrounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit 7; and an N terminal (fifth terminal) 25 that is connected to the S2 terminal 22.

[0017] When the air conditioner according to the embodiment is operated under the indoor-unit power receiving system, the L terminal (fourth terminal) 24 and the N terminal (fifth terminal) 25 are connected to the commercial power supply 12. When the air conditioner according

to the embodiment is operated under the outdoor-unit power receiving system, the L terminal (fourth terminal) 24 and the N terminal (fifth terminal) 25 form a pair of commercial-power-supply input paths to which the commercial power supply 12 is input via the outdoor unit 2. When the air conditioner according to the embodiment is operated under the indoor-unit power receiving system, the S1 terminal (first terminal) 21 and the S2 terminal (second terminal) 22 form a pair of commercial-power-supply output paths that supplies the commercial power supply 12 input to the L terminal (fourth terminal) 24 and the N terminal (fifth terminal) 25 to the outdoor unit 2 via the relay 11.

[0018] The outdoor unit 2 includes an outdoor-unit-side control board 4 and an outdoor-unit-side terminal block 6. The outdoor-unit-side control board 4 includes an outdoor-unit-side power-supply control circuit 8 and an outdoor-unit-side communication circuit 10.

[0019] The outdoor-unit-side terminal block 6 includes an L1 terminal (sixth terminal) 26 that is connected to the ungrounded-side power-supply input terminal of the outdoor-unit-side power-supply control circuit 8; an N1 terminal (seventh terminal) 27 that is connected to the grounded-side power-supply input terminal of the outdoor-unit-side power-supply control circuit 8; an S3' terminal (eighth terminal) 28 that is connected to the grounded-side power-supply input terminal of the outdoor-unit-side power-supply control circuit 8 via the outdoor-unit-side communication circuit 10; an L2 terminal (ninth terminal) 29 that is connected to the L1 terminal 26; and an N2 terminal (tenth terminal) 30 that is connected to the N1 terminal 27.

[0020] When the air conditioner according to the embodiment is operated under the indoor-unit power receiving system, the commercial power supply 12 is input to the L1 terminal (sixth terminal) 26 and the N1 terminal (seventh terminal) 27 via the indoor unit 1. When the air conditioner according to the embodiment is operated under the outdoor-unit power receiving system, the L1 terminal (sixth terminal) 26 and the N1 terminal (seventh terminal) 27 form a pair of commercial-power-supply input paths to which the commercial power supply 12 is connected. When the air conditioner according to the embodiment is operated under the outdoor-unit power receiving system, the L2 terminal (ninth terminal) 29 and the N2 terminal (tenth terminal) 30 form a pair of commercial-power-supply output paths that supplies the commercial power supply 12 input to the L1 terminal (sixth terminal) 26 and the N1 terminal (seventh terminal) 27 to the indoor unit 1.

[0021] The example illustrated in FIG. 1 illustrates an example of wiring of the indoor-unit power receiving system as described above. The commercial power supply 12 is connected between the L terminal 24 and the N terminal 25 on the indoor unit 1 side; the S1 terminal 21 on the indoor unit 1 side and the L1 terminal 26 on the outdoor unit 2 side are connected by a power line 13; the S2 terminal 22 on the indoor unit 1 side and the N1 ter-

terminal 27 on the outdoor unit 2 side are connected by a power-supply and communication common line 14; and the S3 terminal 23 on the indoor unit 1 side and the S3' terminal 28 on the outdoor unit 2 side are connected by a communication line 15. With such connections, the power supplied between the L terminal 24 and the N terminal 25 of the indoor-unit-side terminal block 5 from the commercial power supply 12 is supplied to the indoor-unit-side power-supply control circuit 7 and the power is also supplied to the outdoor-unit-side power-supply control circuit 8 via the power line 13 and the power-supply and communication common line 14 by the indoor-unit-side power-supply control circuit 7 closing the relay 11.

[0022] The example illustrated in FIG. 2 illustrates an example of wiring of the outdoor-unit power receiving system as described above. The commercial power supply 12 is connected between the L1 terminal 26 and the N1 terminal 27 on the outdoor unit 2 side; the L terminal 24 on the indoor unit 1 side and the L2 terminal 29 on the outdoor unit 2 side are connected by the power line 13; the N terminal 25 on the indoor unit 1 side and the N2 terminal 30 on the outdoor unit 2 side are connected by the power-supply and communication common line 14; and the S3 terminal 23 on the indoor unit 1 side and the S3' terminal 28 on the outdoor unit 2 side are connected by the communication line 15. With such connections, the power supplied between the L1 terminal 26 and the N1 terminal 27 of the outdoor-unit-side terminal block 6 from the commercial power supply 12 is supplied to the outdoor-unit-side power-supply control circuit 8 and the power is also supplied to the indoor-unit-side power-supply control circuit 7 via the power line 13 and the power-supply and communication common line 14.

[0023] The indoor-unit-side communication circuit 9 performs a predetermined communication with the outdoor-unit-side communication circuit 10 of the outdoor-unit-side control board 4 via the communication line 15 and the power-supply and communication common line 14.

[0024] In the example of the wiring of the indoor-unit power receiving system illustrated in FIG. 1, when the commercial power supply 12 is supplied between the L terminal 24 and the N terminal 25 of the indoor unit 1, the power is supplied to the indoor-unit-side power-supply control circuit 7 from the commercial power supply 12. However, in the present embodiment, the relay 11 is open at this point; therefore, the power is not supplied to the outdoor-unit-side control board 4. Thus, at this point, the power is not supplied to the outdoor-unit-side communication circuit 10 and communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is not established.

[0025] When the air conditioner according to the present embodiment is on operational standby, if the air conditioner receives an operation start signal to operate the air conditioner from a wireless remote controller (not illustrated) or the like, the indoor-unit-side power-supply control circuit 7 shorts the relay 11 to supply power to

the outdoor-unit-side control board 4. When power is supplied to the outdoor-unit-side control board 4, a predetermined communication is performed between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10.

[0026] In contrast, when the air conditioner according to the present embodiment is in operation, if the air conditioner receives an operation stop signal to stop the air conditioner from a wireless remote controller (not illustrated) or the like, the indoor-unit-side power-supply control circuit 7 opens the relay 11 to stop supplying power to the outdoor-unit-side control board 4. As described above, in the example of the wiring of the indoor-unit power receiving system, the standby power can be reduced by stopping the supply of power to the outdoor-unit-side control board 4 when the air conditioner is on operational standby.

[0027] Although not illustrated, the indoor unit 1 is provided with an indoor heat exchanger, an indoor fan, a sensor, a display, and the like, which are a mechanical system. In a similar manner, the outdoor unit 2 is provided with an outdoor heat exchanger, an outdoor fan, a refrigerant switching valve, a compressor, and the like, which are a mechanical system.

