An air conditioner and an operating method thereof are disclosed. The air conditioner is provided with a plurality of controllers, indoor units and outdoor units are controlled by the plurality of controllers, setting data is sent to and received from the plurality of controllers so as to be applied, and each of the controllers is configured to output operational information for the units corresponding to an inputted user command on the screen. Accordingly, a setting changed by a predetermined controller may be applicable to other controllers. Thus, a friction between the plurality of controllers is prevented, the efficiency of control is enhanced, the plurality of units can be selectively monitored and the operation control thereof is possible, and the convenience of management and control of the air conditioner is enhanced.
Description

[0001] The present invention relates to an air conditioner and an operating method thereof, and more particularly, to an air conditioner, which can effectively control a plurality of units included in the air conditioner by including an indoor unit, and an operating method thereof.

[0002] Generally, an air conditioner is provided for cooling, heating, or air cleaning, and is installed to discharge cooling/heating air indoors, and clean indoor air to provide comfortable indoor environment to a man. Such an air conditioner is divided into an indoor unit composed of an indoor heat exchanger, and an outdoor unit composed of a compressor and an outdoor heat exchanger. The air conditioner operates by controlling a power source supplied to the compressor or the heat exchanger.

[0003] In the air conditioner, a plurality of indoor units may be connected to the outdoor unit, and the outdoor unit is driven according to the number of indoor units driven, supplies a refrigerant to the indoor units according to a requested operating state, and is operated in a cooling or heating mode.

[0004] Such an air conditioner includes a predetermined controller for controlling an indoor unit and an outdoor unit. The controller displays, on the screen, an entire list of a plurality of indoor units and outdoor units to be connected, and outputs an operating state of each of the indoor units and outdoor units on the screen so that a user can check a state of each unit.

[0005] However, such a controller can merely produce an output for the plurality of indoor units and outdoor units connected, but cannot extract and output data only corresponding to a user desired state, thus making the convenience of management low.

[0006] Moreover, if there is a plurality of such controllers, data or settings of the controllers do not match with each other, and this produces a collision, thereby lowering the efficiency of control of the indoor and outdoor units.

SUMMARY OF THE INVENTION

[0007] It would be desirable to provide an air conditioner, which includes a plurality of controllers in the air conditioner, and shares settings through data transmission and reception between the controllers so that a change in the settings may be applied to other controllers, thereby keeping the settings of the plurality of controllers the same and preventing a collision between the controllers, and an operating method thereof.

[0008] Furthermore, it would also be desirable to provide an air conditioner, which allows user-desired information only to be outputted on the screen for selective monitoring and operation control by displaying, on the screen, operation information of a unit corresponding to a user command upon controlling a plurality of indoor units or outdoor units or other units by a controller, and an operating method thereof.

[0009] The present invention provides an air conditioner, comprising: a plurality of units; a first controller connected to the plurality of units and for controlling the operating state thereof; and a second controller connected to the first controller, wherein if settings of the plurality of units are changed, the first controller transmits changed setting data to the second controller, and the second controller updates stored setting data based on the received setting data, and displays changed setting information on the screen to be synchronized with the first controller.

[0010] Furthermore, the present invention provides an operating method of an air conditioner, comprising the steps of: a first controller’s changing setting information for controlling a plurality of units in response to a user command; transmitting first setting data including the changed setting information to a second controller; receiving second setting data about a change in the setting information of the plurality of units from the second controller; and updating the setting information based on the second setting data and displaying the updated setting information on the screen.

[0011] The thus-constructed air conditioner and the operating method thereof according to the present invention can maintain the consistency of settings because data can be shared between a plurality of controllers and indoor units and outdoor units can be controlled according to the same settings by applying a changed setting to other controllers through communication between the plurality of controllers, and accordingly can enhance controlling efficiency and the convenience of users using the controllers because the stability of control of the air conditioner is improved by preventing a friction between the controllers.

[0012] Furthermore, the air conditioner and the operating method thereof according to the present invention can enhance user convenience for control of the air conditioner, enhance the convenience of management through the controllers, and accordingly enhance efficiency since it is possible to configure a screen corresponding to a user’s request by outputting operational information of units only corresponding to a user command inputted from the controllers and making the corresponding units controllable.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

FIG. 1 is a configuration view showing the configuration of an air conditioner in accordance with one
FIG. 1 is a configuration view showing the configuration of an air conditioner in accordance with one embodiment of the present invention;

FIG. 2 is a view showing the relation between controllers of the air conditioner according to one embodiment of the present invention;

FIG. 3 is a view showing first and second embodiments according to the configurations of remote controllers and a local controller of the air conditioner of the present invention;

FIG. 4 is a view showing a third embodiment in accordance with the configuration of a plurality of remote controllers of an air conditioner of the present invention;

FIG. 5 is a view showing a fourth embodiment in accordance with an access of a plurality of remote controllers and a remote location of an air conditioner of the present invention;

FIG. 6 is a view showing a fifth embodiment in accordance with the connection configuration of a plurality of remote controllers of an air conditioner of the present invention;

FIG. 7 is a block diagram showing the configuration of the controllers of FIG. 2;

FIG. 8 is an illustrative view showing an example in accordance with the output of a control screen of the controllers of FIG. 7;

FIG. 9 is an illustrative view showing another example in accordance with the output of a control screen of the controllers of FIG. 7;

FIG. 10 is an illustrative view showing an example in which the control screen of the controllers of FIG. 7 is outputted in a list;

FIG. 11 is an illustrative view showing an example of the control screen corresponding to the data management of the controllers of FIG;

FIG. 12 is an illustrative view showing an example of an authentication information management screen of the controllers of FIG. 7;

FIG. 13 is a sequential view showing a method of selectively outputting operational information of a unit according to a user command in the controllers of FIG. 7;

FIG. 14 is a sequential view showing a method of outputting operational information of the units of the controllers of FIG. 7;

FIG. 15 is a sequential view showing a method of data transmission between a plurality of controllers of an air conditioner of the present invention;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Hereinafter, embodiments of the present invention will be described below with reference to the accompanying drawings.

[0015] FIG. 1 is a configuration view showing the configuration of an air conditioner in accordance with one embodiment of the present invention.

[0016] The air conditioner according to the present invention, as shown in FIG. 1, includes one or more indoor units I installed indoors and one or more outdoor units O connected to the indoor unit I and including a compressor and a heat exchanger. The air conditioner further includes a controller connected to the outdoor unit O and the indoor unit I and for monitoring and controlling the operating state of the air conditioner.

[0017] Additionally, the air conditioner may further include units, such as a ventilator, a humidifier, an air cleaner, and a heater. These units may be integrally controlled by the controller. Although the present invention is limited to a case where the indoor unit I and the outdoor unit O are connected to the controller, it may also be applicable to a case the above-mentioned units are further connected thereto.

