Guidebook for WCCBO

The Frist World Championship in Cybernetic Building Optimization

(www.wccbo.org)

The Society of Heating, Air-Conditioning and Sanitary Engineers of Japan
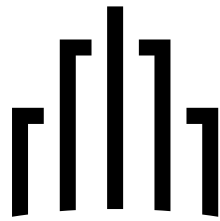
WCCBO

World Championship in Cybernetic Building Optimization

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1. Introduction

1.1 Purpose of hosting the championship

The energy consumed by buildings during operation is extremely high, and over half of carbon dioxide emitted by buildings in their lifetime occur during the operation stage. On the other hand, as buildings are man-made, comparison of the quality of operation of different buildings is difficult. Therefore, in this championship, , we will develop an extremely realistic building simulation model (hereinafter referred to as "emulator") and try to quantitatively evaluate the optimization skill of the participants competing for optimization of operation of the emulator. In other words, the purpose of this championship is to decide the No. 1 in building optimization skill. An emulator and a simple Building Automation System (BAS) are distributed to each championship participants. By operating the simple BAS, participants try adjusting the temperature setting value for each season, the operating schedule of the air conditioner, etc. to maintain the building cozy and energy efficient.
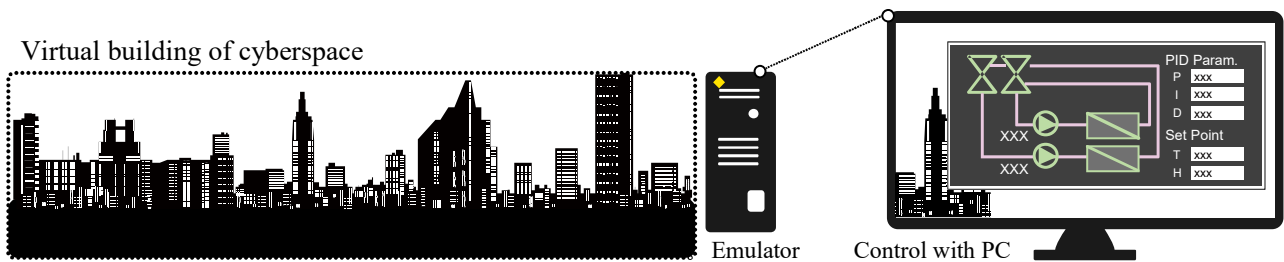
Figure 1.1 Structure of the "World Championship in Cybernetic Building Optimization"

1.2 Structure of this guidebook

To participate in this championship, the entire guidebook need not be read and understood. However, in chapter 2, 3, and 4, information on the implementation of this championship, distribution data, and basic rules are respectively described, which must be studied clearly.

In Chapter 5, actual optimization examples are described, and you can learn the optimization procedure by using the simple BAS. Details of the simple BAS function and operational method are described in Chapter 6.

Chapters 7 and 8 contain information on the challenging advanced optimization, and they need not be read. Chapter 7 describes the method to edit the initialization file to change the operating conditions of the emulator and the simple BAS. Chapter 8 contains reference information to be used when optimizing, by making your own BACnet communication program without using the simple BAS.

2.　Championship rules

2.1　Schedule

Figure 2.1 shows schedule of the championship. The championship is to be held on June 7, 2019. Interested participants need to complete entry by April 12 on the website (http://www.wccbo.org). A set of documents (guidebook, emulators, etc.) will be mailed to the participants in early May. Participants need to check whether the emulator is compatible with their private PC during the month until the opening day.
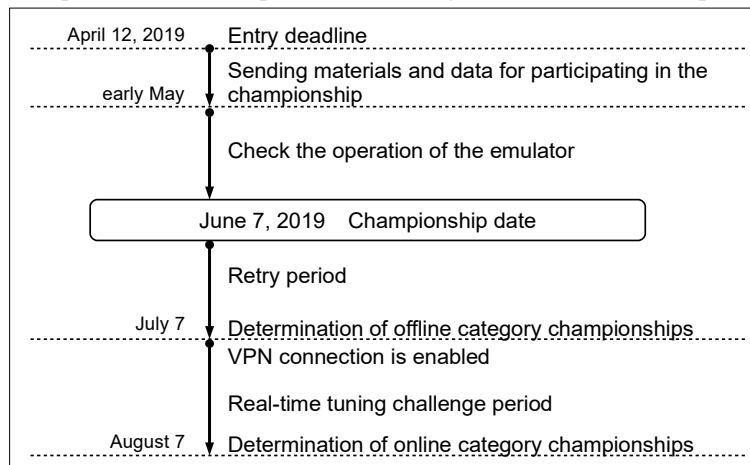
Figure 2.1 Suchedule of championship

On the date of the championship, the basic operation method of the emulator and control configurations will be explained according to the tutorial of this guidebook (Chapter 4). Thereafter, the participants can individually change controls and challenge optimization. The control data created by the participants is uploaded to the server immediately, and the server will execute the data, considering a day's data as a year's data, for which it is preset, following which, on June 8, the ranking of all participants will be published on the web.