[0028] In the example of the wiring of the outdoor-unit power receiving system illustrated in FIG. 2, when the commercial power supply 12 is supplied between the L1 terminal 26 and the N1 terminal 27 of the outdoor unit 2, the power is supplied to the indoor-unit-side control board 3 and the outdoor-unit-side control board 4 but not via the relay 11. Moreover, while the commercial power supply 12 continues to be supplied, the power is supplied to the indoor-unit-side control board 3 and the outdoor-unit-side control board 4; therefore, communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is established. In this example of the wiring of the outdoor-unit power receiving system, communication is always performed while the commercial power supply 12 continues to be supplied. Thus, the latest information can always be shared between the indoor unit 1 and the outdoor unit 2; therefore, the startup when the operation is started can be made faster.

[0029] The above is an explanation of the configuration of the air conditioner according to the present embodiment. Next, the operation of the air conditioner according to the present embodiment will be explained.

<Operation>

[0030] In the examples illustrated in FIG. 1 and FIG. 2, an explanation is made of example configurations that can use both the indoor-unit power receiving system and the outdoor-unit power receiving system with the same indoor-unit-side control board 3. An explanation will be made of the power-receiving-system determination procedure in the indoor unit of the air conditioner according to the present embodiment with reference to FIG. 1 to

FIG. 3. FIG. 3 is a diagram illustrating an example of a power-receiving-system determination flow in the indoor unit of the air conditioner according to the embodiment.

[0031] When the indoor-unit-side control board 3 of the indoor unit 1 starts to receive power (Step ST101), the indoor-unit-side power-supply control circuit 7 determines whether communication from the outdoor-unit-side communication circuit 10 to the indoor-unit-side communication circuit 9 is performed normally (Step ST102). As described above, at this point, the relay 11 is open (OFF).

[0032] As a method of determining whether communication from the outdoor-unit-side communication circuit 10 to the indoor-unit-side communication circuit 9 is performed normally, for example, it is satisfactory to determine whether the indoor-unit-side communication circuit 9 receives a signal in a preset format from the outdoor-unit-side communication circuit 10. The method of determining whether communication from the outdoor-unit-side communication circuit 10 to the indoor-unit-side communication circuit 9 is performed normally does not limit the present invention.

[0033] If the communication from the outdoor-unit-side communication circuit 10 to the indoor-unit-side communication circuit 9 is performed normally (Yes in Step ST102), it is determined that the air conditioner is operated under the outdoor-unit power receiving system (Step ST103) and the power-receiving-system determination flow ends. Thereafter, the control is performed on the assumption that power continues to be supplied to the indoor-unit-side control board 3 and the air conditioner is operated under the outdoor-unit power receiving system until the indoor unit 1 is reset. When the control is performed on the assumption that the air conditioner is operated under the outdoor-unit power receiving system, the control of shorting and opening of the relay 11 is not performed.

[0034] If the communication from the outdoor-unit-side communication circuit 10 to the indoor-unit-side communication circuit 9 is not performed normally (No in Step ST102), a count is made of the number of times the communication from the outdoor-unit-side communication circuit 10 to the indoor-unit-side communication circuit 9 is not performed normally from when the power starts to be supplied to the indoor-unit-side control board 3 (the number of times the communication fails), and it is determined whether the number of times the communication fails exceeds a predetermined number of times (n times in this example) (Step ST104). If the number of times the communication fails does not exceed the predetermined number of times (n times in this example) (No in Step ST104), the process returns to Step ST102. If the number of times the communication fails exceeds the predetermined number of times (n times in this example) (Yes in Step ST104), it is determined that the air conditioner is operated under the indoor-unit power receiving system (Step ST105) and the air conditioner transitions to an operational standby state (Step ST106).

[0035] In Step ST104, for example, it is possible to count the elapsed time (communication failure elapsed time) from when the power starts to be supplied to the indoor-unit-side control board 3 instead of using the method of counting the number of times the communication fails from when the power starts to be supplied to the indoor-unit-side control board 3 and then to determine whether the communication failure elapsed time exceeds a predetermined time (x seconds in this example). In this case, it is satisfactory that if the communication failure elapsed time does not exceed the predetermined time (x seconds in this example) (No in Step ST104), the process returns to Step ST102, and, if the communication failure elapsed time exceeds the predetermined time (x seconds in this example) (Yes in Step ST104), it is determined that the air conditioner is operated under the indoor-unit power receiving system (Step ST105) and the air conditioner transitions to an operational standby state (Step ST106). Alternatively, the following method may also be used. Specifically, both the number of times the communication fails and the communication failure elapsed time are counted and it is determined whether any one of them exceeds a predetermined value. If the number of times the communication fails or the communication failure elapsed time does not exceed the predetermined value (n times or x seconds) (No in Step ST104), the process returns to Step ST102. If the number of times the communication fails or the communication failure elapsed time exceeds the predetermined value (n times or x seconds) (Yes in Step ST104), it is determined that the air conditioner is operated under the indoor-unit power receiving system (Step ST105) and the air conditioner transitions to an operational standby state (Step ST106).

[0036] Thereafter, when an operation start signal is received from a wireless remote controller (not illustrated) or the like, the indoor-unit-side power-supply control circuit 7 shorts (ON) the relay 11 (Step ST107). Consequently, power is supplied to the outdoor unit 2.

[0037] Next, the indoor-unit-side power-supply control circuit 7 determines whether communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is performed normally (Step ST108). As a method of determining whether communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is performed normally, for example, it is satisfactory to determine whether the indoor-unit-side communication circuit 9 receives a response signal from the outdoor-unit-side communication circuit 10 in response to the signal transmitted from the indoor-unit-side communication circuit 9. The method of determining whether communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is performed normally does not limit the present invention.

[0038] If the communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is performed normally (Yes in

Step ST108), a normal control in the case of the indoor-unit power receiving system is performed, for example, the operation of the air conditioner is started (Step ST109) and the power-receiving-system determination flow ends.

[0039] If the communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is not performed normally (No in Step ST108), a count is made of the number of times the communication between the indoor-unit-side communication circuit 9 and the outdoor-unit-side communication circuit 10 is not performed normally from when the power starts to be supplied to the outdoor-unit-side control board 4 (number of times the communication fails), and it is determined whether the number of times the communication fails exceeds a predetermined number of times (m times in this example) (Step ST110). If the number of times the communication fails does not exceed the predetermined number of times (m times in this example) (No in Step ST110), the process returns to Step ST108. If the number of times the communication fails exceeds the predetermined number of times (m times in this example) (Yes in Step ST110), the indoor-unit-side power-supply control circuit 7 determines that a communication error has occurred, opens (OFF) the relay 11 to stop the supply of power to the outdoor unit 2, and performs an abnormal-time control of announcing the occurrence of a communication error by performing a process of, for example, indicating an abnormality on a display (not illustrated) or making a warning sound (Step ST111), and the power-receiving-system determination flow ends.