[0018] At least one indoor unit I of the air conditioner may be provided in one room, and one or more outdoor units O are driven by a request of at least one of a plurality of indoor units I. As the cooling/heating capacity varies in response to the indoor units I being driven, the number of operations of the outdoor units O and the number of operations of the compressor installed at the outdoor units O vary. Here, the number of outdoor units may vary depending on the cooling/heating capacity corresponding to the number of indoor units of the air conditioner and the capacity of the compressor provided therein.

[0019] The outdoor units O and the indoor units I are connected through refrigerant piping P, and perform a cooling or heating operation according to the flow of refrigerant between the outdoor units O and the indoor units I and sends and receives data there between according to a predetermined communication method.

[0020] The outdoor units O include a compressor supplied with refrigerant to compress the same, an outdoor heat exchanger for heat-exchanging between the refrigerant and outside air, an accumulator for extracting gaseous refrigerant from the refrigerant supplied and supplying the same to the compressor, and a four-way valve for selecting a flow path of refrigerant according to a heating operation. Further, the outdoor units O include a high pressure sensor for measuring the pressure of refrigerant discharged from the compressor and a low pressure sensor for measuring the pressure of refrigerant supplied to the compressor. Besides, a plurality of sensors, a valve, an oil recovery unit, etc. may be further included, but descriptions of these components will be omitted below.

[0021] The indoor units I include an indoor heat exchanger, an indoor fan, an expansion valve for expanding refrigerant supplied from the outdoor units O, and a plurality of sensors.

[0022] FIG. 2 is a view showing the relation between controllers of the air conditioner according to one embodiment of the present invention.

[0023] The air conditioner includes a plurality of controllers connected to the plurality of indoor units and outdoor units and for monitoring the operations of the indoor units and outdoor units from a remote location. Such a plurality of controllers, as shown in FIG. 2, send and re-
receives data therebetween to share data for controlling the indoor units and the outdoor units.

[0024] In the air conditioner, if a plurality of controllers are connected to a plurality of indoor units and outdoor units, each of the controllers share setting data of the plurality of indoor units and outdoor units through data communication therebetween, and if there is a change in the settings of any one of the controllers, changed setting data is sent and received to apply them to each of the controllers, thereby making the setting data of the indoor units and outdoor units have the same set values in all the controllers connected to the indoor units and the outdoor units.

[0025] If each of the controllers receives setting data corresponding to a change in settings from other controllers, it updates stored setting data and displays changed setting information on the screen, thereby allowing the users using the respective controllers to check that the settings are changed by other controllers. At this time, the setting information displayed on the screen includes operation set values for the indoor units and outdoor units, authentication information in response to an access of the controllers, and an announcement message about a change in settings.

[0026] At this time, the controllers include a remote control R, a local controller LRC, and remote controllers RC1, RC10, and RC20.

[0027] The remote control R is connected to an indoor unit to display the operating state of the connected indoor unit and control the operation of the indoor unit according to a user command. The remote control R includes a wired remote control connected to an indoor unit by wire to perform a two-way communication and a wireless remote control for inputting a control command into the indoor unit by a predetermined wireless communication method.

[0028] The remote control R may be connected to one indoor unit or to a plurality of indoor units. If connected to a plurality of indoor units, the remote control R displays an operating state of any one of the plurality of indoor units and transmits the same control command to the plurality of indoor units connected.

[0029] The local controller LRC and the remote controllers are connected to the plurality of indoor units and outdoor units to control the operations of the plurality of indoor units and outdoor units and monitor the operating states thereof. At this time, the number of indoor units controllable in the local controller LRC is set the same as or smaller than the number of indoor units controllable in the remote controllers. In some cases, the local controller LRC may perform simple control of the indoor units connected.

[0030] The remote controllers RC1, RC10, and RC20 can monitor and control a plurality of indoor units and outdoor units, and can control a larger number of indoor units than the local controller can. Such remote controllers are provided with a wired or wireless communication device, and connected to the indoor units and outdoor units according to various communication methods. In some cases, the remote controllers RC1, RC10, and RC20 may have a priority of a control command over the local controller LRC and the remote control R.

[0031] These remote controllers RC1, RC10, and RC20 include a first remote controller RC1 directly connected to a plurality of indoor units and outdoor units, a second remote controller connected to the first remote controller RC1, and a third remote controller RC20 connected to the first remote controller or the second remote controller RC10 via the internet.

[0032] The first remote controller RC1 sends and receives data to and from the local controller LRC and the plurality of indoor units and outdoor units, and sends and receives data to and from the remote control through the indoor units and the outdoor units. In some cases, the remote control R and the first remote controller RC1 are directly connected to perform communication.

[0033] The second and third remote controllers RC10 and RC20 send and receive data through the first remote controller RC1 without being directly connected to the indoor units and the outdoor units.

[0034] Here, the second remote controller RC10 has a control program installed therein to control the first remote controller RC1. In a case where the first remote controller RC1 substantially controls the indoor units and the outdoor units, the first remote controller RC1 and the second remote controller RC10 may be considered as one controller. This is applicable, especially, when a user interface for the inputting of a user command and the outputting of predetermined data does not exist in the first remote controller RC1.

[0035] FIG. 3 is a view showing first and second embodiments according to the configurations of remote controllers and a local controller of the air conditioner of the present invention.

[0036] As shown in (a) of FIG. 3, the first embodiment of the air conditioner includes a local controller LRC1 connected to a plurality of indoor units I11 to I13 and I21 to I23 and outdoor units O1 and O2 and controlling the plurality of indoor units and a first remote controller RC1 connected to the plurality of indoor units and outdoor units and communicating with the local controller LRC1.

[0037] If a setting for a predetermined indoor unit is changed according to an inputted user command, the first remote controller RC1 changes a set value of the corresponding indoor unit, and generates a control command corresponding to the set value and transmits it to the corresponding indoor unit and an outdoor unit connected to the indoor unit. At the same time, the first remote controller RC1 transmits changed setting data to the local controller LRC1. The local controller LRC1 updates stored setting data in accordance with setting data received from the first remote controller RC1. If a display means is provided at the output part of the local controller LRC1, changed setting information is outputted through the display means. Otherwise, if no display means is provided, a predetermined sound effect through a speaker
provided, or a lamp provided flashes for a predetermined period of time to enable the outputting of a change in settings.

If a set value of a predetermined indoor unit is changed by the local controller LRC1, a control command for this is transmitted to the corresponding indoor unit and outdoor unit, and, at the same time, changed setting data is transmitted to the first remote controller RC1. The first remote controller RC1 updates stored setting data based on the received setting data, and outputs resulting changed setting information on the screen through the display means.

At this time, the first remote controller RC1 is capable of locking settings in the operation control for the indoor unit and the outdoor unit in order to avoid the settings from being changed by other controllers. If a setting is locked by the first remote controller RC1, setting data for this is transmitted to each controller, thus displaying that the settings of the indoor unit and the outdoor unit are locked.