The server is prepared for each participant, and you can re-upload and recalculate control data any number of times, for a month from the inauguration of championship. For a month, you can try improving your grades and rankings, from your home or office, at any time. Come 7th July, which will mark a month since the beginning of the championship, the participants with the highest grades will be referred to as "offline category championships".

In the above mentioned method, calculation is done at once after all control methods have been determined. On the other hand, in actual buildings, it is possible to perform real-time tuning while monitoring the momentarily changing outdoor air condition or indoor conditions. In order to challenge such next-generation optimization, this championship also offers one-month real-time tuning challenge period. The VPN connection to the server will be enabled from July 8th, so it will be possible to communicate with BACnet directly to the emulator on the server side. Because of this, you can try optimization with any control program. We are convinced that such online tuning will be an essential technology in the future, albeit participation in this challenge is purely

voluntary.

2.2　Optimization procedure

1) Offline category

Figure 2.2 shows optimization procedure of the offline category.
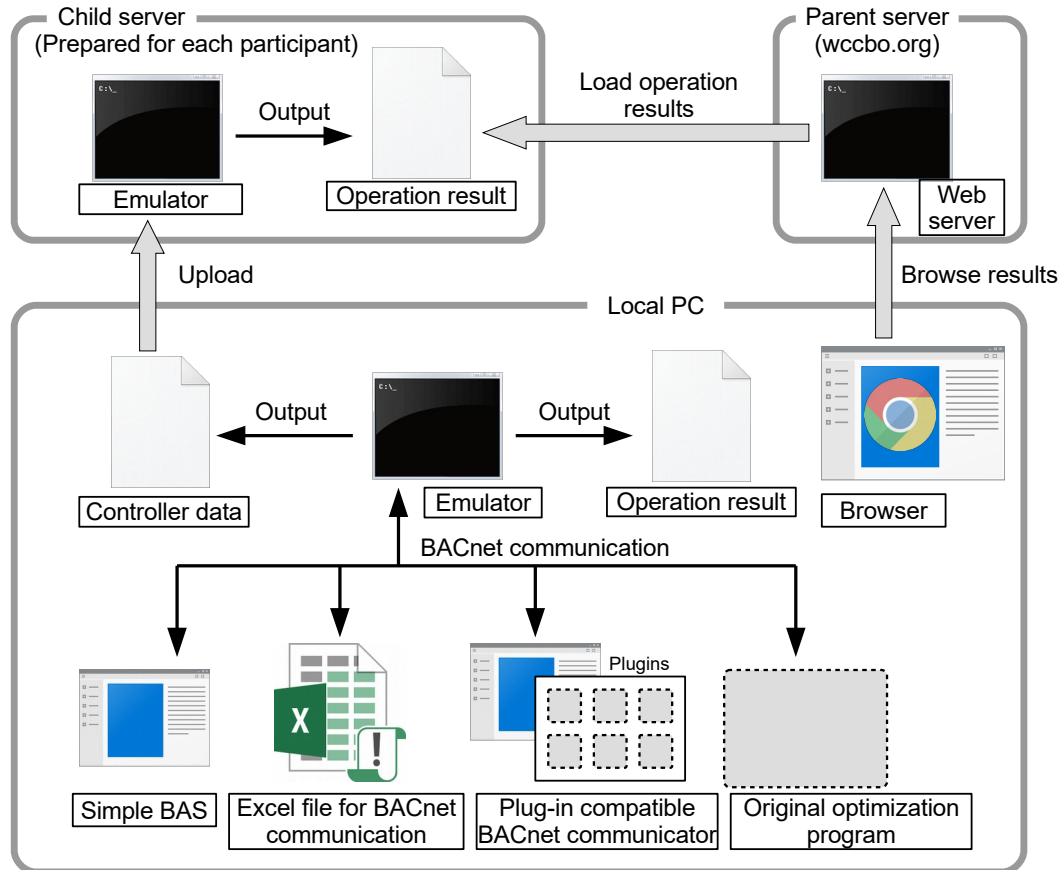
Figure 2.2 Optimization procedure (Offline category)

In this category, most of the work is done on the competitor's local PC. First, execute the emulator on the competitor's local PC. To change the operation, you need to communicate with this emulator via BACnet. Simple BAS and Excel file can be used as a user interface for this. Competitors can also develop their own original BACnet communication program. We also prepared plug-in type BACnet communication software to easily develop your optimization program.

