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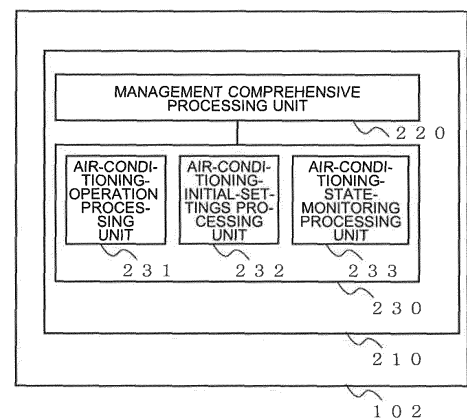
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(54) **AIR CONDITIONING MANAGEMENT DEVICE, AIR CONDITIONING DEVICE, AND PROGRAM FOR DEVICE MANAGEMENT METHOD**

(57) An air-conditioning management apparatus of one embodiment of the present disclosure includes: a management-side communication device that communicates with an air-conditioning apparatus for air-conditioning a target space and equipment other than the air-conditioning apparatus; a management-side input device that receives an instruction for the air-conditioning apparatus; a management-side display device that displays information based on a display signal; and a management-side control device that includes a management application processing unit. The management application processing unit includes a management individual processing unit and a management comprehensive processing unit. The management individual processing unit includes: an air-conditioning-operation processing unit that performs processing involving an operation for the air-conditioning apparatus; an air-conditioning-initial-settings processing unit that performs processing involving an initial setting for the air-conditioning apparatus; an air-conditioning-state-monitoring processing unit that performs processing involving state monitoring of the air-conditioning apparatus; and a processing unit that performs processing involving at least one of state monitoring, an operation, and an initial setting for the equipment. The management comprehensive processing unit performs comprehensive processing on data processed by the management individual processing unit.

FIG. 2



Description

Technical Field

[0001] The present disclosure relates to an air-conditioning management apparatus, an air-conditioning apparatus, and a program for implementing an apparatus management method. The present disclosure relates to, in particular, operations or processing performed by running a management application program.

Background Art

[0002] Hitherto, an air-conditioning apparatus has been operated by using a dedicated remote controller. In addition, in a known technology (see, for example, Patent Literature 1), initial settings for an air-conditioning apparatus are performed by running an application program (hereinafter referred to as an application) as dedicated software installed on a personal information processing terminal, such as a smartphone.

Citation List

Patent Literature

[0003] Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2017-146065

Summary of Invention

Technical Problem

[0004] To use the remote controller disclosed in Patent Literature 1, an application for performing processing needs to be installed on an information processing terminal. The application used in Patent Literature 1 is a dedicated application for initial settings, which are a part of the management of an air-conditioning apparatus. Thus, another application needs to be installed for a user to operate an air-conditioning apparatus or other equipment by using the remote controller disclosed in Patent Literature 1.

[0005] It is, however, inconvenient to install an application for each purpose of management of the air-conditioning apparatus or other equipment. In addition, compatibility between applications should be ensured. When applications are created, complicated processing details for an input instruction need to be defined for each application. This poses an issue in terms of, for example, convenience.

[0006] In order to solve such a problem, the present disclosure aims at providing an air-conditioning management apparatus, an air-conditioning apparatus, and a program for implementing an apparatus management method that provide higher convenience in terms of, for example, operations for the air-conditioning apparatus and other equipment.

Solution to Problem

[0007] An air-conditioning management apparatus of one embodiment of the present disclosure includes: a management-side communication device that communicates with an air-conditioning apparatus for air-conditioning a target space and equipment other than the air-conditioning apparatus; a management-side input device that receives an instruction for the air-conditioning apparatus; a management-side display device that displays information based on a display signal; and a management-side control device that includes a management application processing unit. The management application processing unit includes a management individual processing unit and a management comprehensive processing unit. The management individual processing unit includes: an air-conditioning-operation processing unit that performs processing involving an operation for the air-conditioning apparatus; an air-conditioning-initial-settings processing unit that performs processing involving an initial setting for the air-conditioning apparatus; an air-conditioning-state-monitoring processing unit that performs processing involving state monitoring of the air-conditioning apparatus; and a processing unit that performs processing involving at least one of state monitoring, an operation, and an initial setting for the equipment. The management comprehensive processing unit performs comprehensive processing on data processed by the management individual processing unit.

[0008] An air-conditioning apparatus of another embodiment of the present disclosure includes: an air-conditioning-side communication device that communicates with the air-conditioning management apparatus; an air-conditioning-side notification device that provides a notification based on a notification signal; and an air-conditioning-side control device that transmits the notification signal to the air-conditioning-side notification device when the air-conditioning-side communication device receives a signal from the air-conditioning management apparatus.

[0009] A program for implementing an apparatus management method of still another embodiment of the present disclosure is a program including: an air-conditioning-operation processing unit that performs processing involving an operation for an air-conditioning apparatus for air-conditioning a target space; an air-conditioning-initial-settings processing unit that performs processing involving an initial setting for the air-conditioning apparatus; an air-conditioning-state-monitoring processing unit that performs processing involving state monitoring of the air-conditioning apparatus; and a processing unit that performs processing involving at least one of state monitoring, an operation, and an initial setting for equipment other than the air-conditioning apparatus. The apparatus management method includes: causing a selected processing unit to perform processing; and processing, according to a predetermined procedure, data processed by the selected processing unit.

Advantageous Effects of Invention

[0010] In the air-conditioning management apparatus of an embodiment of the present disclosure, the management application processing unit includes the air-conditioning-operation processing unit, the air-conditioning-initial-settings processing unit, and the air-conditioning-state-monitoring processing unit. Thus, processing of the same application enables state monitoring, an operation, and initial settings for the air-conditioning apparatus, which facilitates higher convenience.

Brief Description of Drawings

[0011]

[Fig. 1] Fig. 1 illustrates an example of the configuration of a system that centers on an air-conditioning management apparatus 100 according to Embodiment 1 of the present disclosure.

[Fig. 2] Fig. 2 illustrates a configuration of a management-side control device 102 according to Embodiment 1 of the present disclosure.

[Fig. 3] Fig. 3 illustrates a procedure of processing performed by a management application processing unit 210 according to Embodiment 1 of the present disclosure.

[Fig. 4] Fig. 4 illustrates a configuration of a system that centers on an air-conditioning management apparatus 100 according to Embodiment 2 of the present disclosure.

[Fig. 5] Fig. 5 illustrates a configuration of a management-side control device 102 according to Embodiment 2 of the present disclosure.

[Fig. 6] Fig. 6 illustrates an example of processing performed by a management comprehensive processing unit 220 according to Embodiment 3 of the present disclosure.

[Fig. 7] Fig. 7 illustrates the details of control performed by a system according to Embodiment 3 of the present disclosure.

[Fig. 8] Fig. 8 illustrates an example of a parameter conversion table 400 including additional parameters for a lighting apparatus 2 and a window 3 according to Embodiment 3 of the present disclosure.

[Fig. 9] Fig. 9 illustrates an example of the configuration of a system that centers on an air-conditioning management apparatus 100 according to Embodiment 4 of the present disclosure.

Description of Embodiments

[0012] Hereinafter, the embodiments of the present disclosure are described with reference to the drawings. In the drawings referred to below, components assigned the same reference symbols are identical or equivalent components, and the same applies to the entire embodiments described below. In addition, the exemplified com-

ponents in the entire Description are mere examples, and components are not limited to the exemplifications given below. Combinations of components, in particular, are not limited to those described in the embodiments, and components described in one embodiment may be used in another embodiment where appropriate. Regarding the same type of apparatuses differentiated by suffix, suffixes may be omitted if differentiation or identification is not particularly needed.