[0040] In Step ST110, for example, it is possible to count the elapsed time (communication failure elapsed time) from when the power starts to be supplied to the outdoor-unit-side control board 4 instead of using the method of counting the number of times the communication fails from when the power starts to be supplied to the outdoor-unit-side control board 4 and then to determine whether the communication failure elapsed time exceeds a predetermined time (y seconds in this example). In this case, it is satisfactory that if the communication failure elapsed time does not exceed the predetermined time (y seconds in this example) (No in Step ST110), the process returns to Step ST108, and, if the communication failure elapsed time exceeds the predetermined time (y seconds in this example) (Yes in Step ST110), it is determined that a communication error has occurred, and the supply of power to the outdoor unit 2 is stopped by opening (OFF) the relay 11 and an abnormal-time control as described above is performed (Step ST111). Alternatively, the following method may also be used. Specifically, both the number of times the communication fails and the communication failure elapsed time are counted and it is determined whether any one of them exceeds a predetermined value. If the number of times the communication fails or the communication failure elapsed time does not exceed the predetermined value

(m times or y seconds) (No in Step ST110), the process returns to Step ST108. If the number of times the communication fails or the communication failure elapsed time exceeds the predetermined value (m times or y seconds) (Yes in Step ST110), it is determined that a communication error has occurred, and the supply of power to the outdoor unit 2 is stopped by opening (OFF) the relay 11 and an abnormal-time control as described above is performed (Step ST111).

<Effect>

[0041] As described above, according to the air conditioner in the present embodiment, when the indoor-unit-side control board starts to receive power, it is determined whether communication from the outdoor-unit-side communication circuit to the indoor-unit-side communication circuit is performed normally. If the communication from the outdoor-unit-side communication circuit to the indoor-unit-side communication circuit is performed normally, power-supply control is performed on the assumption that the air conditioner is operated under the outdoor-unit power receiving system. If the communication from the outdoor-unit-side communication circuit to the indoor-unit-side communication circuit is not performed normally, power-supply control is performed on the assumption that the air conditioner is operated under the indoor-unit power receiving system. Therefore, it is possible to automatically switch between the indoor-unit power receiving system and the outdoor-unit power receiving system in accordance with the situation when the product is installed without requiring components for setting whether the air conditioner is the indoor power receiving type or the outdoor power receiving type and without requiring a setting operation when the product is shipped or when the product is installed. Therefore, the handling cost when the product is manufactured or after the product is shipped, and the component cost and component mounting cost can be reduced.

[0042] Moreover, the air conditioner can use both the indoor-unit power receiving system and the outdoor-unit power receiving system with the same indoor-unit-side control board; therefore, it is not necessary to develop an indoor-unit-side control board or software for controlling the indoor-unit-side control board for each of the indoor power receiving type and the outdoor power receiving type. Thus, the development cost can be reduced and the development period can be shortened.

[0043] In the above embodiment, an explanation is made of a case of a single connection configuration in which one indoor unit is connected to one outdoor unit; however, it is obvious that the same effect can be obtained even with a multiple connection configuration in which a plurality of indoor units are connected to one outdoor unit.

[0044] Moreover, the configurations illustrated in the above embodiment are examples of the configuration of the present invention and it is obvious that the configurations

can be combined with other publicly known technologies and the configurations can be changed, for example, by omitting a part thereof without departing from the scope of the present invention.

[0045] According to the present invention, an effect is obtained where it is possible to automatically switch between the indoor-unit power receiving system and the outdoor-unit power receiving system in accordance with the situation when the product is installed without requiring components for setting whether the air conditioner is the indoor power receiving type or the outdoor power receiving type and without requiring a setting operation when the product is shipped or when the product is installed and thus the handling cost when the product is manufactured or after the product is shipped, and the component cost and component mounting cost can be reduced.

[0046] Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

Claims

1. An air conditioner that includes an indoor unit (1), an outdoor unit (2), a power line (13) and a communication line (15) and is capable of being operated either under an indoor-unit power receiving system, in which a commercial power supply (12) supplied to the indoor unit (1) is supplied to the outdoor unit (2) via the power line (13), or under an outdoor-unit power receiving system, in which the commercial power supply (12) supplied to the outdoor unit (2) is supplied to the indoor unit (1) via the power line (13), wherein the indoor unit (1) includes an indoor-unit-side communication circuit (9) configured to perform a predetermined communication with the outdoor unit (2) via the communication line (15), the air conditioner being **characterized in that** the indoor unit (1) further includes:

a relay (11) configured to be able to stop the supply of the commercial power supply (12) to the outdoor unit (2) via the power line (13) when the air conditioner is operated under the indoor-unit power receiving system, and an indoor-unit-side power-supply control circuit (7) configured to control shorting and opening of the relay (11) and to determine, when power starts to be received by the indoor unit (1), whether communication with the outdoor unit (2) by the indoor-unit-side communication circuit (9) is possible while the relay (11) is open, the indoor-unit-side power-supply control circuit (7)

being further configured, in case said communication is possible, to determine that the air conditioner is operated under the outdoor-unit power receiving system and to perform power-supply control accordingly, and, in case said communication is not possible, to determine that the air conditioner is operated under the indoor-unit power receiving system and to perform power-supply control accordingly.

2. The air conditioner according to claim 1, wherein the indoor-unit-side power-supply control circuit (7) is configured to count number of times communication by the indoor-unit-side communication circuit (9) fails from when power starts to be received by the indoor unit (1), and, if the number of times communication fails exceeds a predetermined number of times, to determine that communication with the outdoor unit (2) is not possible.

3. The air conditioner according to claim 1 or 2, wherein the indoor-unit-side power-supply control circuit (7) is configured to count communication failure elapsed time, during which communication by the indoor-unit-side communication circuit (9) fails, from when power starts to be received by the indoor unit (1), and, if the communication failure elapsed time exceeds a predetermined time, to determine that communication with the outdoor unit (2) is not possible.

4. The air conditioner according to any one of claims 1 to 3, wherein the indoor unit (1) includes

a pair of commercial-power-supply input paths (24, 25), to which the commercial power supply (12) is connected when operating under the indoor-unit power receiving system and to which the commercial power supply (12) is supplied via the outdoor unit (2) when operating under the outdoor-unit power receiving system, and a pair of commercial-power-supply output paths (21, 22) that supplies the commercial power supply (12) connected to the commercial-power-supply input paths (24, 25) to the outdoor unit (2) via the relay (11) when operating under the indoor-unit power receiving system,

and, in a case of operating the air conditioner under the indoor-unit power receiving system, the indoor-unit-side power-supply control circuit (7) is further configured, when the air conditioner is on operational standby, to stop feeding power to the outdoor unit (2) by opening the relay (11).

5. The air conditioner according to claim 4, wherein the indoor-unit-side power-supply control circuit (7) is further configured, after having determined that the

air conditioner is operated under the indoor-unit power receiving system and after having started feeding power to the outdoor unit (2) by shorting the relay (11) when an operation is started, to determine whether communication with the outdoor unit (2) by the indoor-unit-side communication circuit (9) is possible, the indoor-unit-side power-supply control circuit (7) being further configured, in case said communication is possible, to perform a normal control and, in case said communication is not possible, to stop feeding of power to the outdoor unit (2) by opening the relay (11) and perform an abnormal-time control of announcing occurrence of a communication error.