When the emulator finishes calculation, it outputs operation results. If you are satisfied with the results, write out the emulator controller data. The controller data contains such as seasonal temperature set values or on/off schedules. Upload this controller data to the server provided for each participant. The emulator performs recalculation on the server side and outputs the operation results. The parent server aggregates these results and discloses the results on the web. You can check the results of all competitors with the browser. You can challenge as many times as you like during the championship and update the results.

2) Online category

Figure 2.3 shows optimization procedure of the online category.
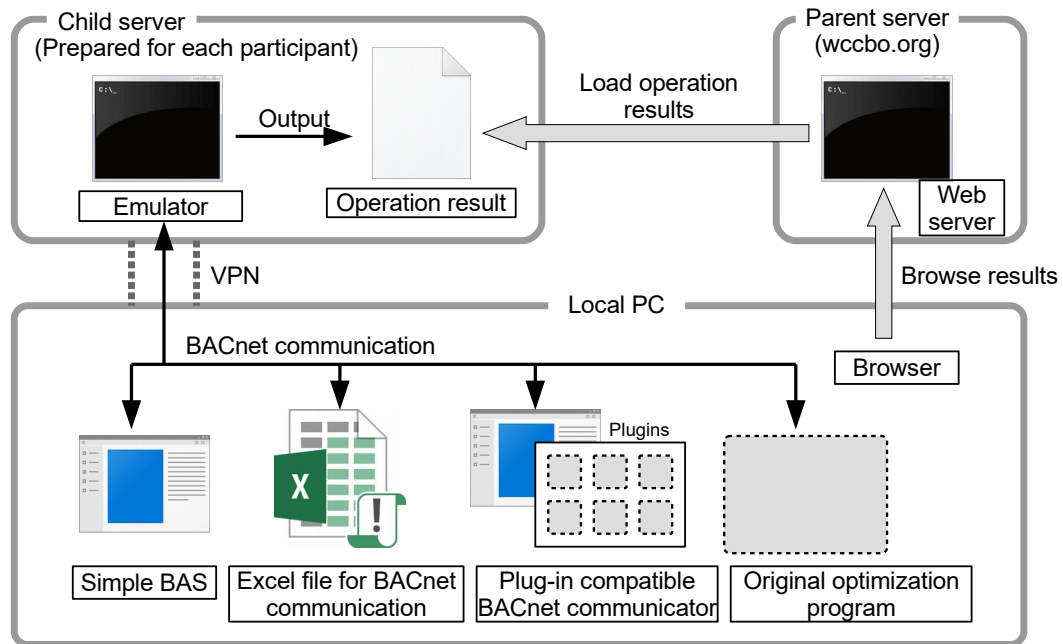
Figure 2.3 Optimization procedure (Online category)

    The difference from the offline catecory is that BACnet communication can be made directly to the emulator running on the server side, since VPN connection with the server is enabled. As a result, you no longer need to use the standard scheduler provided by the emulator, and you can control the emulator freely. For example, if using the standard scheduler, the temperature settings for each air conditioning zone can only be set independently for four periods. However, if you communicate directly with the server-side emulator via BACnet, you can receive information on the current date and time and indoor thermal environment, and continue to update the optimal temperature settings based on these information. It is also possible to control the blind slat angle or the amount of outside air intake by adjusting the lift of the OA damper. This emulator assumes a near future building, and it is possible to obtain information (location, thermal sensation, and dissatisfaction) of about 1,000 occupants inside building by BACnet. You may use machine learning to estimate the thermal preferences of individual occupant from these information, and change the temperature settings for each zone. In order to deal with uncertain behavior, it would be impossible to constantly monitor everything manually. It will be necessary to automatically monitor operations, learn about uncertain factors, and provide feedback by using the program.