Embodiment 1

[0013] Fig. 1 illustrates an example of the configuration of a system that uses an air-conditioning management apparatus 100 according to Embodiment 1 of the present disclosure as a main device. The system illustrated in Fig. 1 includes one or more air-conditioning apparatuses 1. As illustrated in Fig. 1, the system in Embodiment 1 includes an air-conditioning apparatus 1A and an air-conditioning apparatus 1B.

[0014] The air-conditioning apparatus 1 includes devices involved in air-conditioning and air-conditions a target space. The air-conditioning apparatus 1 includes an air-conditioning-side control device 11, an air-conditioning-side communication device 12, an air-conditioning-side storage device 13, and an air-conditioning-side notification device 14. The air-conditioning-side control device 11 controls the devices of the air-conditioning apparatus 1 and performs air-conditioning operation. In Embodiment 1, the air-conditioning-side control device 11 performs control based on a signal received from the air-conditioning management apparatus 100. The air-conditioning-side communication device 12 can communicate with the air-conditioning management apparatus 100. Through communication between the air-conditioning-side communication device 12 and the air-conditioning management apparatus 100, the air-conditioning-side control device 11 transmits to and receives from the air-conditioning management apparatus 100 a signal including various data. The air-conditioning-side storage device 13 stores temporarily or over the long term various data used for the air-conditioning-side control device 11 to perform control. The air-conditioning-side notification device 14 provides notification based on a notification signal received from the air-conditioning-side control device 11. In Embodiment 1, in the air-conditioning apparatus 1, the air-conditioning-side control device 11 provides the notification of receiving a signal from the air-conditioning management apparatus 100. Here, a notification method is not limited to a particular method. For instance, visual notification may be provided by illuminating an LED, or auditory notification may be provided by oscillating, for example, a speaker and producing a sound.

[0015] The system illustrated in Fig. 1 includes the air-conditioning management apparatus 100 capable of communicating with the air-conditioning-side control device 11 of the air-conditioning apparatus 1. Fig. 1 illus-

trates an example of the hardware configuration of the air-conditioning management apparatus 100. The air-conditioning management apparatus 100 transmits a signal including data on an instruction input by a user, such as an operator, to the one or more air-conditioning apparatuses 1. The instruction is, for example, an operation or setting instruction about, for example, starting or stopping operation, a temperature setting, and a cooling or heating operation mode. In addition, the air-conditioning management apparatus 100 displays state-monitoring information in accordance with a signal including data on, for example, the operating state of the air-conditioning apparatus 1. Installation of an application on a portable information terminal, such as a smartphone, enables the portable terminal to function as the air-conditioning management apparatus 100. The portable terminal serves as the hardware of the air-conditioning management apparatus 100. Here, a general-purpose portable terminal is used as the hardware; however, a dedicated remote controller for an air-conditioning apparatus may be used as hardware by installing an application on the remote controller.

[0016] As illustrated in Fig. 1, the air-conditioning management apparatus 100 includes a management-side display device 101, a management-side control device 102, a management-side communication device 103, a management-side storage device 104, and a management-side input device 105. In accordance with a display signal received from the management-side control device 102, the management-side display device 101 displays the state of the air-conditioning apparatus 1 to inform the user of the state. As an input signal, the management-side input device 105 transmits data on an operation or setting, input by the user to the management-side control device 102.

[0017] The management-side storage device 104 stores temporarily or over the long term various data used for the management-side control device 102 of the air-conditioning management apparatus 100 to perform processing. Here, the management-side storage device 104 includes, for example, a hard disk and a volatile storage device (not illustrated), such as random access memory (RAM) capable of temporarily storing data. The management-side storage device 104 further includes a non-volatile auxiliary storage device (not illustrated), such as flash memory (ROM) capable of storing data over the long term.

[0018] The management-side communication device 103 can communicate with the air-conditioning apparatus 1. Through communication between the management-side communication device 103 and the air-conditioning apparatus 1, the management-side control device 102 transmits to and receives from the air-conditioning apparatus 1 a signal including various data. In Embodiment 1, short-range wireless communication that can be performed within a radius of around several tens of meters is performed between the management-side communication device 103 and the air-conditioning apparatus

1. For instance, the communication standard of short-range wireless communication performed by the management-side communication device 103 is not limited to a particular standard. Communication can be performed by, for example, Bluetooth (registered trademark) or Wi-Fi (registered trademark). It should be noted that in Embodiment 1, wireless communication is performed between the management-side communication device 103 and the air-conditioning apparatus 1. However, wired communication may be performed between the management-side communication device 103 and the air-conditioning apparatus 1 connected to each other via a transmission line (not illustrated).

[0019] Fig. 2 illustrates a configuration of the management-side control device 102 according to Embodiment 1 of the present disclosure. The management-side control device 102 in Embodiment 1 includes the management application processing unit 210. The management application processing unit 210 processes a management application for managing the air-conditioning apparatus 1. Although not illustrated, the management-side control device 102 can process an application other than the management application. Although the storage place of the management application is not limited to a particular place, in Embodiment 1, the management-side storage device 104 stores the management application to be processed by the management application processing unit 210.

[0020] The management application processing unit 210 includes a management comprehensive processing unit 220 and a management individual processing unit 230 and implements an apparatus management method to manage the apparatus. The management individual processing unit 230 includes a processing unit for each purpose of management of the apparatus, the management including, for example, operations or various settings including initial settings or a schedule setting. A processing unit selected by the user, for example, performs processing to display a respective screen matching the management purpose and performs processing based on an input instruction or numerical value. The management individual processing unit 230 in Embodiment 1 performs processing by running a program created by using an application programming interface. Here, a program to be run is not particularly limited to a program created by using an application programming interface. The application programming interface is an interface defined to enable creation of, by using a software development kit described later, a program for performing processing involving, for example, input and output.

[0021] The management individual processing unit 230 in Embodiment 1 includes an air-conditioning-operation processing unit 231, an air-conditioning-initial-settings processing unit 232, and an air-conditioning-state-monitoring processing unit 233. The air-conditioning-operation processing unit 231 causes the management-side display device 101 to display a screen for operating

the air-conditioning apparatus. The air-conditioning-operation processing unit 231 receives an operation instruction input by the user via the management-side input device 105 and then transmits the operation instruction to the management comprehensive processing unit 220. The air-conditioning-initial-settings processing unit 232 causes the management-side display device 101 to display a screen for performing initial settings for the air-conditioning apparatus. The air-conditioning-initial-settings processing unit 232 receives instructions about initial settings input by the user via the management-side input device 105 and then transmits the instructions to the management comprehensive processing unit 220. The air-conditioning-state-monitoring processing unit 233 causes the management-side display device 101 to display a screen for monitoring an air-conditioning state representing the state of the air-conditioning apparatus 1. In Embodiment 1, the management individual processing unit 230 includes the air-conditioning-initial-settings processing unit 232 that performs processing involving initial settings. The management individual processing unit 230 may include a processing unit that performs processing involving settings, such as a schedule setting.

[0022] In addition, the management comprehensive processing unit 220 processes data received from the management individual processing unit 230. The management comprehensive processing unit 220 processes the data processed by each processing unit of the management individual processing unit 230. Thus, the management comprehensive processing unit 220 can perform comprehensive processing on data common to, for example, operations or initial settings. The management comprehensive processing unit 220 in Embodiment 1 performs processing by running a program created using a software development kit and provided by, for example, the developer of the air-conditioning apparatus 1. Here, a program to be run is not particularly limited to a program provided by, for example, the developer. In Embodiment 1, regarding the management of the air-conditioning apparatus 1, processing details for various data obtained by, for example, input are aggregated, and the aggregated processing details are provided as a software development kit for application development.