6. The air conditioner according to claim 5, wherein the indoor-unit-side power-supply control circuit (7) is configured to count number of times communication by the indoor-unit-side communication circuit (9) fails from when feeding of power to the outdoor unit (2) is started, and, if the number of times communication fails exceeds a predetermined number of times, to determine that communication with the outdoor unit is not possible.

7. The air conditioner according to claim 5 or 6, wherein the indoor-unit-side power-supply control circuit (7) is configured to count communication failure elapsed time, during which communication by the communication circuit (9) fails, from when feeding of power to the outdoor unit (2) is started, and, if the communication failure elapsed time exceeds a predetermined time, to determine that communication with the outdoor unit is not possible.

8. The air conditioner according to any one of claims 1 to 7, wherein the indoor unit (1) includes an indoor-unit-side control board (3) and an indoor-unit-side terminal block (5), the indoor-unit-side control board (3) including:

the indoor-unit-side power-supply control circuit (7),
the indoor-unit-side communication circuit (9) and
the relay (11),

the indoor-unit-side terminal block (5) including:

a first terminal (21) connected to an ungrounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit (7) via the relay (11),
a second terminal (22) connected to a grounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit (7),
a third terminal (23) connected to the grounded-side power-supply input terminal of the indoor-

unit-side power-supply control circuit (7) via the indoor-unit-side communication circuit (9),
 a fourth terminal (24) connected to the ungrounded-side power-supply input terminal of the indoor-unit-side power-supply control circuit (7), and
 a fifth terminal (25) connected to the second terminal (22).

9. The air conditioner according to any one of claims 1 to 8, wherein the outdoor unit (2) includes an outdoor-unit-side control board (4) and an outdoor-unit-side terminal block (6),
 the outdoor-unit-side control board (4) including:

an outdoor-unit-side power-supply control circuit (8) and
 an outdoor-unit-side communication circuit (10),

the outdoor-unit-side terminal block (6) including:

a sixth terminal (26) connected to an ungrounded-side power-supply input terminal of the outdoor-unit-side power-supply control circuit (8),
 a seventh terminal (27) connected to a grounded-side power-supply input terminal of the outdoor-unit-side power-supply control circuit (8),
 an eighth terminal (28) connected to the grounded-side power-supply input terminal of the outdoor-unit-side power-supply control circuit (8) via the outdoor-unit-side communication circuit (10),
 a ninth terminal (29) connected to the sixth terminal (26), and
 a tenth terminal (30) connected to the seventh terminal (27).

10. The air conditioner according to claims 8 and 9, further including a power-supply and communication common line (14) and wherein, when operated under the indoor-unit power receiving system, the commercial power supply (12) is connected between the fourth terminal (24) and the fifth terminal (25), the first terminal (21) and the sixth terminal (26) are connected by the power line (13), the second terminal (22) and the seventh terminal (27) are connected by the power-supply and communication common line (14), and the third terminal (23) and the eighth terminal (28) are connected by the communication line (15), and, when operated under the outdoor-unit power receiving system, the commercial power supply (12) is connected between the sixth terminal (26) and the seventh terminal (27), the fourth terminal (24) and the ninth terminal (29) are connected by the power line (13), the fifth terminal (25) and the tenth terminal (30) are connected by the power-supply and communication common line (14), and the third terminal (23) and the eighth terminal (28) are connected

by the communication line 15.

11. The air conditioner according to any one of claims 1 to 10, wherein, the indoor-unit-side power-supply control circuit (7) is configured, when performing power-supply control on the assumption that the air conditioner is operated under the outdoor-unit power receiving system, not to perform control of shorting and opening of the relay (11) and, when performing power-supply control on the assumption that the air conditioner is operated under the indoor-unit power receiving system, to short the relay (11) when the air conditioner receives an operation start signal and to open the relay (11) when the air conditioner receives an operation stop signal.

Patentansprüche

1. Klimaanlage, die eine Inneneinheit (1), eine Außeneinheit (2), eine Stromleitung (13) und eine Kommunikationsleitung (15) umfasst und entweder mit einem Inneneinheit-Stromaufnahmesystem, in dem eine Netzstromversorgung (12), die der Inneneinheit (1) zugeführt wird, der Außeneinheit (2) über die Stromleitung (13) zugeführt wird, oder mit einem Außeneinheit-Stromaufnahmesystem, in dem die Netzstromversorgung (12), die der Außeneinheit (2) zugeführt wird, der Inneneinheit (1) über die Stromleitung (13) zugeführt wird, betrieben werden kann, wobei die Inneneinheit (1) einen Inneneinheit-seitigen Kommunikationsschaltkreis (9) umfasst, der zum Durchführen einer vorgegebenen Kommunikation mit der Außeneinheit (2) mittels der Kommunikationsleitung (15) ausgebildet ist, wobei die Klimaanlage **dadurch gekennzeichnet ist, dass** die Inneneinheit (1) ferner umfasst:

ein Relais (11), das so ausgebildet ist, dass es die Zuführung der Netzstromversorgung (12) zu der Außeneinheit (2) über die Stromleitung (13) stoppen kann, wenn die Klimaanlage mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, und

einen Inneneinheit-seitigen Stromversorgungssteuerschaltkreis (7), der zum Steuern des Kurzschließens und Öffnens des Relais (11) und zum Bestimmen, wann der Strom durch die Inneneinheit (1) aufgenommen wird, ausgebildet ist, wobei bezüglich dessen, ob eine Kommunikation mit der Außeneinheit (2) durch den Inneneinheit-seitigen Kommunikationsschaltkreis (9) möglich ist, während das Relais (11) offen ist, der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7), wenn die Kommunikation möglich ist, ferner ausgebildet ist zum Bestimmen, dass die Klimaanlage mit dem Außeneinheit-Stromaufnahmesystem betrieben

wird, und zum Durchführen einer entsprechenden Stromversorgungssteuerung, und, wenn die Kommunikation nicht möglich ist, zum Bestimmen, dass die Klimaanlage mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, und zum Durchführen einer entsprechenden Stromversorgungssteuerung.