2.3   Definition of "Optimization"

    To decide the championship, it is necessary to integrate indoor thermal environment and energy saving performance of the building into one index. This is an evaluation index that combines comfort and physical quantity, and we cannot make a definitive version that convinces everyone. In this championship, we will preliminarily evaluate it using Equation 2.1. This is called Effective Energy Reduction Rate (E2R2). E2R2 is the

product of Energy Reduction Rate (ERR) and Dissatisfied Occupant Reduction Rate (DRR). Figure 2.4 shows E2R2 contours depending on the combination of ERR and DRR. When both are negative, E2R2 is negative, and vice versa. However, E2R2 becomes 0 when the both signs are not the same. Therefore, in this championship, only when the energy performance and indoor thermal environment are improved, E2R2 will be a positive value and will be evaluated as "good operation".

ERR and DRR are calculated by Equation 2.2 and Equation 2.3. E and D are primary energy consumption [GJ] and dissatisfied occupant rate [-], respectively. The emulator simultaneously calculates buildings with changed control and buildings with standard control. The subscript R represents the buildings with standard control, and the subscript opt represents the buildings that were tried to be optimized by changing the control. By calculating the difference between the two for both energy reduction rate and dissatisfied occupant rate, the effect of control change is displayed in real time.

$$E2R2 = \text{sgn}(ERR) \times \max(0, ERR \times DRR) \tag{2.1}$$

$$ERR = \frac{E_R - E_{opt}}{E_R} \tag{2.2}$$

$$DRR = \frac{D_R - D_{opt}}{D_R} \tag{2.3}$$
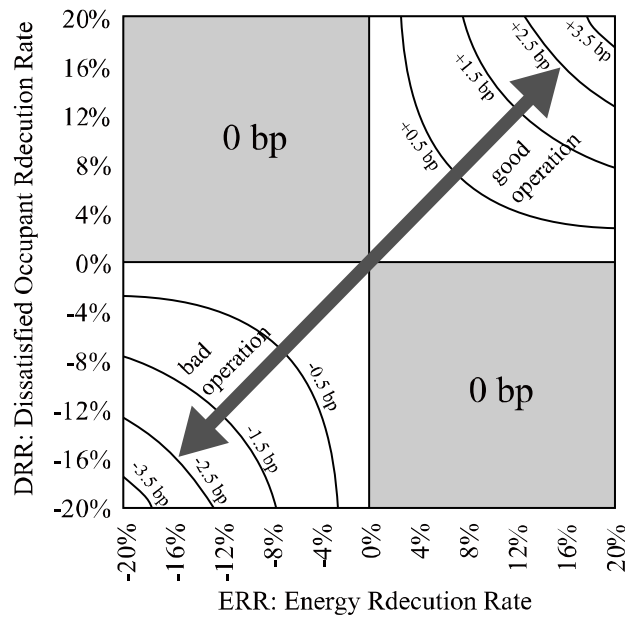
Figure 2.4 Relation between ERR, DRR, and E2R2

3. Provided data

In addition to this guide, the data necessary for participating in the championship will be provided to the participants via USB memory. Table 3.1 shows the directory list of the provided data.

Table 3.1 Directory list of the provided data

Directory	Contents
Emulator	Emulator and simple BAS software
Data_BEMS	A year's operation data of the emulator
SourceCode	Source code of emulator and related programs

3.1 Emulator directory

This directory stores the emulator and simple BAS software. There is no special installer and by just moving this directory to your computer desktop, installation is complete. Table 3.2 shows contents of the Emulator directory.

Table 3.2 Contents of Emulator directory

Directory / File	No.	Contents
Emulator		
└── backup		
├── buiding.bin	1	Emulator backup data for the past 5 days
└── controller.bin	2	Emulator controller backup data for the past 5 days
├── Communicators		Directory for storing the measured operation data
├── Data		Directory by year
│ ├── yyyy		Directory by month
│ │ └── m		Emulator backup data for the past 5 days
│ │ ├── d-1.csv	3	Data on the primary side system
│ │ ├── d-2.csv	4	Data on the secondary side system
│ │ ├── d-3.csv	5	Data on the absence information of the office workers
│ │ └── d-4.csv	6	Data on thermal comfort of the office workers
│ ├── Questionnaire		Results of questionnaires on thermal sensation to officers
│ │ ├── yyyymmddAM.csv	7	Results of questionnaires (AM)
│ │ └── yyyymmddPM.csv	8	Results of questionnaires (PM)
│ └── MakeHourlyData.exe	9	Program to convert 1 minute interval data to 1 hour data
├── ExcelInterface_Samples		Directory for storing sample settings of ExcelInterface
├── initFiles		Initialization directory
│ ├── FirstName_F.txt	10	Name of office workers (Female)
│ ├── FirstName_M.txt	11	Name of office workers (Male)
│ ├── LastName.txt	12	Family name of office workers
│ ├── SpecialCharacters.txt	13	Name of special characters
│ └── setting.ini	14	Initialization file
├── ExclusivePort.csv	15	Port list of BACnet communication
├── ExcelCommunicator.exe	16	Program for controlling the emulator from Microsoft Excel
├── ExcelInterface.xlsm	17	Excel sheet to controll emulator
├── Manual.pdf	18	PDF of this guidebook
├── RemoteCommunicator	19	Software to remotely execute user's original control program
├── Shizuku.exe	20	Emulator
├── ShizukuClient.exe	21	Simple BAS software
├── ShizukuUnity.exe	22	3D interface by Unity
└── ShizukuUnity_Data	23	Unity auxiliary file