[0023] Fig. 3 illustrates a procedure of processing performed by the management application processing unit 210 according to Embodiment 1 of the present disclosure. Hereinafter, processing for operating the air-conditioning apparatus 1 is described. In the management individual processing unit 230 of the management application processing unit 210, the air-conditioning-operation processing unit 231 causes the management-side display device 101 to display a screen for operating the air-conditioning apparatus and instructs the user to input an operation instruction (step S1). When the user inputs the instruction via the management-side input device 105 (step S2), the air-conditioning-operation processing unit 231 processes data included in an input signal and transmits the processed data to the management comprehensive

sive processing unit 220 (step S3).

[0024] The management comprehensive processing unit 220 of the management application processing unit 210 processes the received data (step S4). The management comprehensive processing unit 220 then causes the management-side communication device 103 to transmit a command signal corresponding to an instructed operation (step S5). For instance, in Fig. 1, an air-conditioning apparatus 1A receives a command signal indicating the operations: a cool mode and a temperature setting of 25 degrees Celsius. An air-conditioning apparatus 1B, on the other hand, receives a command signal indicating the schedule setting: start the operation at 9 am and stop the operation at 5 pm.

[0025] Thus, in the air-conditioning management apparatus 100 included in the system in Embodiment 1, the management application processing unit 210 performs processing by running the management application. Running the same management application enables state monitoring, operations, and initial settings for the air-conditioning apparatus 1. Accordingly, an application need not be installed for each purpose of management, which facilitates higher convenience. In addition, the management application includes the management comprehensive processing unit 220 and the management individual processing unit 230. Thus, the management comprehensive processing unit 220 can perform comprehensive processing on common data obtained through individual processing of the management individual processing unit 230 for each purpose of management. Hence, for instance, a complex procedure need not be defined for each purpose of management.

Embodiment 2

[0026] The air-conditioning management apparatus 100 in Embodiment 1 performs the operations, initial settings, and state monitoring of the air-conditioning apparatus 1. In addition to the management of an air-conditioning apparatus 1, an air-conditioning management apparatus 100 in Embodiment 2 performs the operations, initial settings, and state monitoring of equipment other than the air-conditioning apparatus 1.

[0027] Fig. 4 illustrates a configuration of a system that centers on the air-conditioning management apparatus 100 according to Embodiment 2 of the present disclosure. In Fig. 4, the apparatuses and devices assigned the same reference symbols as those illustrated in Fig. 1 and other figures have configurations similar to those described in Embodiment 1 and perform operations similar to those described in Embodiment 1. In Fig. 4, a lighting apparatus 2 illuminates a target space. The lighting apparatus 2 includes a lighting-apparatus-side control device 21, a lighting-apparatus-side communication device 22, and a lighting-apparatus-side storage device 23. The lighting-apparatus-side control device 21 controls the lighting apparatus 2. In Embodiment 2, the lighting-apparatus-side control device 21 performs control based

on a signal received from the air-conditioning management apparatus 100. The lighting-apparatus-side communication device 22 can communicate with the air-conditioning management apparatus 100. Through communication between the lighting-apparatus-side communication device 22 and the air-conditioning management apparatus 100, the lighting-apparatus-side control device 21 transmits to and receives from the air-conditioning management apparatus 100 a signal including data. The lighting-apparatus-side storage device 23 stores temporarily or over the long term various data used for the lighting-apparatus-side control device 21 to perform control.

[0028] In addition, a window 3 is installed in the target space. A window-state monitoring device 31 transmits a signal to the air-conditioning management apparatus 100 via a window-side communication device 32, the signal including data indicating, for example, the state of the window 3, such as whether the window 3 is open or closed. The window-side communication device 32 can communicate with the air-conditioning management apparatus 100. Through communication between the window-side communication device 32 and the air-conditioning management apparatus 100, the window-state monitoring device 31 transmits to and receives from the air-conditioning management apparatus 100 a signal including data.

[0029] Fig. 5 illustrates a configuration of a management-side control device 102 according to Embodiment 2 of the present disclosure. In the air-conditioning management apparatus 100 in Embodiment 2, a management individual processing unit 230 of a management application processing unit 210 further includes a lighting-apparatus-operation processing unit 234, a lighting-apparatus-initial-settings processing unit 235, a lighting-apparatus-state-monitoring processing unit 236, and a window-state-monitoring processing unit 237. The lighting-apparatus-operation processing unit 234 causes a management-side display device 101 to display a screen for operating the lighting apparatus. The lighting-apparatus-operation processing unit 234 receives an operation instruction input by a user via a management-side input device 105 and then transmits the operation instruction to a management comprehensive processing unit 220. The lighting-apparatus-initial-settings processing unit 235 causes the management-side display device 101 to display a screen for performing initial settings. The lighting-apparatus-initial-settings processing unit 235 receives instructions about initial settings input by the user via the management-side input device 105 and then transmits the instructions to the management comprehensive processing unit 220. The lighting-apparatus-state-monitoring processing unit 236 causes the management-side display device 101 to display a screen for monitoring the state of the lighting apparatus. The window-state-monitoring processing unit 237 causes the management-side display device 101 to display a screen for monitoring the state of the window. As described in

Embodiment 1, each processing unit obtains data by performing processing and transmits the obtained data to the management comprehensive processing unit 220. Then, the management comprehensive processing unit 220 processes the received data and transmits a command signal to target equipment via a management-side communication device 103. For instance, in Fig. 4, the air-conditioning apparatus 1 receives a command signal indicating the operations: a cool mode and a temperature setting of 25 degrees Celsius. The lighting apparatus 2, on the other hand, receives a command signal indicating an instruction to switch on the lighting apparatus 2. A window-state monitoring device 31 for monitoring the state of the window 3 transmits a signal indicating that the window 3 is closed.

[0030] Thus, in the air-conditioning management apparatus 100 in Embodiment 2, by each processing unit of the management application processing unit 210 performing processing, it is possible not only to manage the air-conditioning apparatus 1 but also to perform the operations, initial settings, and state monitoring of the lighting apparatus 2 and the state monitoring of the window 3. Here, management-target equipment is not limited to the lighting apparatus 2 and the window 3. For instance, a water heater and a television can be managed.

Embodiment 3

[0031] Fig. 6 illustrates an example of processing performed by a management comprehensive processing unit 220 according to Embodiment 3 of the present disclosure. Fig. 6 illustrates a parameter conversion table 400. The parameter conversion table 400, in which information is held in a table format, illustrates, for each setting item, relationships between data obtained by, for example, input and numerical values given for a set parameter. In Embodiment 3, in an air-conditioning management apparatus 100, a management-side storage device 104 holds the parameter conversion table 400. Meanwhile, in an air-conditioning apparatus 1, an air-conditioning-side storage device 13 holds the parameter conversion table 400. In Embodiment 3, an example of processing performed by the management comprehensive processing unit 220 when the air-conditioning apparatus 1 is operated using the air-conditioning management apparatus 100 is described.

[0032] As illustrated in Fig. 6, in Embodiment 3, parameters are principally classified into numerical-value-setting parameters and state-setting parameters. The parameters are used to control the air-conditioning apparatus 1 in Embodiment 3 and input by the user of the air-conditioning management apparatus 100 to, for example, operate the air-conditioning apparatus 1. For the numerical-value-setting parameters, for instance, an instruction about, for example, a temperature is input as a numerical value. For the state-setting parameters, for instance, an instruction about, for example, an operation mode is input as a state.