For example, a set temperature of a predetermined indoor unit or indoor unit group is varied by the first remote controller RC1, the first remote controller RC1 transmits a control command for the changed set temperature to the indoor unit and the outdoor unit and transmits setting data with the changed set temperature to the local controller LRC1. At this time, the local controller LRC1 updates stored setting data based on the received setting data, and if a display means is provided, changes the set temperature of the predetermined indoor unit or indoor unit group and displays the same. In some cases, an announcement message about a change in settings may be further displayed.

Additionally, if a predetermined indoor unit is set to be stopped in operation by the local controller LRC1, the corresponding indoor unit is stopped in operation, setting data for the stopping of the operation of the indoor unit is transmitted to the first remote controller RC1. At this time, the first remote controller RC1 updates stored setting data with information that the indoor unit is set to be stopped in operation according to the setting data received from the local controller LRC1, and outputs changed setting information. Further, the first remote controller RC1 displays a current operating state of the indoor unit on the screen in accordance with operating state data received from the indoor unit and the outdoor unit, and outputs operating state data about the stopping of the operation of a predetermined indoor unit through a display means provided.

The second embodiment of the air conditioner, as shown in (b) of FIG. 3, further includes a remote control R22 connected to an indoor unit in the first embodiment. In the second embodiment, the same names and same reference numerals are used to refer to the same components as in the first embodiment, and description thereof will be omitted below.

The second embodiment of the air conditioner includes a plurality of indoor units I11 to I13 and I21 to I23 and outdoor units O1 and O2, a local controller LRC1, a first remote controller RC1, and a remote control R22.

At this time, the remote control R22 is connected to at least one of a plurality of indoor units, for example, the fifth indoor unit I22. In some cases, a plurality of remote controls to be connected to different indoor units may be provided.

If the setting of a predetermined indoor unit is changed by the first remote controller RC1 or the local controller LRC1, the first remote controller RC1 or the local controller LRC1 transmits setting data to other controllers. At this time, the remote control receives setting data on a connected indoor unit and updates stored setting data in accordance with changed setting data, and displays resultant changed setting information on the screen.

That is, the air volume of the fifth indoor unit I22 is varied to middle by the first remote controller RC1, the remote control R22 connected to the fifth indoor unit I22 receives setting data of the first remote controller RC1, and changes the air volume of the fifth indoor unit I22 to middle and displays it on the screen. At this time, an announcement message corresponding to a change in the setting may be further outputted.

If the setting of the fifth indoor unit I22 is changed by the remote control R22, the remote control R22 transmits a control command to the fifth indoor unit I22 and, at the same time, transmits changed setting data to the first remote controller RC1 and the local controller LRC1. At this time, the remote control R22 directly transmits setting data to the first remote controller RC1 and the local controller LRC1 according to a predetermined communication method, or transmits setting data through the connected fifth indoor unit I22.

Additionally, if a temperature setting for the fifth indoor unit I22 is locked by the first remote controller RC1, the locking of the setting of the fifth indoor unit I22 is displayed in the local controller LRC and the remote control R22, and the change of the temperature setting of the fifth indoor unit I22 is unavailable.

Meanwhile, the second embodiment of the air conditioner may include a plurality of indoor units and outdoor units, a first remote controller RC1, and a remote control while excluding the local controller LRC1. In this case, however, the components except for the local controller LRC1 and the operations thereof are the same as those in the embodiment of FIG. 2, and thus descriptions thereof will be omitted below.

FIG. 4 is a view showing a third embodiment in accordance with the configuration of a plurality of remote controllers of an air conditioner of the present invention.

The third embodiment of the air conditioner includes, as shown in (a) of FIG. 4, a plurality of indoor units I11 to I13, I21 to I23 and I31 to I33 and outdoor units O1 02 and 03, and a plurality of remote controllers.

At this time, the third embodiment of the air conditioner may further include, as shown in (b) of FIG. 4, a local controller LRC2 or a remote control R31. In this
case, the configurations and operations of the local controller LRC2 and the remote control R31 are the same as those of the remote control R22 and the local controller LRC1 of the previous first and second embodiments, so a description thereof will be omitted below. By the way, in a case where the local controller LRC2 is connected as shown in (b) of FIG. 4, the local controller LRC2 controls the third outdoor unit O3 and the seventh to ninth indoor units I31 to I33 only.

[0053] The air conditioner includes a plurality of indoor units I11 to I13, I21 to I23 and I31 to I33 and outdoor units O1 to O3, a first remote controller RC1, and a second remote controller RC10.

[0054] The first remote controller RC1 is connected to the plurality of indoor units I11 to I13, I21 to I23 and I31 to I33 and outdoor units O1, O2 and O3 to perform monitoring and operation control, and the second remote controller RC10 is connected to the first remote controller RC1 to receive data on the plurality of indoor units and outdoor units through the first remote controller RC1 and perform monitoring, and controls the operations thereof by transmitting an inputted control command to the indoor units and the outdoor units through the first remote controller RC1.

[0055] The first remote controller RC1 and the second remote controller RC10 are provided with a wired or wireless communication means to send and receive data therebetween, and can share log data including control logs or control data on the remote controllers, as well as setting data on the indoor units and the outdoor units.

[0056] If the setting of a predetermined indoor unit or indoor unit group is changed by the first remote controller RC1, the first remote controller RC1 transmits a control command to the predetermined indoor unit or indoor unit group and an outdoor unit connected thereto, and, at the same time, transmits changed setting data to the second remote controller RC10. At this time, as shown in (b) of FIG. 4, in a case where the local controller LRC2 or the remote control R31 is connected, setting data is transmitted also by the local controller LRC2 or the remote control R31.

[0057] The second remote controller RC10 updates stored setting data based on the setting data received from the first remote controller RC1, and displays resultant setting information on the screen.

[0058] Meanwhile, if the setting of the predetermined indoor unit is changed by the second remote controller RC10, the second remote controller RC10 transmits changed setting information to the first remote controller RC1 along with a control command. The first remote controller RC1 controls the indoor units and the outdoor units according to the control command received from the second remote controller RC10, and updates stored setting data based on the changed setting data, and transmits the setting data to other controllers connected thereto, i.e., the local controller LRC2 or the remote control R31.

[0059] FIG. 5 is a view showing a fourth embodiment in accordance with an access of a plurality of remote controllers and a remote location of an air conditioner of the present invention.

[0060] The fourth embodiment of the air conditioner includes, as shown in (a) of FIG. 5, a plurality of indoor units I11 to I13, I21 to I23 and I31 to I33 and outdoor units O1, O2 and O3, and a plurality of remote controllers connected thereto. The fourth embodiment of the air conditioner further includes a third remote controller RC20 connected to a first remote controller in the previous third embodiment of FIG. 4. The same names and same reference numerals are used to refer to the same components as in the third embodiment, and description thereof will be omitted below. In some cases, as shown in (b) of FIG. 5, a second remote controller may be excluded, and the first remote controller RC1 and the third remote controller RC20 may be connected. As the third remote controller RC20, a controller dedicated for controlling the indoor units and the outdoor units, or a mobile communication device, such as a laptop, computer, mobile phone, and PDA, may be used.