The "backup" directory stores the past 5 days state of the emulator . "No.1: building.bin" is the data that saves the state of the emulator. Similarly, "No.2: controller.bin" is the data that saves the controller state of the emulator. If you move "building.bin" to the same directory as "Shizuku.exe" and restart the emulator, you can resume calculation from the saved data. Similarly, if you move "controller.bin" to the same directory as "Shizuku.exe", the emulator will be initialized with the saved controller data.

The past operation data of the emulator are saved in the "Data" directory. For example, indoor thermal environmental information (temperature, MRT, and humidity), heat source start / stop state, temperature of heat storage tank etc. Data that is not measured by current general Building Energy Management System (BEMS) such as human absence information or thermal sensation are also stored. Data are saved in different directories by year and month, as a different CSV file every day. A summary of what kind of data are included is shown in Appendix 4.

Although the data measurement interval is 1 min, 1-min interval data is inconvenient to analyze the long-term trend. If you use "No. 9: MakeHourlyData.exe", integration or averaging processing is performed based on the 1-min data, and 1-h data is created.

In the emulator, an office workers questionnaire will be held on the opening day. As shown in Appendix 3, there are about 1,000 workers in the building. "Tenant number" "sex" "age" "clo value" "thermal sensation value," and "satisfied or not" are recorded those present. The results of this questionnaire are saved in the "Questionnaire" directory.

The "initFiles" directory contains the files related to emulator initial settings. The specific setting method is explained in Chapter 7.

"No.15: ExclusivePort.csv" is a file to be edited when BACnet communication is remotely performed. You do not need to edit it if you want to adjust only the controls on the local computer. When remotely controlling the emulator running on the server, it is necessary to replace the file, which will be explained in Chapter 8.

"No.16: ExcelCommunicator.exe" and "No.17: ExcelInterface.xlsm" are programs for controlling the emulator using Excel. Their usage is explained in Chapter X.

"No.19: RemoteCommunicator.exe" is a plug-in remote BACnet communication program. Plug-ins are in the "Communicators" directory.

"No. 20: Shizuku.exe" and "No. 21: ShizukuClient.exe" are emulator and simple BAS, respectively, which can be started by double-click. Their usage is explained in Chapter 4 and Chapter 6.

3.2   Data_BEMS directory

This directory contains data for when you run the emulator for one year with standard control. This is the "Data" directory in Table 3.2. Appendix 6 is the result of analysis based on this data.

3.3   SourceCode directory

This directory contains all the source codes such as those of emulator, simple BAS, sample program for communication, and optimization with BACnet (explained in Chapter 8).

4. Tutorial

In this chapter, the procedures for using the emulator, simplified BAS, and changing the operation are explained. Because it is the main object to experience the use of software, the detailed explanation of each control will be skipped here. Please refer to Chapter 6 for details of simple BAS software.

4.1 Installation

If you move the "Emulator" directory saved in the recording media to desktop, installation is complete. However, .NET Framework must be installed in your PC.