[0033] In Fig. 6, the numerical-value-setting parameters include two parameters for a numerical value setting 1 and a numerical value setting 2. A setting temperature X is assigned to the numerical value setting 1, and a setting humidity Y is assigned to the numerical value setting 2. The state-setting parameters include two parameters for a state setting 1 and a state setting 2. The operation mode is assigned to the state setting 1, and the volume of airflow is assigned to the state setting 2. In the state-setting parameters, a one-to-one relationship holds between a state and a numerical value.

[0034] Three groups are provided with regard to the setting temperature X. When, for instance, a value of X is input, where $X < 19$, X is converted into a numerical value of 19, that is, a setting temperature of 19 degrees Celsius. When a value of X is input, where $19 \leq X \leq 40$, X is converted into a numerical value of X, that is, a setting temperature of X degrees Celsius. When a value of X is input, where $40 < X$, X is converted into a numerical value of 40, that is, a setting temperature of 40 degrees Celsius. Furthermore, three groups are provided with regard to the setting humidity Y. When, for instance, a value of Y is input, where $Y < 0$, Y is converted into a numerical value of 0, that is, a setting humidity of 0%. When a value of Y is input, where $0 \leq Y \leq 100$, Y is converted into a numerical value of Y, that is, a setting humidity of Y%. When a value of Y is input, where $100 < Y$, Y is converted into a numerical value of 100, that is, a setting humidity of 100%.

[0035] Regarding the operation mode, a cool mode is converted into a numerical value of 0. A heat mode is converted into a numerical value of 1. A dry mode is converted into a numerical value of 2. A fan mode is converted into a numerical value of 3. An auto mode is converted into a numerical value of 4. Regarding the volume of airflow, weak airflow is converted into a numerical value of 0. Medium airflow is converted into a numerical value of 1. Strong airflow is converted into a numerical value of 2.

[0036] Here, two numerical-value settings and two state settings are provided. However, the number of settings is not limited to the above number. In addition, parameters to be set are not limited to particular parameters. For instance, the direction of airflow may be set as a state setting. Categories other than the numerical-value-setting parameters and the state-setting parameters may be provided.

[0037] Fig. 7 illustrates the details of control performed by a system according to Embodiment 3 of the present disclosure. In Embodiment 3, a management application processing unit 210 of a management-side control device 102 performs the processing illustrated in the flowchart in Fig. 3. The management comprehensive processing unit 220 performs the parameter conversion processing in accordance with data received from an air-conditioning-operation processing unit 231 and transmits a command signal including converted data to the air-conditioning apparatus 1 via a management-side communica-

tion device 103. For instance, when receiving from the user an instruction to set the heat mode and a temperature of 25.0 degrees Celsius, the air-conditioning-operation processing unit 231 transmits data on the instruction to set the heat mode and a temperature of 25.0 degrees Celsius to the management comprehensive processing unit 220. The management comprehensive processing unit 220 then performs conversion processing according to the parameter conversion table 400 and obtains: "the numerical value setting 1: 25.0" and "the state setting 1: 1". A command signal including converted data is transmitted to the air-conditioning apparatus 1, which enables desired operations to be performed.

[0038] In the air-conditioning apparatus 1, according to the parameter conversion table 400 stored in the air-conditioning-side storage device 13, an air-conditioning-side control device 11 performs conversion processing on the data included in the command signal received from the air-conditioning management apparatus 100. The air-conditioning-side control device 11 then controls the air-conditioning apparatus 1 in accordance with conversion results.

[0039] The processing involving the operation that the air-conditioning management apparatus 100 transmits a signal to the air-conditioning apparatus 1 is described above. However, conversion processing based on the parameter conversion table 400 is not limited to the preceding processing. When performing monitoring processing based on a signal transmitted from the air-conditioning apparatus 1 to the air-conditioning management apparatus 100, the management comprehensive processing unit 220 of the management-side control device 102 and the air-conditioning-side control device 11 can perform conversion processing based on the parameter conversion table 400.

[0040] As described above, the air-conditioning management apparatus 100 in Embodiment 3 holds the parameter conversion table 400 as data. The management comprehensive processing unit 220 performs conversion processing based on the parameter conversion table 400 and transmits a command signal, for example. Thus, it is possible to transmit a command signal in a predetermined format. Settings can be performed according to the predetermined parameter conversion table 400, and the parameter conversion table 400 is scalable. Settings can be readily changed by changing the details of the parameter conversion table 400.

[0041] As described in Embodiment 2, if the management application processing unit 210 in the air-conditioning management apparatus 100 performs processing, conversion processing based on the parameter conversion table 400 is also applicable to a case in which an operation is performed on equipment other than the air-conditioning apparatus 1, such as a lighting apparatus 2. For instance, the management-side storage device 104 stores the parameter conversion table 400 for management-target equipment, and the management comprehensive processing unit 220 performs processing.

When managing more than one piece of equipment, regardless of the type of equipment, it is possible to transmit a command signal in the formats: "numerical-value setting: numerical value" and "state setting: numerical value". Thus, instruction details transmitted by command signal need not be changed to match items for each equipment.

[0042] Fig. 8 illustrates an example of the parameter conversion table 400 including additional parameters for the lighting apparatus 2 and a window 3 according to Embodiment 3 of the present disclosure. In the lighting apparatus 2, low illuminance is converted into a numerical value of 0. Medium illuminance is converted into a numerical value of 1. High illuminance is converted into a numerical value of 2. In the window 3, a closed state is converted into a numerical value of 0, and an open state is converted into a numerical value of 1. Thus, even if the same state-setting command is transmitted, a different parameter can be monitored and controlled depending on the equipment that has received the command.

[0043] For instance, when the user gives an instruction to set high illuminance for the lighting apparatus 2, a lighting-apparatus-operation processing unit 234 transmits data on the instruction to set high illuminance to the management comprehensive processing unit 220. The management comprehensive processing unit 220 converts the received data into "the state setting 1: 2" according to the parameter conversion table 400. A command signal including converted data is transmitted to the lighting apparatus 2, which enables a desired operation to be performed. Thus, even if the same state-setting command signal is transmitted, an operation based on a different parameter can be performed depending on the equipment that has received the command signal. That is, according to the predetermined parameter conversion table 400, the management comprehensive processing unit 220 converts received data into a similar state-setting parameter and a similar numerical-value-setting parameter regardless of the air-conditioning apparatus 1, the lighting apparatus 2, and the window 3. Each of the air-conditioning apparatus 1, the lighting apparatus 2, and the window 3 that has received a command signal performs a desired operation according to operation-setting information matching the command signal and prestored in each of the air-conditioning apparatus 1, the lighting apparatus 2, and the window 3.

[0044] It should be noted that the items of the parameter conversion table 400 are not limited to those illustrated in Figs. 6 and 8. For instance, in the air-conditioning apparatus 1, a state setting 3 related to the direction of airflow may be further set. In addition, a parameter conversion table may be set not only for operations but also for initial settings or state monitoring. By performing similar settings for a water heater, a television, or other apparatuses capable of performing communication, such as short-range wireless communication, it is possible to perform the operations, initial settings, and state moni-

toring of such apparatuses. If parameters for apparatuses are similar, state-setting parameters and numerical-value-setting parameters may be partially shared among the apparatuses. For instance, the water heater may use the setting temperature of the numerical value setting 1 of the air-conditioning apparatus 1. In addition, a dedicated mode for the water heater, such as "5 → heat-retention mode" may be added to the operation modes in the state setting 1.