[0061] The first remote controller RC1 is connected to the second remote controller RC10, and the third remote controller RC20 is connected to the first remote controller RC1 via the internet. In some cases, the third remote controller RC20 may be connected to the second remote controller RC10. At this time, the first remote controller RC1 further includes a predetermined branching means H1 for internet connection, and the second remote controller RC10 may be directly connected to the first remote controller RC1 as in the previous third embodiment, or connected thereto through the branching means H1 as shown in (a) of FIG. 5.

[0062] At this time, the third remote controller RC20 may be provided with a control program for controlling the indoor units and the outdoor units, or may access the first remote controller RC1 through a program, such as an internet browser, without any particular program to control the indoor units and the outdoor units through the control menu provided in the first remote controller RC1.

[0063] In a case where a control program for controlling the indoor units and the outdoor units is provided in the third remote controller RC20, if the setting of a predetermined indoor unit or indoor unit group is changed in the third remote controller, changed setting data is transmitted to the first remote controller RC1, and the first remote controller updates stored setting data and transmits the setting data to the second remote controller RC10, the local controller LRC2, and the remote control R31. Each of the controllers applies setting data according to received setting data, and outputs changed setting information.

[0064] Additionally, if the settings are changed from any one of the first remote controller RC1, second remote controller RC10, local controller LRC2, and remote control R31 is changed, the first remote controller RC1 transmits changed setting data to the third remote controller RC20. The third remote controller RC1 applies received setting data, and outputs resultant changed setting infor-
Meanwhile, a description will be made below with respect to a case where no control program is provided in the third remote controller RC20, but the first remote controller RC1 is accessed via the internet to control the indoor units and the outdoor units through the control menu provided in the first remote controller RC1.

When the third remote controller RC1 accesses the first remote controller RC1, the first remote controller RC1 provides a control menu corresponding to an external access, e.g., from the third remote controller RC20, to the third remote controller RC20. The third remote controller RC20 changes the setting of a predetermined indoor unit or indoor unit group according to the control menu provided in the first remote controller RC1. At this time, the third remote controller RC20 only monitors the operating states of the indoor units and the outdoor units based on data provided by the first remote controller RC1 and transmits an inputted user command to the first remote controller RC1, but does not store setting data on the indoor units and the outdoor units.

In other words, in a case where the third remote controller RC20 accesses the first remote controller RC1 to control a predetermined indoor unit or indoor unit group, setting data of the first remote controller RC1 is changed, and the first remote controller RC1 transmits changed setting data to the second remote controller RC10, the local controller LRC2, and the remote control R31.

With the third remote controller RC20 accessed to the first remote controller RC1, if the settings of the indoor units and the outdoor units are changed from any one of the first remote controller RC1, second remote controller RC10, local controller LRC2, and remote controller R31, changed setting data is transmitted to each of the controllers, and the first remote controller RC1 transmits changed setting information to the accessed third remote controller RC20.

The first remote controller RC1 stores authentication information in response to an access of the third remote controller RC20, and if the third remote controller RC20 accesses the first remote controller RC1, an authentication procedure is performed for the third remote controller RC20. Upon completion of authentication, the first remote controller RC1 transmits data on the control menu for controlling the indoor units and the outdoor units to the third remote controller RC20, and controls the indoor units and the outdoor units based on received data. On the other hand, if authentication fails, the third remote controller RC20 is disconnected. Authentication information may include at least one of an ID, password, and user personal information for access to the first remote controller RC1.

FIG. 6 is a view showing a fifth embodiment in accordance with the connection configuration of a plurality of remote controllers of an air conditioner of the present invention.

As shown in (a) of FIG. 6, the fifth embodiment of the air conditioner includes a plurality of indoor units I11 to I13, I21 to I23, I41 to I43 and I51 to I53 and outdoor units O1, O2, O4 and O5, a first remote controller RC1, a second remote controller RC10, a first local controller LRC1, a second local controller LRC2, a first remote control R12, and a second remote control R53. Further, as shown in (b) of FIG. 6, a third remote controller R20 may be further included.

In the fifth embodiment of the air conditioner, the same names and same reference numerals are used to refer to the same components, such as the first and second remote controllers, the third remote controller, the local controller, and the remote control, as in the first to fourth embodiments, and description thereof will be omitted below.

The second remote controller RC10 is connected to the first remote controller RC1 and the fourth remote controller RC2, and the first remote controller RC1 is connected to the fourth remote controller RC2 through a predetermined branching means H2. At this time, as shown in (b) of FIG. 6, the first remote controller RC1, the fourth remote controller RC2, and the second remote controller RC10 may be connected to the third remote controller RC20 through the branching means H2.

The first remote controller RC1 is connected to the first and second outdoor units O1 and O2, and the first to sixth indoor units I11 to I13 and I21 to I23 to perform monitoring and operation control. At this time, the first local controller LRC1 is connected to the first and second outdoor units O1 and O2 to control the first to sixth indoor units I11 to I13 and I21 to I23. The first remote control R12 is connected to the second and third indoor units I12 and I13.

The fourth remote controller RC2 is connected to the fourth outdoor unit O4, the fifth outdoor unit O5, and the tenth to fifteenth indoor units I14 to I15 and I51 to I53 to perform monitoring and operation control. The second local controller LRC2 is connected to the fifth outdoor unit O5 to control the thirteenth to fifteenth indoor units I51 to I53, and the second remote control R53 is connected to the fifteenth indoor unit I53.

The second remote controller RC10 is connected to the first remote controller RC1 and the fourth remote controller RC2 to perform integrated control of the first and fourth remote controllers RC1 and RC2 through data communication with first and fourth remote controllers RC1 and RC2. That is to say, the second remote controller RC10 receives all the information on the first to sixth indoor units, the tenth to fifteenth indoor units, and the first, second, fourth and fifth outdoor units O1, O2, O4 and O5 from the first and fourth remote controllers RC1 and RC2.

The third remote controller RC20 as shown in (b) of FIG. 6 monitors and controls the first to sixth indoor units if connected to the first remote controller RC1, and monitors and controls the tenth to fifteenth indoor units if connected to the fourth remote controller RC2. Otherwise, if the third remote controller RC20 is connected to...
the second remote controller RC10, the first to sixth and tenth to fifteenth indoor units controlled by the first and second remote controllers can be integratedly controlled. 