4.2 Execution of the emulator software

Double-click "Shizuku.exe" to start the emulator. Depending on the version of Windows, a warning as shown in Figure 4.1 may be displayed. Please click on the detailed information and select "execute".
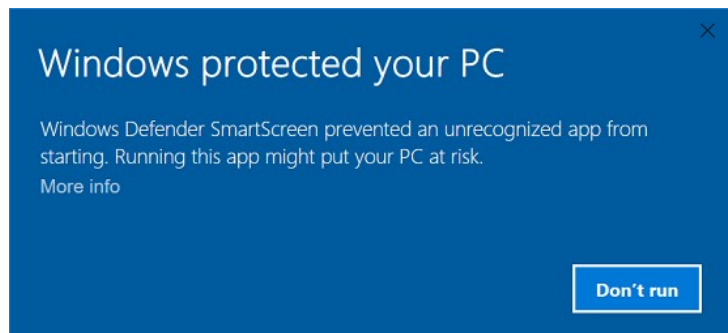
Figure 4.1 Warning indication at emulator startup

Figure 4.2 shows the execution window of the emulator. The emulator is a console application and does not have a graphical user interface. In the emulator, various processes such as calculation of heat load, equipment system, movement of office worker, BACnet communication, etc. are performed, but on the console screen, as shown in Fig. 4.2, only the date and time of the emulator are displayed.

In order to check the calculation status in the emulator and change the control value, it is necessary to communicate with the emulator using BACnet using simple BAS as described below. To exit the emulator, click "x" at the upper right corner of the window or press "Ctrl" + "C" in the keyboard.

Figure 4.2 Execution window of the emulator

The emulator outputs the operation data in CSV format in the "Data" directory (Figure 4.3). Although they are data with 1-min intervals in the standard setting, they can be changed by editing the initial setting file (see Chapter 7, Initial setting of emulator and simple BAS). Opening the operation data in a spreadsheet program is shown in Figure 4.4. Different data are arranged in columns, and data of 1-min interval are arranged in rows. Please refer to Appendix 4 for the list of output data.
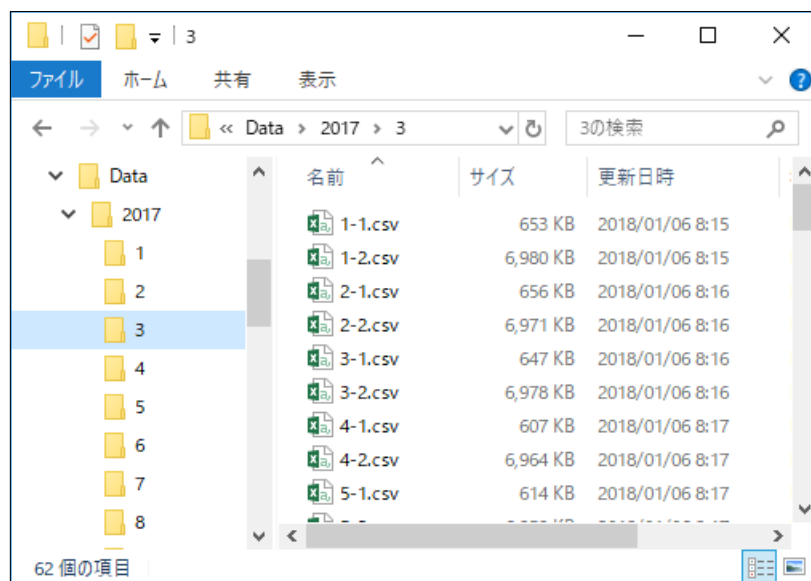
Figure 4.3 Operation data of CSV format outputted by the emulator