Embodiment 4

[0045] Fig. 9 illustrates an example of the configuration of a system that centers on an air-conditioning management apparatus 100 according to Embodiment 4 of the present disclosure. The apparatuses and devices assigned the same reference symbols as those illustrated in Fig. 1 and other figures have configurations similar to those described in Embodiment 1 and perform operations similar to those described in Embodiment 1. As illustrated in Fig. 8, an air-conditioning apparatus 1 is equipped with a remote controller 15 capable of transmitting an air-conditioning instruction to the air-conditioning apparatus 1. In the air-conditioning apparatus 1 in Embodiment 4, the remote controller 15 includes the air-conditioning-side notification device 14 described in Embodiment 1. In this case, instead of the main body of the air-conditioning apparatus 1, the remote controller 15 as a peripheral device may provide the notification of receiving a signal from the air-conditioning management apparatus 100.

Reference Signs List

[0046] 1, 1A, 1B air-conditioning apparatus 2 lighting apparatus 3 window 11 air-conditioning-side control device 12 air-conditioning-side communication device 13 air-conditioning-side storage device 14 air-conditioning-side notification device 15 remote controller 21 lighting-apparatus-side control device 22 lighting-apparatus-side communication device 23 lighting-apparatus-side storage device 31 window-state monitoring device 32 window-side communication device 100 air-conditioning management apparatus 101 management-side display device 102 management-side control device, 103 management-side communication device 104 management-side storage device 105 management-side input device 210 management application processing unit 220 management comprehensive processing unit 230 management individual processing unit 231 air-conditioning-operation processing unit 232 air-conditioning-initial-settings processing unit 233 air-conditioning-state-monitoring processing unit 234 lighting-apparatus-operation processing unit 235 lighting-apparatus-initial-settings processing unit 236 lighting-apparatus-state-monitoring processing unit 237 window-state-monitoring processing unit 400 parameter conversion table

Claims

1. An air-conditioning management apparatus, comprising:

a management-side communication device that communicates with an air-conditioning apparatus for air-conditioning a target space and equipment other than the air-conditioning apparatus; a management-side input device that receives an instruction for the air-conditioning apparatus; a management-side display device that displays information based on a display signal; and a management-side control device that includes a management application processing unit, wherein the management application processing unit includes:

a management individual processing unit; and
a management comprehensive processing unit,
the management individual processing unit including:

an air-conditioning-operation processing unit that performs processing involving an operation for the air-conditioning apparatus;

an air-conditioning-initial-settings processing unit that performs processing involving an initial setting for the air-conditioning apparatus;

an air-conditioning-state-monitoring processing unit that performs processing involving state monitoring of the air-conditioning apparatus; and

a processing unit that performs processing involving at least one of state monitoring, an operation, and an initial setting for the equipment, and the management comprehensive processing unit performing comprehensive processing on data processed by the management individual processing unit.

2. An air-conditioning management apparatus, comprising:

a management-side communication device that communicates with an air-conditioning apparatus for air-conditioning a target space; a management-side input device that receives an instruction for the air-conditioning apparatus; a management-side display device that displays information based on a display signal; and a management-side control device that includes

a management application processing unit, wherein the management application processing unit includes:

a management individual processing unit; and
a management comprehensive processing unit,
the management individual processing unit including at least:

an air-conditioning-operation processing unit that performs processing involving an operation for the air-conditioning apparatus;

an air-conditioning-initial-settings processing unit that performs processing involving an initial setting for the air-conditioning apparatus; and

an air-conditioning-state-monitoring processing unit that performs processing involving state monitoring of the air-conditioning apparatus, and

the management comprehensive processing unit performing comprehensive processing on data processed by the management individual processing unit.

3. The air-conditioning management apparatus of claim 1 or 2, wherein the management comprehensive processing unit of the management application processing unit converts data processed by the management individual processing unit into a predetermined item and a numerical value for the item.

4. The air-conditioning management apparatus of claim 3, wherein each of a numerical-value-related item and a state-related item is set as the item.

5. The air-conditioning management apparatus of claim 3 or 4, wherein the management comprehensive processing unit performs processing according to a parameter conversion table storing a relationship between data on processing by the management individual processing unit and the item and a numerical value for the item.

6. The air-conditioning management apparatus of any one of claims 3 to 5, wherein the management-side communication device transmits a command signal to the air-conditioning apparatus, the command signal including the item and the numerical value for the item that are obtained by conversion processing.

7. The air-conditioning management apparatus of any one of claims 1 to 6,
wherein the management application processing unit performs processing by running a management application as a program, and
the management application is created using a software development kit for developing an application by using a predefined interface. 5
8. The air-conditioning management apparatus of any one of claims 1 to 7,
wherein the management-side communication device performs short-range wireless communication. 10
9. The air-conditioning management apparatus of any one of claims 1 to 8,
wherein the air-conditioning management apparatus is a portable information terminal that includes: 15
- the management-side communication device; 20
the management-side input device;
the management-side display device; and
the management-side control device.
10. An air-conditioning apparatus, comprising: 25
- an air-conditioning-side communication device that communicates with the air-conditioning management apparatus of any one of claims 1 to 9; 30
an air-conditioning-side notification device that provides a notification based on a notification signal; and
an air-conditioning-side control device that transmits the notification signal to the air-conditioning-side notification device when the air-conditioning-side communication device receives a signal from the air-conditioning management apparatus. 35
- 40
11. The air-conditioning apparatus of claim 10, further comprising
a remote controller that transmits an instruction about air-conditioning,
wherein the remote controller includes at least the air-conditioning-side notification device. 45
12. A program for implementing an apparatus management method, the program comprising: 50
- an air-conditioning-operation processing unit that performs processing involving an operation for an air-conditioning apparatus for air-conditioning a target space;
an air-conditioning-initial-settings processing unit that performs processing involving an initial setting for the air-conditioning apparatus; 55
an air-conditioning-state-monitoring processing

unit that performs processing involving state monitoring of the air-conditioning apparatus; and
a processing unit that performs processing involving at least one of state monitoring, an operation, and an initial setting for equipment other than the air-conditioning apparatus,
wherein the apparatus management method includes:

causing a selected processing unit to perform processing; and
processing, according to a predetermined procedure, data processed by the selected processing unit.