2. Klimaanlage nach Anspruch 1, bei welcher der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) zum Zählen der Anzahl, wie häufig eine Kommunikation durch den Inneneinheit-seitigen Kommunikationsschaltkreis (9) ab dem Zeitpunkt, wenn die Stromaufnahme durch die Inneneinheit (1) beginnt, fehlschlägt, und, wenn die Anzahl, wie häufig die Kommunikation fehlschlägt, eine vorgegebene Anzahl übersteigt, zum Bestimmen, dass die Kommunikation mit der Außeneinheit (2) nicht möglich ist, ausgebildet ist.
3. Klimaanlage nach Anspruch 1 oder 2, bei welcher der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) zum Zählen der vergangenen Zeit des Kommunikationsversagens, während der die Kommunikation durch den Inneneinheit-seitigen Kommunikationsschaltkreis (9) fehlschlägt, ab dem Zeitpunkt, wenn die Stromaufnahme durch die Inneneinheit (1) beginnt, und, wenn die Zeit des Kommunikationsversagens eine vorgegebene Zeit übersteigt, zum Bestimmen, dass die Kommunikation mit der Außeneinheit (2) nicht möglich ist, ausgebildet ist.
4. Klimaanlage nach einem der Ansprüche 1 bis 3, bei der die Inneneinheit (1) ein Paar von Netzstromversorgung-Eingangspfaden (24, 25), mit denen die Netzstromversorgung (12) verbunden ist, wenn sie mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, und mit denen die Netzstromversorgung (12) mittels der Außeneinheit (2) versorgt wird, wenn sie mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, und ein Paar von Netzstromversorgung-Ausgangspfaden (21, 22) umfasst, welche die Netzstromversorgung (12), die mit den Netzstromversorgung-Eingangspfaden (24, 25) verbunden ist, der Außeneinheit (2) mittels des Relais (11) zuführen, wenn sie mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, und in einem Fall, bei dem die Klimaanlage mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) weiter so ausgebildet ist, dass dann, wenn sich die Klimaanlage im Bereitschaftsbetrieb befindet, das Zuführen von Strom zu der Außeneinheit (2) durch Öffnen des Relais (11) gestoppt

wird.

5. Klimaanlage nach Anspruch 4, bei welcher der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) ferner ausgebildet ist, nachdem bestimmt worden ist, dass die Klimaanlage mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, und nachdem mit dem Zuführen von Strom zu der Außeneinheit (2) durch Kurzschließen des Relais (11) begonnen worden ist, wenn mit einem Betrieb begonnen wird, zum Bestimmen, ob eine Kommunikation mit der Außeneinheit (2) durch den Inneneinheit-seitigen Kommunikationsschaltkreis (9) möglich ist, wobei der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) ferner ausgebildet ist, wenn die Kommunikation möglich ist, zum Durchführen einer normalen Steuerung, und wenn die Kommunikation nicht möglich ist, zum Stoppen des Zuführens von Strom zu der Außeneinheit (2) durch Öffnen des Relais (11) und Durchführen einer anomale Zeit-Steuerung des Ankündigens eines Auftretens eines Kommunikationsfehlers.
6. Klimaanlage nach Anspruch 5, bei welcher der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) zum Zählen der Anzahl, wie häufig eine Kommunikation durch den Inneneinheit-seitigen Kommunikationsschaltkreis (9) ab dem Zeitpunkt, wenn die Stromaufnahme durch die Außeneinheit (2) beginnt, fehlschlägt, und, wenn die Anzahl, wie häufig die Kommunikation fehlschlägt, eine vorgegebene Anzahl übersteigt, zum Bestimmen, dass die Kommunikation mit der Außeneinheit nicht möglich ist, ausgebildet ist.
7. Klimaanlage nach Anspruch 5 oder 6, bei welcher der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) zum Zählen der vergangenen Zeit des Kommunikationsversagens, während der die Kommunikation durch den Kommunikationsschaltkreis (9) fehlschlägt, ab dem Zeitpunkt, wenn die Stromaufnahme durch die Außeneinheit (2) beginnt, und, wenn die Zeit des Kommunikationsversagens eine vorgegebene Zeit übersteigt, zum Bestimmen, dass die Kommunikation mit der Außeneinheit nicht möglich ist, ausgebildet ist.
8. Klimaanlage nach einem der Ansprüche 1 bis 7, bei der die Inneneinheit (1) eine Inneneinheit-seitige Steuertafel (3) und einen Inneneinheit-seitigen Anschlussblock (5) umfasst, wobei die Inneneinheit-seitige Steuertafel (3) umfasst:
 - den Inneneinheit-seitigen Stromversorgungssteuerschaltkreis (7),
 - den Inneneinheit-seitigen Kommunikationsschaltkreis (9) und

das Relay (11),

wobei der Inneneinheit-seitige Anschlussblock (5) umfasst:

einen ersten Anschluss (21), der mit einem Stromversorgungseingangsanschluss der ungeerdeten Seite des Inneneinheit-seitigen Stromversorgungssteuerschaltkreises (7) mittels des Relais (11) verbunden ist, einen zweiten Anschluss (22), der mit einem Stromversorgungseingangsanschluss der geerdeten Seite des Inneneinheit-seitigen Stromversorgungssteuerschaltkreises (7) verbunden ist, einen dritten Anschluss (23), der mit dem Stromversorgungseingangsanschluss der geerdeten Seite des Inneneinheit-seitigen Stromversorgungssteuerschaltkreises (7) mittels des Inneneinheit-seitigen Kommunikationsschaltkreises (9) verbunden ist, einen vierten Anschluss (24), der mit dem Stromversorgungseingangsanschluss der ungeerdeten Seite des Inneneinheit-seitigen Stromversorgungssteuerschaltkreises (7) verbunden ist, und einen fünften Anschluss (25), der mit dem zweiten Anschluss (22) verbunden ist.

9. Klimaanlage nach einem der Ansprüche 1 bis 8, bei der die Außeneinheit (2) eine Außeneinheit-seitige Steuertafel (4) und einen Außeneinheit-seitigen Anschlussblock (6) umfasst, wobei die Außeneinheit-seitige Steuertafel (4) umfasst:

einen Außeneinheit-seitigen Stromversorgungssteuerschaltkreis (8) und einen Außeneinheit-seitigen Kommunikationsschaltkreis (10),

wobei der Außeneinheit-seitige Anschlussblock (6) umfasst:

einen sechsten Anschluss (26), der mit einem Stromversorgungseingangsanschluss der ungeerdeten Seite des Außeneinheit-seitigen Stromversorgungssteuerschaltkreises (8) verbunden ist, einen siebten Anschluss (27), der mit einem Stromversorgungseingangsanschluss der geerdeten Seite des Außeneinheit-seitigen Stromversorgungssteuerschaltkreises (8) verbunden ist, einen achten Anschluss (28), der mit dem Stromversorgungseingangsanschluss der geerdeten Seite des Außeneinheit-seitigen Stromversorgungssteuerschaltkreises (8) mittels des

Außeneinheit-seitigen Kommunikationsschaltkreises (10) verbunden ist, einen neunten Anschluss (29), der mit dem sechsten Anschluss (26) verbunden ist, und einen zehnten Anschluss (30), der mit dem siebten Anschluss (27) verbunden ist.

10. Klimaanlage nach Anspruch 8 und 9, die ferner eine gemeinsame Stromversorgungs- und Kommunikationsleitung (14) umfasst und bei der, wenn sie mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, die Netzstromversorgung (12) zwischen dem vierten Anschluss (24) und dem fünften Anschluss (25) angeschlossen ist, der erste Anschluss (21) und der sechste Anschluss (26) durch die Stromleitung (13) verbunden sind, der zweite Anschluss (22) und der siebte Anschluss (27) mit der gemeinsamen Stromversorgungs- und Kommunikationsleitung (14) verbunden sind, und der dritte Anschluss (23) und der achte Anschluss (28) durch die Kommunikationsleitung (15) verbunden sind, und, wenn sie mit dem Außeneinheit-Stromaufnahmesystem betrieben wird, die Netzstromversorgung (12) zwischen dem sechsten Anschluss (26) und dem siebten Anschluss (27) angeschlossen ist, der vierte Anschluss (24) und der neunte Anschluss (29) durch die Stromleitung (13) verbunden sind, der fünfte Anschluss (25) und der zehnte Anschluss (30) mit der gemeinsamen Stromversorgungs- und Kommunikationsleitung (14) verbunden sind, und der dritte Anschluss (23) und der achte Anschluss (28) durch die Kommunikationsleitung (15) verbunden sind.