Figure 4.4 Example of operation data

4.3 Controlling emulator with simple BAS

4.3.1 Execution of simple BAS and viewing operating state

Double-click "ShizukuClient.exe" to start simple BAS. The simple BAS startup screen is shown in Figure 4.5. We have not yet connected to the emulator. Therefore, the system status is not displayed on the screen. Thus, click "Connect to emulator (Figure 4.6)" tool button on the upper left corner. Make sure the emulator (Shizuku.exe) is running too. When connection with the emulator succeeds, screen begins updating with information (Figure 4.7).
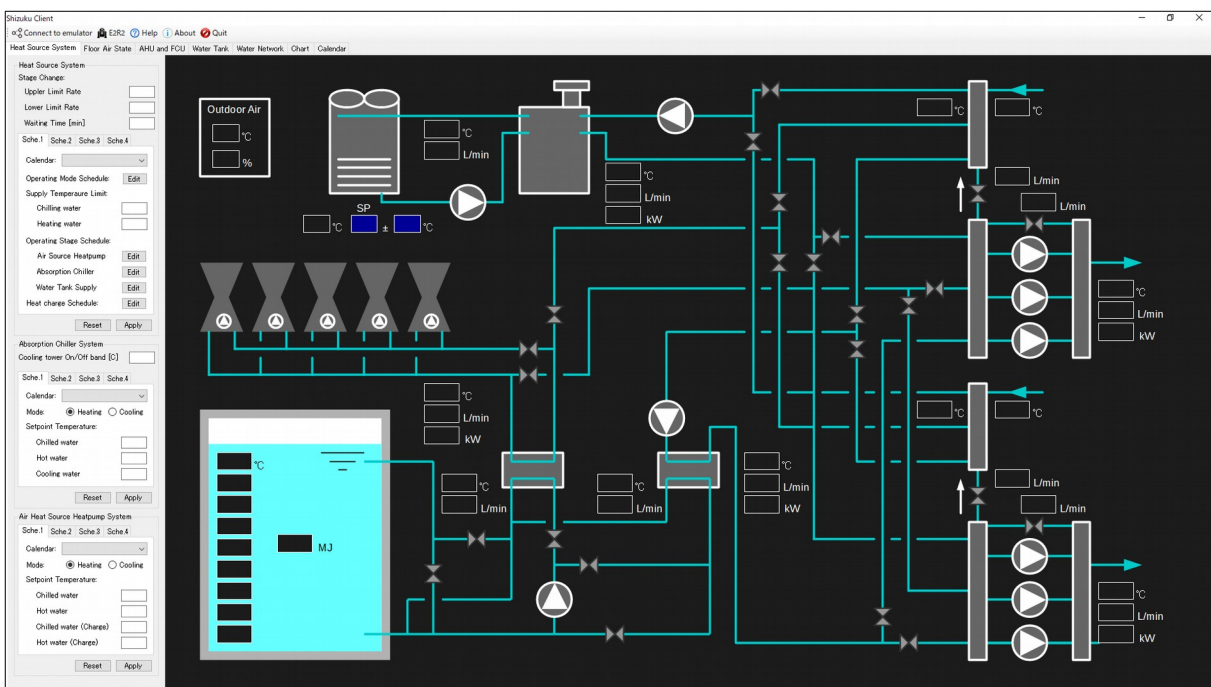
Figure 4.5 Startup screen of Simple BAS
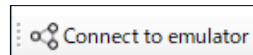
Figure 4.6 Connection button
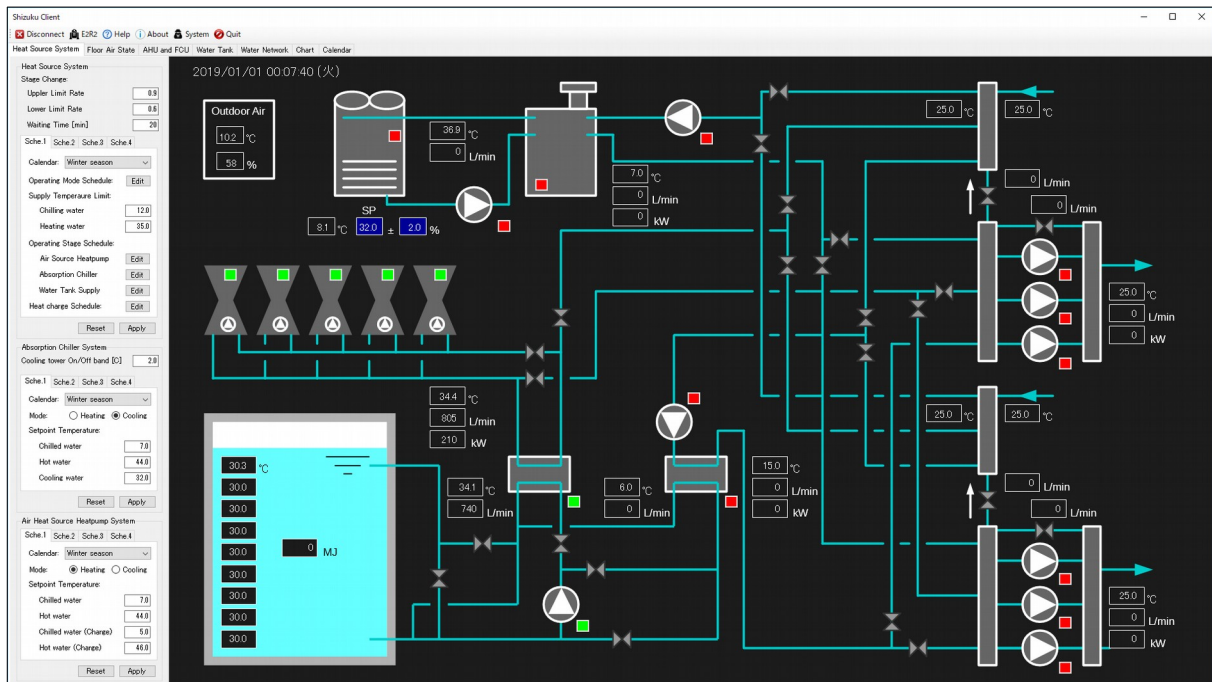
Figure 4.7 Screens after connecting to the emulator