[0078] Meanwhile, if the third remote controller RC20 accesses the first, second, and fourth remote controllers RC1, RC10, and RC2, respectively, the first, second, and fourth remote controllers RC1, RC10, and RC2, as in the previous fourth embodiment, stores authentication information on the third remote controllers RC20, and performs a predetermined authentication procedure for the third remote controller RC20.

[0079] If the authentication information is changed from any one of the first, second, and fourth remote controllers RC1, RC10, and RC2, changed authentication information is transmitted to other remote controllers along with setting data of the indoor units and the outdoor units, to thus update the authentication information. The authentication information may be transmitted also to the local controller in some cases.

[0080] FIG. 7 is a block diagram showing the configuration of the controllers of FIG. 2.

[0081] The controllers as above are configured as shown in FIG. 7. At this time, although the configurations may be different according to the type of the controllers, a common configuration of the controllers is as follows and will be described by taking an example of the configuration of the first remote controller RC1.

[0082] The remote controller RC includes a control part 10, a data part 20, a communication part 30, an input part 40, and an output part 50.

[0083] The input unit 40 includes at least one button or a touch input means, and applies an inputted user command to the control part 10. The input unit 40 may include both the button and the touch input means if necessary. Further, the input part 40 may include a soft key to be displayed on the screen. If the input part 40 is provided with a plurality of buttons, each of the buttons performs an independent function, or the plurality of buttons are combined so as to input different data into the control part 10 according to a combination of the buttons.

[0084] The output part 50 is provided with a display means for outputting texts or images, displays the operating state of an indoor unit I received through the communication part 30, and outputs a set value corresponding to data inputted by the input part 40 on the screen according to a control command of the control part 10. Also, the output part 50 displays a control menu for controlling the indoor unit I and a schedule setting menu on the screen of the display means.

[0085] Furthermore, the output part 50 may further include a speaker for outputting a sound effect, a warning sound, and a voice announcement and a lamp to be lighted or flashed.

[0086] The data part 20 stores data to be inputted through the input part 40, and stores data received from the indoor unit I and an outdoor unit O through the communication part 30, control data for controlling the indoor unit I and the outdoor unit O, setting data corresponding to the control of the outdoor unit and the indoor unit, and address data for data transmission and reception with the indoor unit and the outdoor unit.

[0087] The communication part 30 includes a plurality of communication modules, and sends and receives data with the outdoor unit O and the indoor unit O, or other controllers in a predetermined communication method to apply the data to the control part 10. Further, the communication part 30 processes an external access via the internet, transmits a control command of the control part 10 through data transmission and reception with a unit, such as a ventilator or an air cleaner, and receives operating state data of each unit.

[0088] At this time, the remote control R is provided with a communication module for communication with the indoor unit, and the local controller LRC is provided with a communication module for communication with the indoor unit and the outdoor unit, or the remote controller RC.

[0089] Moreover, the communication part 30 can send and receive data in a different communication method corresponding to a connected unit, and in some cases, may further include a conversion part for converting data between different communication methods.

[0090] The control part 10 controls data sent and received through the communication part 30, and controls inputted and outputted data by allowing data inputted through the input part 40 to be outputted through the output part 50. Especially, the control part 10 controls the operations of the indoor unit I, outdoor unit O, ventilator, and air cleaner, and monitors the operations thereof by displaying their respective operating states through the output part 50.

[0091] At this time, the control part 10 generates a control command and transmits it through the communication part 30 so that each unit can perform a predetermined operation in response to a user command inputted through the input part 40, and allows logs on sent and received data to be stored in the data part 20.

[0092] Especially, the control part 10 extracts a unit corresponding to a user command inputted through the input part 40 among the plurality of units, such as an indoor unit I, an outdoor unit O, a ventilator, and an air cleaner, and allows operational information of the extracted unit to be selectively displayed through the output part 50. At this time, the operational information includes data corresponding to the operating state, operation mode, and operation setting of each unit, and the control part 10 controls so as to selectively display data on the unit having a specific operation information according to a user command.

[0093] For example, the control unit 10 controls such that only the unit operating in any one of the operating states, including ‘operation’, ‘shutdown’ and ‘error’ can be selectively displayed, or such that the indoor unit or outdoor unit operating in any one of the operation modes, including ‘cooling’, ‘heating’, ‘dehumidification’, ‘fan’, ‘air cleaning’, and ‘
ventilation’, can be displayed. Further, it is possible to display only the unit whose air volume is higher or lower than a set value, or selectively output only the unit having a difference of a predetermined value between a set temperature and an indoor temperature. At this time, the ‘All’ category is further included in the categories of selection for each operating state so as to output all the units.

[0094] Additionally, in outputting state information of a unit through the output part 50, the control unit 10 controls such that operational information of the unit corresponding to an inputted user command can be outputted in an image or in an icon comprised of a combination of a plurality of images and text, or outputted in a text list.

[0095] Further, if the settings for the operations of the indoor unit I and the outdoor unit O are changed in response to a user command inputted from the input part 40, the control unit 10 generates a control command based on changed setting data and transmits it to the indoor unit I and the outdoor unit O through the communication part 30, and transmits changed setting data to other controllers to share them. Also, when the settings are changed from any one of the controllers and changed setting data is received through the communication part 30, the control unit 10 stores the changed setting data, and updates and applies the existing settings. Accordingly, setting data on the indoor unit and the outdoor unit has the same set value in all the controllers included in the air conditioner.

[0096] At this time, the second or third remote controller RC10 and RC20 transmits a control command generated in response to an inputted user command to the first remote controller RC1 to thus transmit data to the first remote controller RC1.

[0097] FIG. 8 is an illustrative view showing an example in accordance with the output of a control screen of the controllers of FIG. 7.

[0098] As shown in FIG. 8, the remote controllers RC1, RC10, and RC20 display operational information of an indoor unit or outdoor unit connected or, if necessary, operational information of a ventilator or air cleaning unit on the screen of the output part 50. At this time, the control part 10 of the remote controllers RC1, RC10, and RC20 controls such that operational information of each unit displayed on the screen can be outputted in an icon. Especially, the icon is formed of an image or a combination of a plurality of images and text.

[0099] As shown in (a) of FIG. 8, the remote controllers RC1, RC10, and RC20 display at least one icon corresponding to each unit on the control screen, and display some of the operational information of the unit corresponding to each icon in an image or text.

[0100] At this time, an operational information selection menu 12 for selectively inputting specific operational information is displayed at one side of the control screen of the remote controllers RC1, RC10, and RC20. According to an input of a user command through the input part 40, when a specific operational information is selected among a plurality of operational information, the control part 10 selects such that a unit corresponding to the selectively inputted operational information can be extracted and outputted on the screen.

[0101] In other words, with all the units connected being displayed, when the operational information selection menu is manipulated and a predetermined operational information is selected from a plurality of operational information, the control part 10 selects only the unit in the state of the corresponding operational information and outputs it on the screen.