FIG. 1

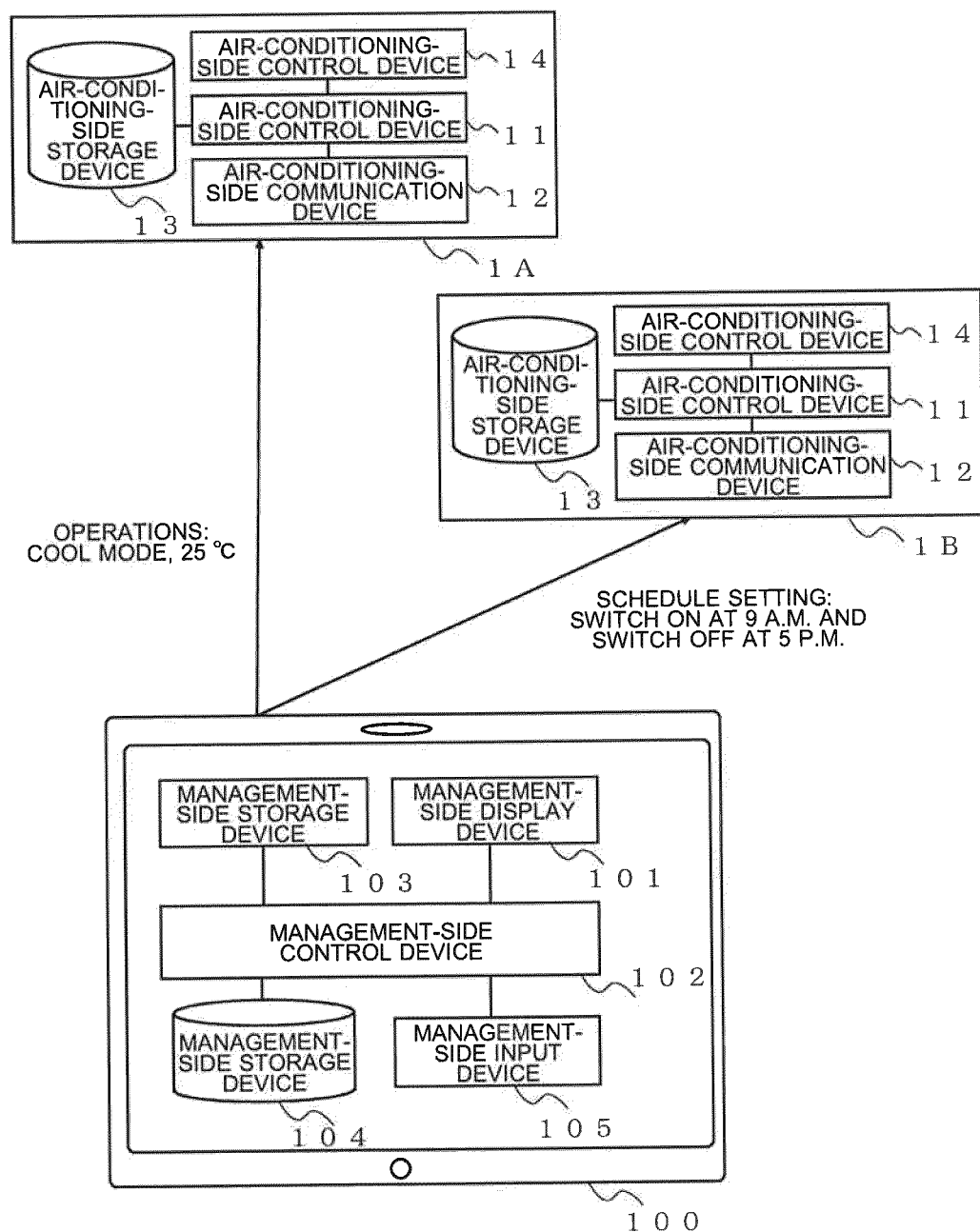


FIG. 2

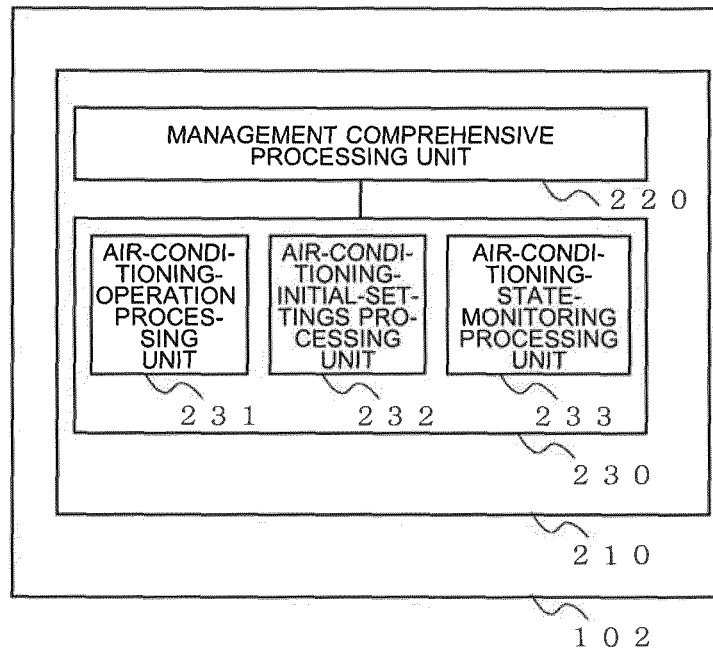


FIG. 3

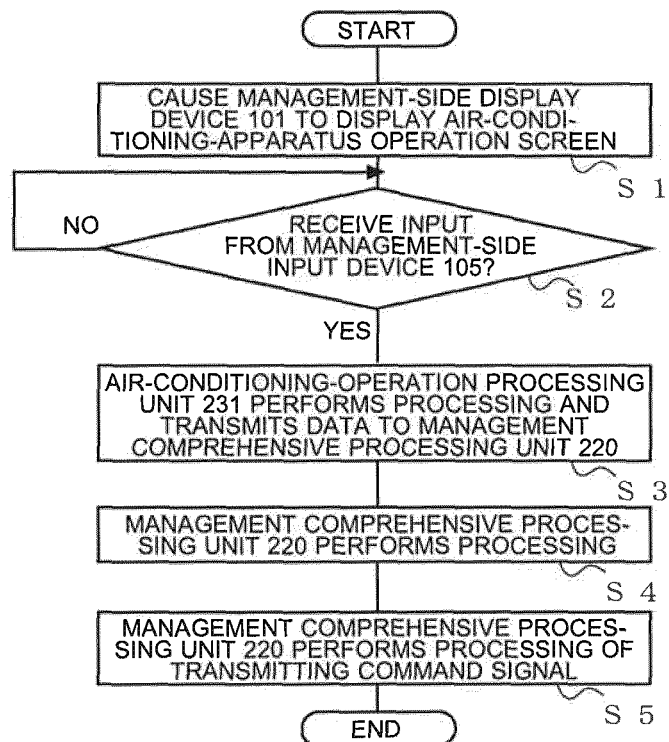


FIG. 4

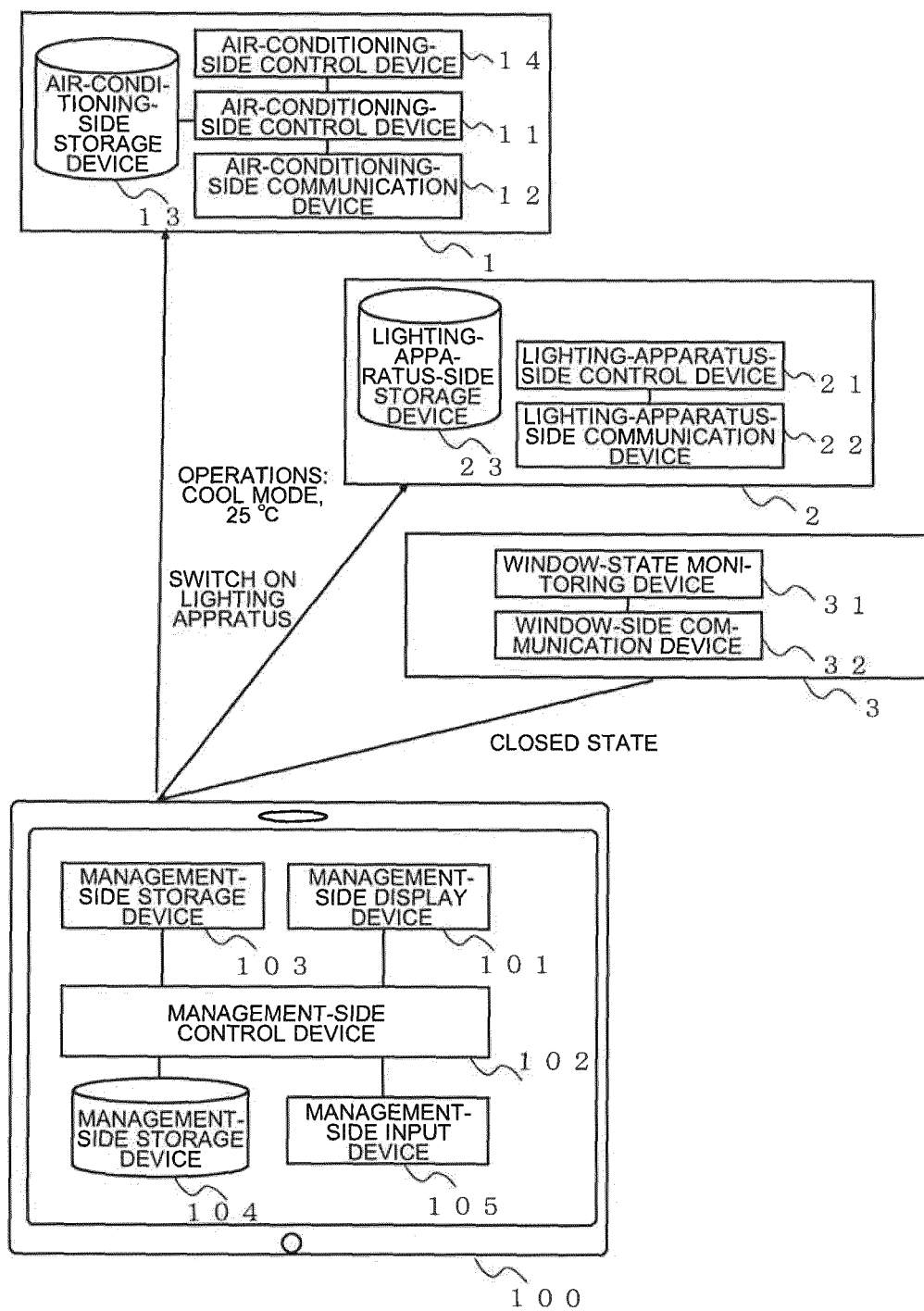


FIG. 5

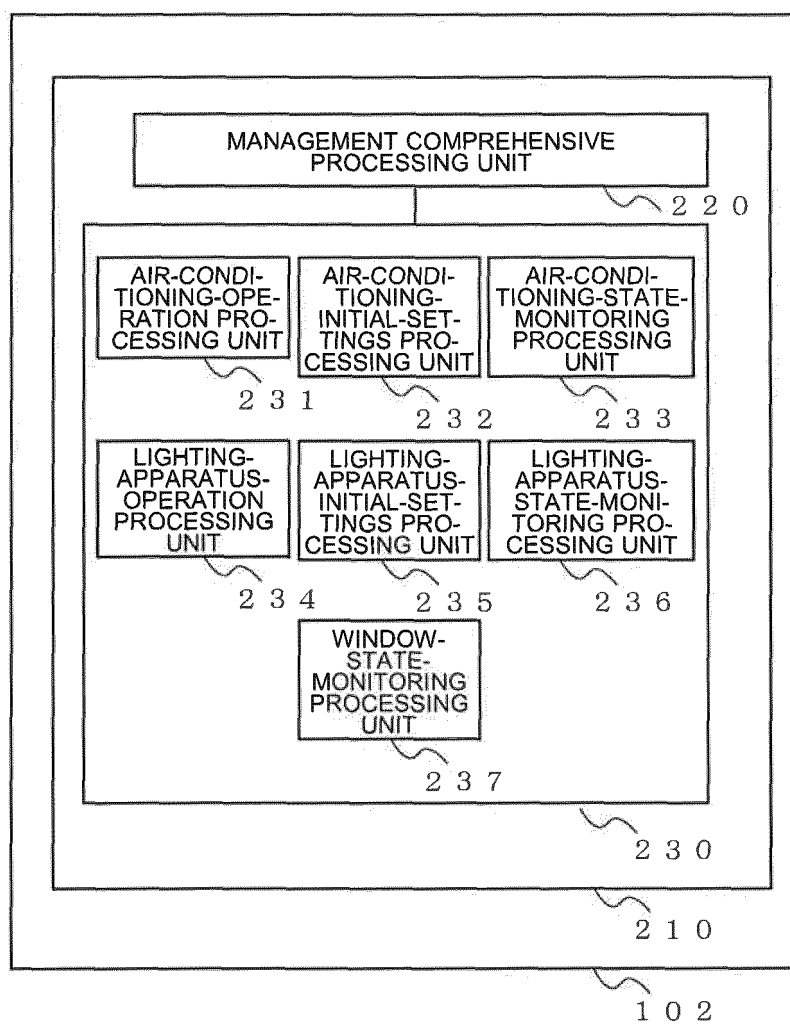


FIG. 6

NUMERICAL VALUE SETTING 1: SETTING TEMPERATURE	NUMERICAL VALUE SETTING 2: SETTING HUMIDITY
X < 19 → 19°C	Y < 0 → 0%
19 ≤ X ≤ 40 → X°C	0 ≤ Y ≤ 100 → Y%
40 < X → 40°C	100 < Y → 100%
STATE SETTING 1: OPERATION MODE	STATE SETTING 2: AIRFLOW VOLUME
COOL MODE → 0	WEAK → 0
HEAT MODE → 1	MEDIUM → 1
DRY MODE → 2	STRONG → 2
FAN MODE → 3	
AUTO MODE → 4	