11. Klimaanlage nach einem der Ansprüche 1 bis 10, bei welcher der Inneneinheit-seitige Stromversorgungssteuerschaltkreis (7) ausgebildet ist, wenn eine Stromversorgungssteuerung unter der Annahme durchgeführt wird, dass die Klimaanlage mit dem Außeneinheit-Stromaufnahmesystem betrieben wird, die Steuerung des Kurzschließens und Öffnens des Relais (11) nicht durchzuführen, und, wenn eine Stromversorgungssteuerung unter der Annahme durchgeführt wird, dass die Klimaanlage mit dem Inneneinheit-Stromaufnahmesystem betrieben wird, das Relais (11) kurzzuschließen, wenn die Klimaanlage ein Betriebsbeginnsignal erhält, und das Relais (11) zu öffnen, wenn die Klimaanlage ein Betriebstoppsignal erhält.

Revendications

1. Climatiseur qui comporte une unité intérieure (1), une unité extérieure (2), une ligne électrique (13) et une ligne de communication (15) et est capable de fonctionner soit sous un système de réception d'électricité par l'unité intérieure, dans lequel une alimentation électrique commerciale (12) fournie à

l'unité intérieure (1) est fournie à l'unité extérieure (2) via la ligne électrique (13), soit sous un système de réception d'électricité par l'unité extérieure, dans lequel l'alimentation électrique commerciale (12) fournie à l'unité extérieure (2) est fournie à l'unité intérieure (1) via la ligne électrique (13), dans lequel l'unité intérieure (1) comporte un circuit de communication côté unité intérieure (9) configuré pour réaliser une communication prédéterminée avec l'unité extérieure (2) via la ligne de communication (15), le climatiseur étant **caractérisé en ce que** l'unité intérieure (1) comporte en outre :

- un relais (11) configuré pour être capable d'arrêter la fourniture de l'alimentation électrique commerciale (12) à l'unité extérieure (2) via la ligne électrique (13) lorsque le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure, et un circuit de commande d'alimentation électrique côté unité intérieure (7) configuré pour commander une conduction et une ouverture du relais (11) et pour déterminer, lorsque l'électricité commence à être reçue par l'unité intérieure (1), si une communication avec l'unité extérieure (2) par le circuit de communication côté unité intérieure (9) est possible tandis que le relais (11) est ouvert, le circuit de commande d'alimentation électrique côté unité intérieure (7) étant en outre configuré, dans le cas où ladite communication est possible, pour déterminer que le climatiseur fonctionne sous le système de réception d'électricité par l'unité extérieure et pour réaliser une commande d'alimentation électrique en conséquence, et, dans le cas où ladite communication n'est pas possible, pour déterminer que le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure et pour réaliser une commande d'alimentation électrique en conséquence.
2. Climatiseur selon la revendication 1, dans lequel le circuit de commande d'alimentation électrique côté unité intérieure (7) est configuré pour compter le nombre de fois où une communication par le circuit de communication côté unité intérieure (9) échoue depuis le moment où l'électricité commence à être reçue par l'unité intérieure (1), et, si le nombre de fois où une communication échoue dépasse un nombre de fois prédéterminé, pour déterminer qu'une communication avec l'unité extérieure (2) n'est pas possible.
3. Climatiseur selon la revendication 1 ou 2, dans lequel le circuit de commande d'alimentation électrique côté unité intérieure (7) est configuré pour compter une durée écoulée d'échec de communication,

pendant laquelle une communication par le circuit de communication côté unité intérieure (9) échoue, depuis le moment où l'électricité commence à être reçue par l'unité intérieure (1), et, si la durée écoulée d'échec de communication dépasse une durée prédéterminée, pour déterminer qu'une communication avec l'unité extérieure (2) n'est pas possible.

4. Climatiseur selon l'une quelconque des revendications 1 à 3, dans lequel l'unité intérieure (1) comporte

une paire de voies d'entrée d'alimentation électrique commerciale (24, 25), auxquelles l'alimentation électrique commerciale (12) est connectée lorsque le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure et auxquelles l'alimentation électrique commerciale (12) est fournie via l'unité extérieure (2) lorsqu'il fonctionne sous le système de réception d'électricité par l'unité extérieure, et une paire de voies de sortie d'alimentation électrique commerciale (21, 22) qui fournit l'alimentation électrique commerciale (12) connectée aux voies d'entrée d'alimentation électrique commerciale (24, 25) à l'unité extérieure (2) via le relais (11) lorsque le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure,

et, dans un cas de fonctionnement du climatiseur sous le système de réception d'électricité par l'unité intérieure, le circuit de commande d'alimentation électrique côté unité intérieure (7) est en outre configuré, lorsque le climatiseur est en veille opérationnelle, pour arrêter de fournir de l'électricité à l'unité extérieure (2) en ouvrant le relais (11).

5. Climatiseur selon la revendication 4, dans lequel le circuit de commande d'alimentation électrique côté unité intérieure (7) est en outre configuré, après avoir déterminé que le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure et après avoir commencé la fourniture d'électricité à l'unité extérieure (2) en mettant en conduction le relais (11) lorsqu'un fonctionnement est démarré, pour déterminer si une communication avec l'unité extérieure (2) par le circuit de communication côté unité intérieure (9) est possible, le circuit de commande d'alimentation électrique côté unité intérieure (7) étant en outre configuré, dans le cas où ladite communication est possible, pour réaliser une commande normale et, dans le cas où ladite communication n'est pas possible, pour arrêter de fournir de l'électricité à l'unité extérieure (2) en ouvrant le relais (11) et réaliser une commande de temps anormal annonçant la survenue d'une erreur de communication.