[0102] For example, as shown in (b) of FIG. 8, when ‘in operation’ 12a is selected in the operational information selection menu, the control part 10 controls such that an icon or text list can be outputted not for the unit that is shut down or has an error occurred, but for the unit in operation among all the units.

[0103] FIG. 9 is an illustrative view showing another example in accordance with the output of a control screen of the controllers of FIG. 7.

[0104] In the remote controllers RC1, RC10, and RC20, as shown in FIG. 9, operational information of the units is outputted in an icon or list.

[0105] As shown in (a) of FIG. 9, the control part 10 controls such that all the units connected can be displayed on the screen of the output part 50 in the corresponding icons. At this time, the control part 10 controls such that each icon can be displayed in a different from according to the type of the corresponding unit. When any one of the plurality of icons is selected, operational information of the unit corresponding to the selected icon is displayed at one side of the screen. Further, the icons corresponding to the units can be displayed on the control screen by unit, group, and zone.

[0106] That is to say, according to the settings, the remote controls RC1, RC10, and RC20 controls such that operational information can be displayed in the icons as shown in FIG. 8, or such that operational information can be outputted at one side of the screen when a predetermined icon is selected as shown in FIG. 9.

[0107] At least one icon is displayed on the control screen of the output part 50, and detailed operational information on a selected icon is displayed at one side of the screen, and an icon selection menu 13 for selectively inputting the unit to be outputted on the screen so as to be outputted in an icon or text list can be displayed at one side of the screen.

[0108] That is, while the unit is being displayed in the corresponding icon as shown in (a) of FIG. 9, if the setting of the icon selection menu 13 is changed from ‘icon’ to ‘list’ as shown in (b) of FIG. 9 in response to a user command of the input part 40, the icon displayed on the control screen is changed to a text list. Operational information of the corresponding unit as well is displayed in the text list.

[0109] FIG. 10 is an illustrative view showing an example in which the control screen of the controllers of FIG. 7 is outputted in a list.
As shown in FIG. 10, in the remote controllers RC1, RC10, and RC20, operational information for each unit is outputted along with a text list, with the control screen being outputted in a list.

At this time, the remote controllers RC1, RC10, and RC20 controls such that operational information of each unit displayed in a text list can be selectively displayed according to an operation mode 15, an operating state 16, and operation settings 17 to 19. As the operating settings, a lock setting 17, set temperature 19, and indoor temperature 18 for a unit can be selectively inputted. Besides, the set values of air volume, wind direction, etc. can be selectively inputted. At this time, the setting for each category is a display condition for outputting information of a unit.

For each of operational information in the text list, selection menus for the operating state 15, operational information 16, and operation settings 17 to 19 are displayed. When any one of the selection menus is manipulated to change the settings, information of the unit corresponding the changed settings is outputted in a text list. Further, it is possible to display only a predetermined unit by the name 14 of the unit or display the units in an array.

For example, if an operating state is changed to an error occurrence and inputted while operational information of the plurality of units is being outputted in a text list, that is to say, if ‘in operation’ is inputted as a display condition for the operating state to output only a unit in operation on the screen and the setting of air volume is changed to middle, the unit which is in operation and whose air volume is middle is outputted in a text list.

As shown in FIG. 11, changed setting data is transmitted to the first and fourth remote controllers RC1 and RC2 and the first and second local controllers LRC1 and LRC2.

FIG. 12 is an illustrative view showing an example of an authentication information management screen of the controllers of FIG. 7.

As shown in FIG. 12, the first remote controller RC1, fourth remote controller RC2, and second remote controller RC10 store authentication information on the third remote controller RC20 that is externally connected.

If such authentication information is changed, each of the controllers transmits changed authentication information to other controllers to share the authentication information. Accordingly, the third remote controller RC20 can access the first remote controller RC1, fourth remote controller RC2, and second remote controller RC10 by using the same authentication information.

However, if a predetermined authentication information is set to share exception in any one of the first remote controller RC1, fourth remote controller RC2, and second remote controller RC10, the authentication information is not transmitted to other controllers. In this case, if the authentication information set to share exception is authentication information of the third remote controller RC20, the third remote controller RC20 can access only to a specific controller whose authentication information is registered.

FIG. 13 is a sequential view showing a method of selectively outputting operational information of a unit according to a user command in the controllers of FIG. 7.

As shown in FIG. 13, the remote controllers RC1, RC10, and RC20 output information on connected units in an icon or text list (S210).

When a display condition for operational information of units is inputted according to a user command inputted through an input part 40 (S220), the units corresponding to the inputted display condition are extracted and output to an icon or text list for the corresponding units.

If the inputted display condition is a condition corresponding to an operating state (S230), only the units operating in an inputted operating state is extracted and outputted in an icon or text list (S240). For example, if ‘in operation’ is inputted, only the units in operation are outputted, and if ‘error’ is inputted, only the units having an error occurred are displayed on the screen.

Further, if the inputted display condition is a condition corresponding to an operating mode (S250), operational information is outputted for the units operating in the same operation mode as the inputted operation mode (S260). For example, if the operation mode is selected as ‘cooling’, the units in cooling operation are displayed in an icon or text list.

Further, if the inputted display condition is a condition for other operation settings (S270), the units having the same set value as an inputted operation set value is extracted to thus display operational information thereof (S280). For example, it is possible to display only
the units whose air volume is ‘strong’ and whose target temperature value is 20 degrees or only the unit whose indoor temperature is 24 degrees.

[0129] If there is no particular display condition, an icon or text list is outputted for all the units (S290).

[0130] If operational information of the unit being displayed is changed (S300), the units satisfying the above display condition are re-extracted based on changed operational information to update and output the icon or text list of the units being displayed (S310). If there is no particular change, the screen being displayed is maintained (S320).

[0131] FIG. 14 is a sequential view showing a method of outputting operational information of the units of the controllers of FIG. 7.

[0132] As shown in FIG. 14, the remote controllers RC1, RC10, and RC20 search for connected units (S350), and outputs operational information of the units on the screen based on data received from the connected units (S360). At this time, the operational information of the units is outputted in an icon or text list according to basic settings.

[0133] When view icon is selected according to an inputted user command by manipulating the selection menu displayed on the screen (S370), the units are displayed in an icon composed of an image or a combination of images and text, and resultant operational information is displayed on the screen (S380).

[0134] Meanwhile, if a text list is selected, operational information of the units being displayed on the screen is displayed in a text list (S390).

[0135] At this time, as shown in FIG. 13, when only the information of a corresponding unit is outputted on the screen upon inputting a predetermined display condition, the information of the unit is displayed in an icon or text list as described above.

[0136] FIG. 15 is a sequential view showing a method of data transmission between a plurality of controllers of an air conditioner of the present invention.

[0137] As shown in FIGs. 13 and 14, if a setting is changed according to an inputted user command, with the screen being outputted, the remote controllers RC1, RC10, and RC20, the local controller LRC, and the remote control R share the changed setting. Here, the operation will be described by taking an example of (a) of FIG. 6 and the fifth embodiment of the air conditioner.