4 0 0

FIG. 7

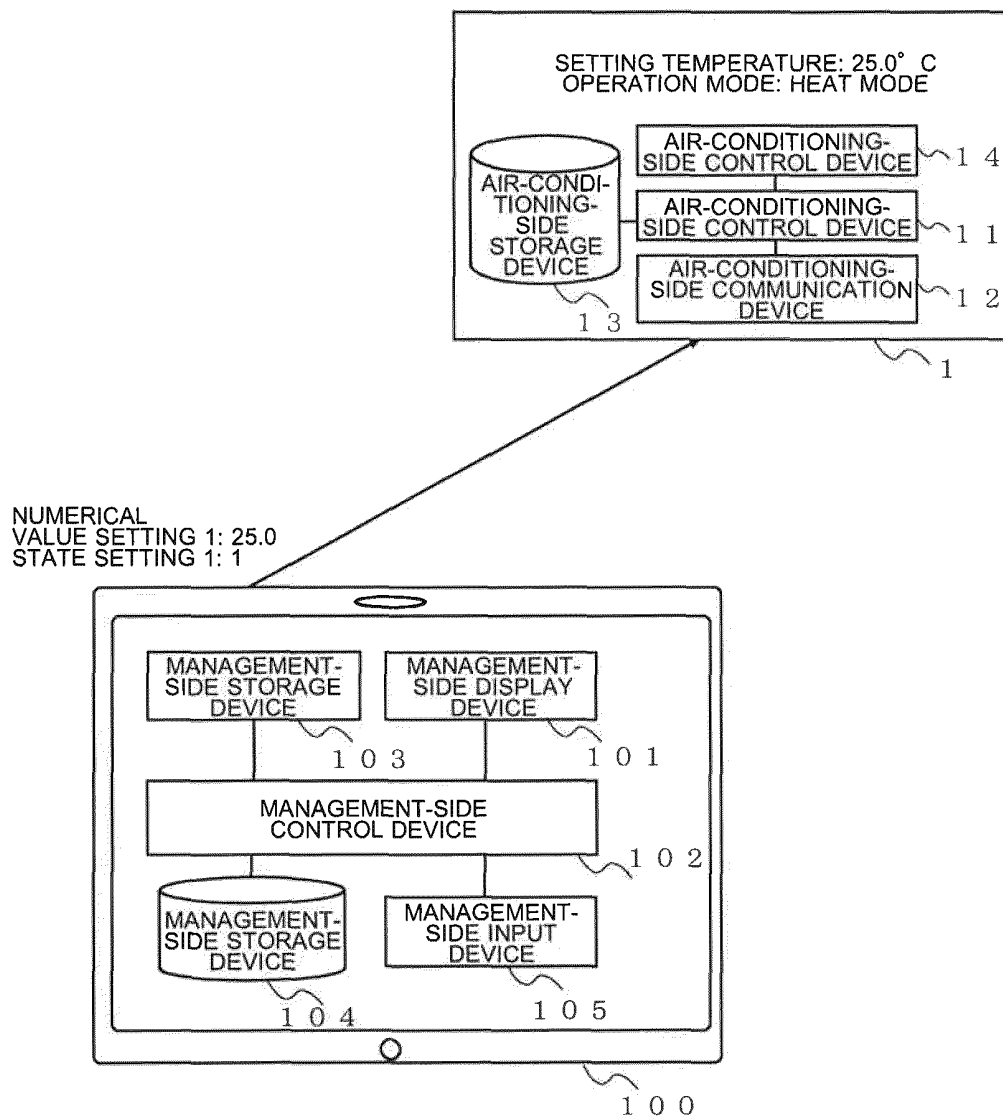
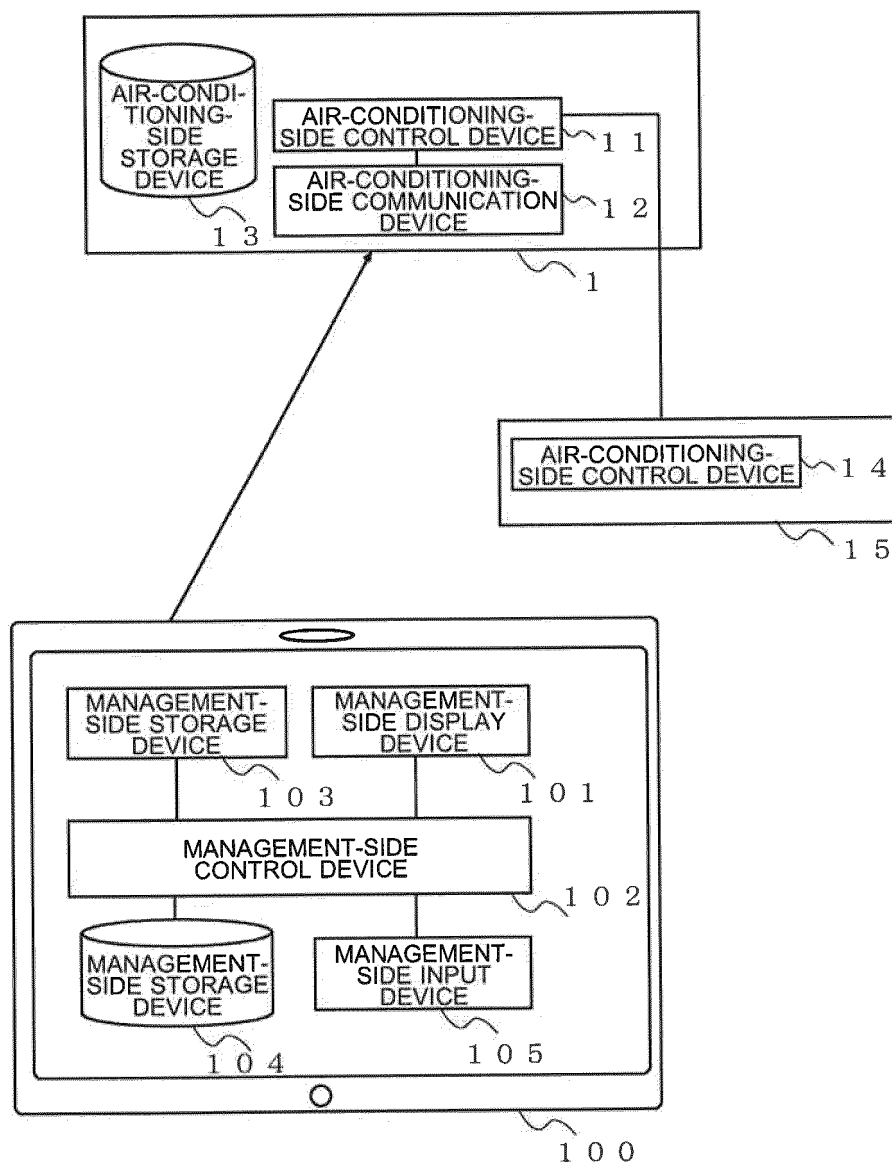


FIG. 8

AIR-CONDITIONING APPARATUS	
NUMERICAL VALUE SETTING 1: SETTING TEMPERATURE	NUMERICAL VALUE SETTING 2: SETTING HUMIDITY
$X < 19 \rightarrow 19^{\circ}\text{C}$	$Y < 0 \rightarrow 0\%$
$19 \leq X \leq 40 \rightarrow X^{\circ}\text{C}$	$0 \leq Y \leq 100 \rightarrow Y\%$
$40 < X \rightarrow 40^{\circ}\text{C}$	$100 < Y \rightarrow 100\%$
STATE SETTING 1: OPERATION MODE	STATE SETTING 2: AIRFLOW VOLUME
COOL MODE $\rightarrow 0$	WEAK $\rightarrow 0$
HEAT MODE $\rightarrow 1$	MEDIUM $\rightarrow 1$
DRY MODE $\rightarrow 2$	STRONG $\rightarrow 2$
FAN MODE $\rightarrow 3$	
AUTO MODE $\rightarrow 4$	
LIGHTING APPARATUS	WINDOW
STATE SETTING 1: ILLUMINANCE	STATE SETTING 1: OPEN/CLOSED
LOW $\rightarrow 0$	CLOSED $\rightarrow 0$
MEDIUM $\rightarrow 1$	OPEN $\rightarrow 1$
HIGH $\rightarrow 2$	

4 0 0

FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/036567

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. F24F11/56(2018.01)i, F24F11/52(2018.01)i, F24F11/64(2018.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. F24F11/56, F24F11/52, F24F11/64

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2018

Registered utility model specifications of Japan 1996-2018

Published registered utility model applications of Japan 1994-2018

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2015-105795 A (DAIKIN INDUSTRIES, LTD.) 08 June 2015, paragraphs [0029]-[0086], fig. 1-9 & US 2017/0038086 A1 & WO 2015/080012 A1 & EP 3076093 A1, paragraphs [0029]-[0086] & EP 3346674 A1 & CN 105765310 A & ES 2666821 T	1-12
Y	JP 2008-92320 A (TOKO ELECTRIC CORPORATION) 17 April 2008, paragraphs [0019]-[0027], fig. 1, 2 (Family: none)	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
13.12.2018Date of mailing of the international search report
25.12.2018Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/036567

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2018-115803 A (TOSHIBA CARRIER CORP.) 26 July 2018, paragraphs [0012]-[0018], fig. 1, 2 (Family: none)	10-11

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2017146065 A [0003]