6. Climatiseur selon la revendication 5, dans lequel le circuit de commande d'alimentation électrique côté unité intérieure (7) est configuré pour compter le nombre de fois où une communication par le circuit de communication côté unité intérieure (9) échoue depuis le moment où l'apport d'électricité à l'unité extérieure (2) est démarré, et, si le nombre de fois où une communication échoue dépasse un nombre de fois prédéterminé, pour déterminer qu'une communication avec l'unité extérieure n'est pas possible.
7. Climatiseur selon la revendication 5 ou 6, dans lequel le circuit de commande d'alimentation électrique côté unité intérieure (7) est configuré pour compter une durée écoulée d'échec de communication, pendant laquelle une communication par le circuit de communication (9) a échoué, depuis le moment où l'apport d'électricité à l'unité extérieure (2) est démarré, et, si la durée écoulée d'échec de communication dépasse une durée prédéterminée, pour déterminer qu'une communication avec l'unité extérieure n'est pas possible.
8. Climatiseur selon l'une quelconque des revendications 1 à 7, dans lequel l'unité intérieure (1) comporte un tableau de commande côté unité intérieure (3) et une plaque à bornes côté unité intérieure (5), le tableau de commande côté unité intérieure (3) comportant :
- le circuit de commande d'alimentation électrique côté unité intérieure (7),
 - le circuit de communication côté unité intérieure (9) et
 - le relais (11),
 - la plaque à bornes côté unité intérieure (5) comportant :
 - une première borne (21) connectée à une borne d'entrée d'alimentation électrique côté non mis à la terre du circuit de commande d'alimentation électrique côté unité intérieure (7) via le relais (11),
 - une deuxième borne (22) connectée à une borne d'entrée d'alimentation électrique côté mis à la terre du circuit de commande d'alimentation électrique côté unité intérieure (7),
 - une troisième borne (23) connectée à la borne d'entrée d'alimentation électrique côté mis à la terre du circuit de commande d'alimentation électrique côté unité intérieure (7) via le circuit de communication côté unité intérieure (9),
 - une quatrième borne (24) connectée à la borne d'entrée d'alimentation électrique côté non mis à la terre du circuit de commande d'alimentation électrique côté unité intérieure
- re (7), et
une cinquième borne (25) connectée à la deuxième borne (22).
9. Climatiseur selon l'une quelconque des revendications 1 à 8, dans lequel l'unité extérieure (2) comporte un tableau de commande côté unité extérieure (4) et une plaque à bornes côté unité extérieure (6), le tableau de commande côté unité extérieure (4) comportant :
- un circuit de commande d'alimentation électrique côté unité extérieure (8) et
 - un circuit de communication côté unité extérieure (10),
 - la plaque à bornes côté unité extérieure (6) comportant :
 - une sixième borne (26) connectée à une borne d'entrée d'alimentation électrique côté non mis à la terre du circuit de commande d'alimentation électrique côté unité extérieure (8),
 - une septième borne (27) connectée à une borne d'entrée d'alimentation électrique côté mis à la terre du circuit de commande d'alimentation électrique côté unité extérieure (8),
 - une huitième borne (28) connectée à la borne d'entrée d'alimentation électrique côté mis à la terre du circuit de commande d'alimentation électrique côté unité extérieure (8) via le circuit de communication côté unité extérieure (10),
 - une neuvième borne (29) connectée à la sixième borne (26), et
 - une dixième borne (30) connectée à la septième borne (27).
10. Climatiseur selon les revendications 8 et 9, comportant en outre une ligne commune de communication et d'alimentation électrique (14) et dans lequel, lorsque le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure, l'alimentation électrique commerciale (12) est connectée entre la quatrième borne (24) et la cinquième borne (25), la première borne (21) et la sixième borne (26) sont connectées par la ligne électrique (13), la deuxième borne (22) et la septième borne (27) sont connectées par la ligne commune de communication et d'alimentation électrique (14), et la troisième borne (23) et la huitième borne (28) sont connectées par la ligne de communication (15), et, lorsque le climatiseur fonctionne sous le système de réception d'électricité par l'unité extérieure, l'alimentation électrique commerciale (12) est connectée entre la sixième borne (26) et la septième borne (27), la quatrième borne (24) et la neuvième borne (29) sont connectées par la

ligne électrique (13), la cinquième borne (25) et la dixième borne (30) sont connectées par la ligne commune de communication et d'alimentation électrique (14), et la troisième borne (23) et la huitième borne (28) sont connectées par la ligne de communication (15). 5

11. Climatiseur selon l'une quelconque des revendications 1 à 10, dans lequel le circuit de commande d'alimentation électrique côté unité intérieure (7) est configuré, lorsqu'il réalise une commande d'alimentation électrique en supposant que le climatiseur fonctionne sous le système de réception d'électricité par l'unité extérieure, pour ne pas réaliser une commande de mise en conduction et d'ouverture du relais (11) et, lorsqu'il réalise une commande d'alimentation électrique en supposant que le climatiseur fonctionne sous le système de réception d'électricité par l'unité intérieure, pour mettre en conduction le relais (11) lorsque le climatiseur reçoit un signal de démarrage de fonctionnement et pour ouvrir le relais (11) lorsque le climatiseur reçoit un signal d'arrêt de fonctionnement. 10 15 20