[0138] Referring to FIG. 15, any one of the plurality of controllers, for example, the first remote controller RC1 changes the setting of the second indoor unit I12 according to a user command S410 inputted through the input part 40, and stores the changed setting (S420). For example, a set temperature in a cooling mode is changed from 25 degrees to 23 degrees.

[0139] The first remote controller RC1 transmits a control command in response to a change in set temperature to the first outdoor unit O1 and the second outdoor unit I12 (S430). At this time, if the third remote controller RC20 is connected, setting data or changed setting information is transmitted to the third remote controller RC20. Here, if the third remote controller RC20 is provided with a program for controlling the indoor units and the outdoor units as in the fourth embodiment, setting data is transmitted, or if the third remote controller RC20 controls through a control menu provided from the first remote controller, only change information is transmitted.

[0140] The operations of the first outdoor unit O1 and the second outdoor unit I12 are controlled according to a received control command (S490). At this time, when the operating state of the second indoor unit I12 changes, changed operating state data is transmitted to the first remote controller RC1 (S500). Further, operating state data of the second indoor unit I12 is transmitted to the first local controller LRC1 and the first remote control R12 as well.

[0141] The first remote controller RC1 outputs operating states for the indoor units and the outdoor units on the screen according to operating state data received from the indoor units or the outdoor units (S480). At this time, the first remote controller RC1 transmits operating state data to the second remote controller RC10.

[0142] The first local controller LRC1, first remote control R12, and second remote controller RC10 update stored setting data based on setting data received from the first remote controller RC1 (S510), and output changed setting information on the screen (S520). At this time, a control provided with no display means is adapted to flash a lamp provided or output a predetermined sound effect through a speaker.

[0143] If a setting is changed in the fourth remote controller RC2, setting data is transmitted to the second remote controller and the second local controller LRC2.

[0144] Meanwhile, if the third remote controller RC20 accesses the first remote controller RC1 (S440, S230), the first remote controller RC1 send a request for authentication information to the third remote controller RC20 (S450), and the third remote controller RC20 transmits predetermined authentication information to the first remote controller RC1 (S540).

[0145] The first remote controller RC1 performs an authentication procedure by comparing stored authentication information with the authentication information received from the third remote controller RC20 and checking whether they are consistent with each other or not. At this time, the authentication information may include an ID, a password, or user’s personal information.

[0146] If the authentication information is consistent with each other, the first remote controller RC1 finishes authentication (S460), and transmits operating state data for the indoor units and the outdoor units to the third remote controller (S470). If authentication fails, the third remote controller RC20 is disconnected and operating states of the indoor units and the outdoor units are outputted (S480).

[0147] At this time, if the third remote controller RC20 is provided with a control program for controlling the indoor units and the outdoor units, received data is dis-
played on the screen (S550) to monitor and control the indoor units and the outdoor units. Meanwhile, if there is no particular control program provided, the first remote controller RC1 provides a control menu for controlling the indoor units and the outdoor units to the third remote controller RC20.

[0148] Although the air conditioner and the operating method thereof according to the present invention have been described with reference to the illustrated drawings, these are merely illustrative, and those skilled in the art will understand that various modifications and equivalent other embodiments of the present invention are possible. The present invention is not limited to the embodiments and drawings disclosed in this specification, and can be applied within the scope of the technical concept of the present invention.

Claims

1. An air conditioner, comprising:
   - a plurality of units (I,O);
   - a first controller connected to the plurality of units and for monitoring and controlling the operating state thereof; and
   - a second controller connected to the first controller,

wherein, if settings of the plurality of units are changed, the first controller transmits changed setting data to the second controller, and the second controller updates stored setting data based on the received setting data, and displays changed setting information on the screen to be synchronized with the first controller.

2. The air conditioner of claim 1, wherein the first controller is either a local controller (LRC) for simply controlling a predetermined unit of the plurality of units, or a remote control (R) connected to any one of the plurality of units, or remote controllers (RC1, RC2, RC10, and RC20) for monitoring and controlling the operations of the plurality of units, and the second controller is either a local controller (LRC) for simply controlling a predetermined unit of the plurality of units, or a remote control (R) connected to any one of the plurality of units, or remote controllers (RC1, RC2, RC10, and RC20) for monitoring and controlling the operations of the plurality of units.

3. The air conditioner of claim 1, further comprising a third controller connected to the first controller to receive operating state data on the units and transmit an inputted control command to the first controller for controlling the units through the first controller, wherein the third controller receives the setting data from the first controller, updates stored setting data, displays changed setting information on the screen, and if setting data on the plurality of units is changed according to an inputted user command, transmits the changed setting data to the first controller.

4. The air conditioner of claim 3, wherein the third controller is provided with a wired or wireless communication means and connected to the first controller.

5. The air conditioner of claim 3, wherein the first controller stores authentication information in response to an access of the third controller, and performs authentication based on the authentication information upon access of the third controller.

6. The air conditioner of claim 5, wherein the first controller transmits the authentication information on the third controller to the second controller to share the same, and the third controller accesses the second controller through the same authentication information to receive and control information on the units.

7. The air conditioner of claim 3, wherein, if any one of setting information, among the operating state, operation mode, and operating settings of the plurality of units, is changed, the first controller displays changed setting information on the screen and transmits setting data including the changed setting information to the second controller and the third controller, and if setting data on any one of setting information, among the operating state, operation mode, and operating settings of the plurality of units, is received from any one of the second controller and the third controller, stored setting data is updated based on the setting data and displayed on the screen.

8. The air conditioner of claim 1, wherein, if a display condition for at least one operational information, among an operating state, an operation mode, and operating settings, is inputted according to an inputted user command, the first controller extracts at least one unit having a display condition corresponding to the user command among the plurality of units, and outputs operational information on the extracted unit.

9. The air conditioner of claim 8, wherein the first controller comprises:
   - an output part (50) for displaying operational information on the plurality of units;
   - an input part (40) for inputting the user command;
   - a communication part (30) for sending and transmitting data with the plurality of units; and
   - a control part (10) for controlling such that a unit corresponding to the user command can be extracted based on data on the plurality of units.
received through the communication part (30), and operational information of the extracted unit can be outputted in an icon or list through the output part (50).

10. The air conditioner of claim 9, wherein, if there are a plurality of display conditions corresponding to the user command, the control part 10 controls such that a unit satisfying all the plurality of conditions is extracted and outputted through the output part (50).

11. An operating method of an air conditioner, comprising the steps of:
   - a first controller’s changing setting information for controlling a plurality of units in response to a user command;
   - transmitting first setting data including the changed setting information to a second controller;
   - receiving second setting data about a change in the setting information of the plurality of units from the second controller; and
   - updating the setting information based on the second setting data and displaying the updated setting information on the screen.