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FIG.1

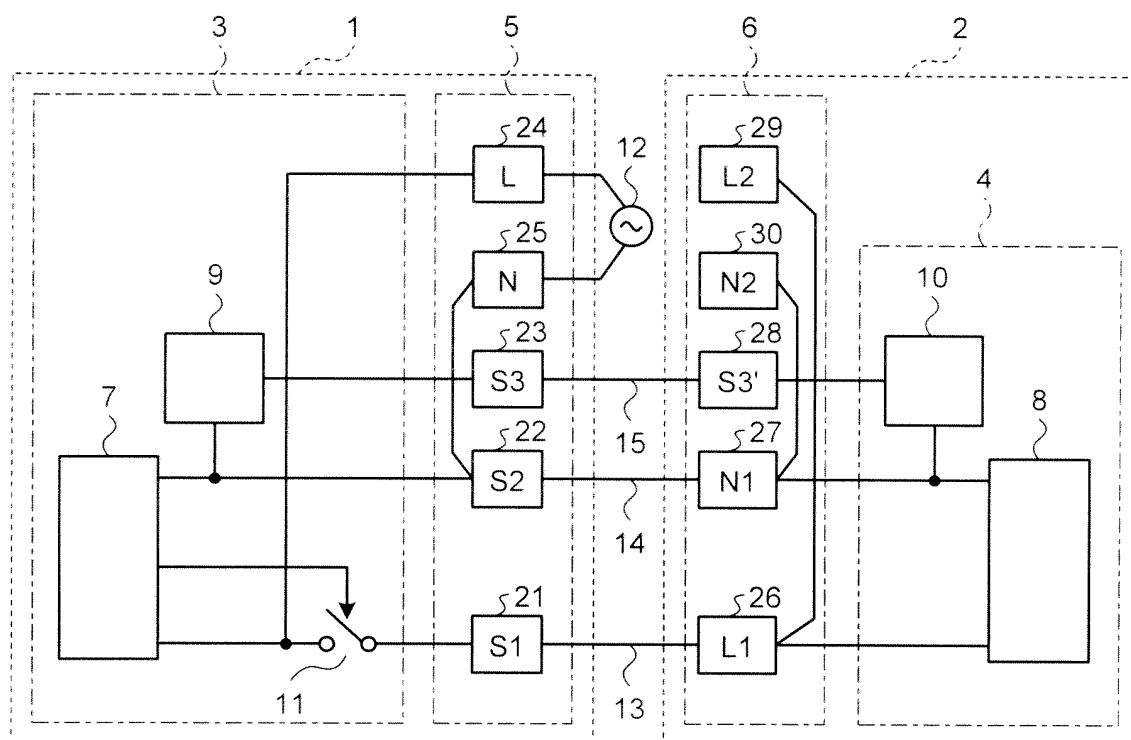


FIG.2

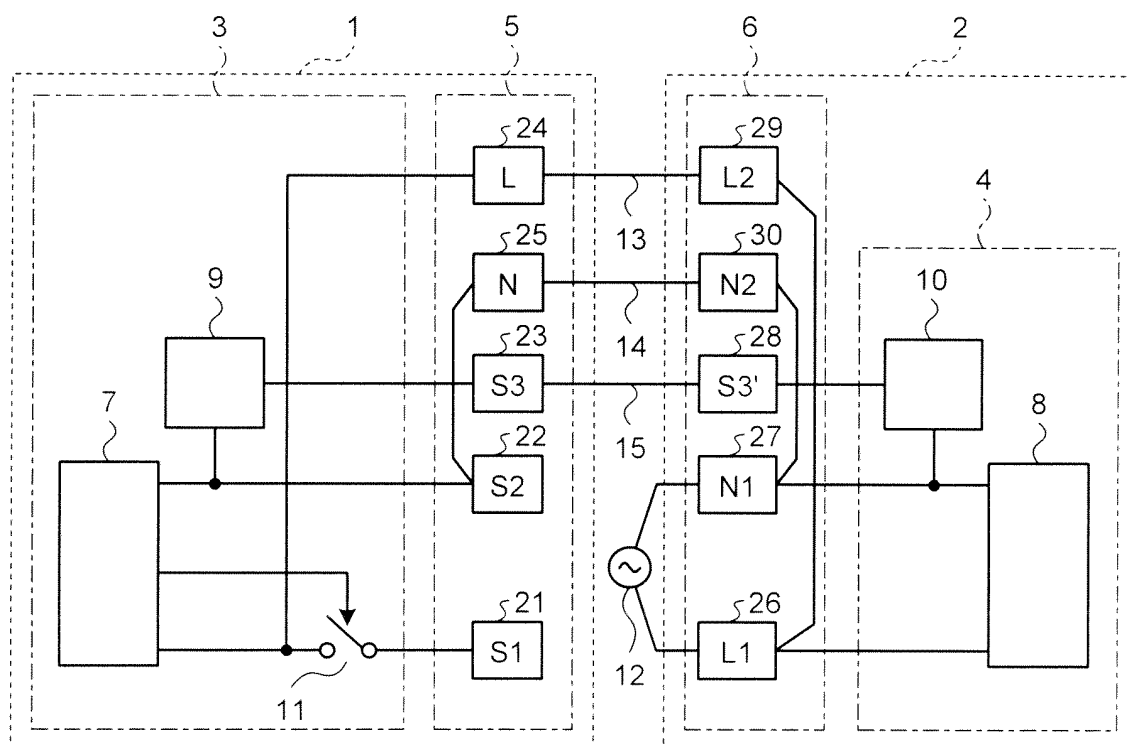
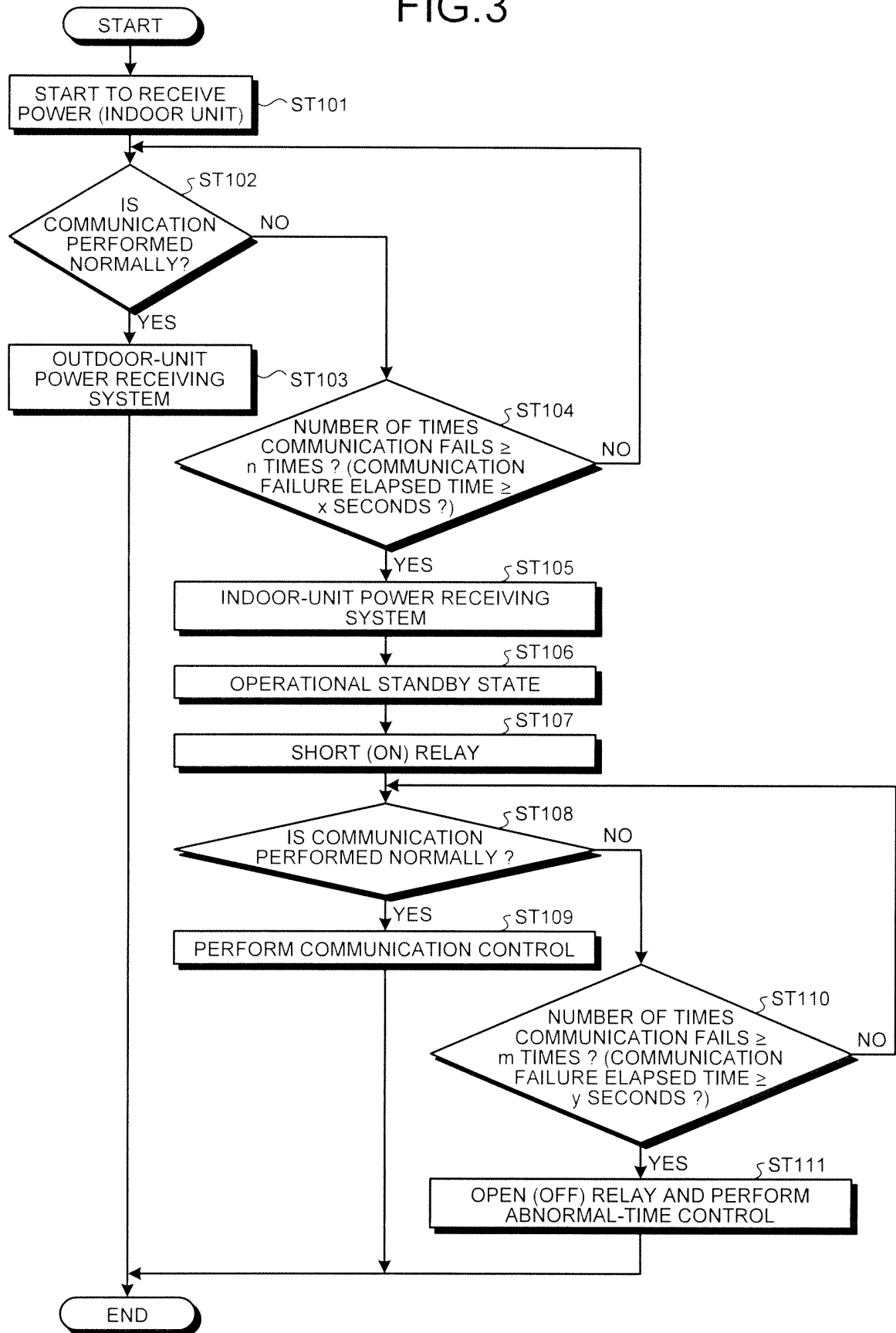


FIG.3



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2012117704 A [0003] [0004]
- EP 1830138 A [0007]
- EP 1795823 A [0007]
- EP 1795823 A1 [0007]