12. The method of claim 11, further comprising the steps of:
   - the second controller’s updating setting information based on the first setting data received from the first controller and displaying the same on the screen; and
   - if the setting information of the plurality of units is changed in response to an inputted user command, transmitting the second setting data including the changed setting information to the first controller.

13. The method of claim 11, further comprising the steps in which:
   - when the third controller accesses the first controller, authentication for the third controller is performed; and
   - upon completion of authentication, operating state data for the units are transmitted to the third controllers, and the units are controlled based on data received from the third controller.

14. The method of claim 11, further comprising the steps in which:
   - if a display condition for at least one operational information, among the operating state, operation mode, and operating settings of the plurality of units, is inputted according to an inputted user command, the units satisfying the display condition are extracted among the plurality of units and operational information thereof are outputted on the screen; and
   - if no display condition is inputted upon an input of a user command, operational information on the entire plurality of units is outputted on the screen.

15. The method of claim 14, wherein if the display condition is an operating state, at least one of operating states, including all, in operation, shutdown, and error, is inputted, if the display condition is an operation mode, any one of operation modes, including all, cooling mode, heating mode, fan mode, dehumidification mode, ventilation mode, and air cleaning mode, is inputted, and if the display condition is operation settings, any one of operation settings, including lock settings, air volume, wind direction, set temperature, and set temperature, is inputted.
Fig. 3

(a)

(b)
Fig. 4

(a)

(b)
Fig. 5
Fig. 7

Data part -> Control part

Input part <- 10

Output part <- 40

Communication part <- 30

Indoor unit

Outdoor unit

Controller

RC1, RC2, RC10, RC20

20
**Fig.10**

<table>
<thead>
<tr>
<th>UP</th>
<th>DOWN</th>
<th>[Group 2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>▲▼</td>
<td>Operation mode</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
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</table>
## Fig. 11

### Entry of air conditioner information

<table>
<thead>
<tr>
<th>Type</th>
<th>Air conditioner name</th>
<th>Physical address</th>
<th>Model name</th>
<th>Maximum electric power consumption (W)</th>
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<tbody>
<tr>
<td>UAC</td>
<td>No. 107 accounting section</td>
<td>0 0 0</td>
<td>Default</td>
<td>3000</td>
</tr>
<tr>
<td>UAC</td>
<td>No. 108 professor room</td>
<td>0 0 1</td>
<td>Default</td>
<td>3000</td>
</tr>
<tr>
<td>UAC</td>
<td>No. 109 professor room</td>
<td>0 0 2</td>
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<td>3000</td>
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<td>0 0 3</td>
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<td>UAC</td>
<td>No. 111 professor room</td>
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<table>
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<tr>
<th>Type</th>
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<th>Physical address</th>
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<th>Maximum electric power consumption (W)</th>
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<tbody>
<tr>
<td>UAC</td>
<td>No. 112 lecturer room</td>
<td>0 0 5</td>
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<td>3000</td>
</tr>
<tr>
<td>UAC</td>
<td>No. 113 lecturer room</td>
<td>0 0 6</td>
<td>Default</td>
<td>3000</td>
</tr>
<tr>
<td>UAC</td>
<td>No. 114 studio</td>
<td>0 0 7</td>
<td>Default</td>
<td>3000</td>
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**Fig. 12**

![ID/PW INPUT Diagram]

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<tr>
<th>ID</th>
<th>PW</th>
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<tbody>
<tr>
<td>x</td>
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</tr>
<tr>
<td>x</td>
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</tbody>
</table>
**Fig. 13**

1. **Start**
2. **Search for connected units**
3. **Is display condition for operational information inputted?**
   - **Yes**
     - **Output according to operating state?**
       - **Yes**
         - **Output list of units in the same operating state as inputted operating state**
       - **No**
         - **Output according to operation mode?**
           - **Yes**
             - **Output list of units in the same operation mode as inputted operation mode**
           - **No**
             - **Output according to operation settings?**
               - **Yes**
                 - **Output list of units according to input of operation settings**
               - **No**
                 - **Output entire list of units**
4. **Is operational information of units changed?**
   - **Yes**
     - **Update outputted list of units**
   - **No**
     - **Maintain output**
5. **Finish**
Fig. 14

Start

Search for connected units

Output list of units

Is view icon selected?

No

Yes

Output operational information of units in icon list

Output operational information of units in text list

Finish
# Documents Considered to Be Relevant

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document with indication, where appropriate, of relevant passages</th>
<th>Relevant to claim</th>
<th>Classification of the Application (IPC)</th>
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<tbody>
<tr>
<td>X</td>
<td>EP 0 793 062 A (SANYO ELECTRIC CO [JP]) 3 September 1997 (1997-09-03) * the whole document *</td>
<td>1-15</td>
<td>F24F</td>
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The present search report has been drawn up for all claims.

Place of search: Munich  
Date of completion of the search: 5 February 2009  
Examiner: Valenza, Davide

<table>
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<tr>
<th>CATEGORY OF CITED DOCUMENTS</th>
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<td>X: particularly relevant if taken alone</td>
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<tr>
<td>Y: particularly relevant if combined with another document of the same category</td>
</tr>
<tr>
<td>A: technological background</td>
</tr>
<tr>
<td>C: non-written disclosure</td>
</tr>
<tr>
<td>P: intermediate document</td>
</tr>
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</table>

| T: theory or principle underlying the invention |
| E: earlier patent document, but published on, or after the filing date |
| D: document cited in the application |
| L: document cited for other reasons |
| S: member of the same patent family, corresponding document |
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<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
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<td>DE 60311400 T2 29-11-2007</td>
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<td>JP 2004198102 A 15-07-2004</td>
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<td></td>
<td>US 2004204793 A1 14-10-2004</td>
<td></td>
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<td></td>
<td>KR 20060064822 A 14-06-2006</td>
<td></td>
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<tr>
<td></td>
<td>US 2006123808 A1 15-06-2006</td>
<td></td>
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<tr>
<td>JP 9296950 A 18-11-1997</td>
<td>NONE</td>
<td></td>
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<tr>
<td>KR 20070078548 A 01-08-2007</td>
<td>NONE</td>
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<td></td>
<td>KR 20070072261 A 04-07-2007</td>
<td></td>
<td></td>
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<tr>
<td>EP 0793062 A 03-09-1997</td>
<td>CN 1160160 A 24-09-1997</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>DE 69727164 D1 19-02-2004</td>
<td></td>
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<td>DE 69727164 T2 02-09-2004</td>
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<td>ES 2214564 T3 16-09-2004</td>
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<td>JP 9236297 A 09-09-1997</td>
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<td>PT 793062 T 31-05-2004</td>
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<td></td>
<td>US 6009939 A 04-01-2000</td>
<td></td>
<td></td>
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<td>JP 6241544 A 30-08-1994</td>
<td></td>
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