Various information on the emulator are displayed on the simple BAS. Details of each control are explained in Chapter 6; thus, in this chapter some representative information will be given and some controls will be tried to change. After starting the simple BAS, the heat source system diagram is displayed as shown in Figure 4.7. The current date and time in the emulator are displayed on the upper left corner of the screen, and you can view the time progression (Figure 4.8). In the standard setting, the emulator starts from 0:00 on January 1, 2019, and the calculation speed is 60 times the real time. Therefore, if time has not passed since the start of the emulator, the conditions during New Year's morning should be displayed on the screen.

Figure 4.8 Current date and time in the emulator

The equipment in operation is colored green on the screen. As it is late-night in winter, you can see that the air heat source heat pump (AHP) is operating due to heat storage in the hot water storage tank (Fig. 4.9). In the tank, 9 thermometers are installed vertically, and hot water seeps from the top. The water temperature is 30 °C initially. In the example shown in Figure 4.9, the hot water in the tank exchanges heat with hot water of 34.4 °C,

supplied from the AHP and reaches 34.1 °C and returns to the water tank.
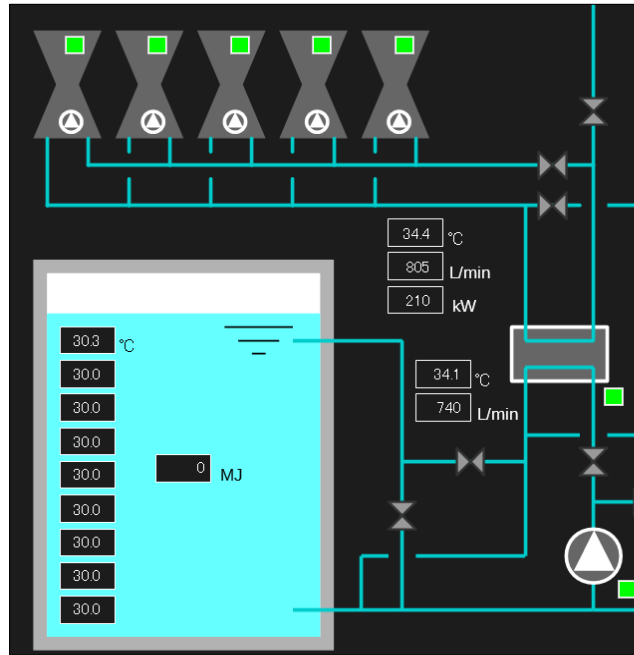
Figure 4.9 Operating state of equipment around the water tank

In the standard schedule, the heat source and air conditioner will begin the preheating operation at 8 o'clock in the morning. Let us advance time to the morning to confirm that the air conditioner starts up. You may wait, but you can also accelerate the speed of time in the emulator. Click "System" from the control button on the upper left, and the window shown in Figure 4.10 appears. This is a control to change the acceleration of the emulator, and now you can see that the acceleration rate is 60 times. When you change the track bar and click the "Apply" button, the acceleration of the emulator changes. If you check the time in the emulator shown in Figure 4.8, you can see that the progress of time has been advanced.

As time advances to 10 o'clock, the heat source system will be in the state as shown in Figure 4.11. Heat storage operation was performed, but because the temperature of water is still low, heat release from the water tank is still not performed. Instead, the AHP system is in operation. In the interior zone, there is demand for cooling throughout the year, so you can see that the absorption chiller system is performing the cooling operation.
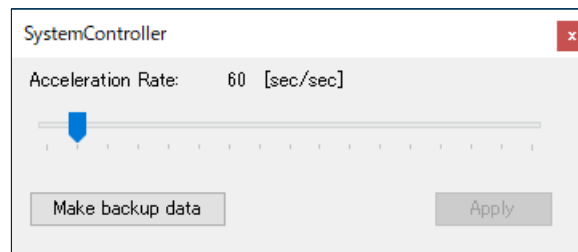
Figure 4.10 Controlling the acceleration of the emulator
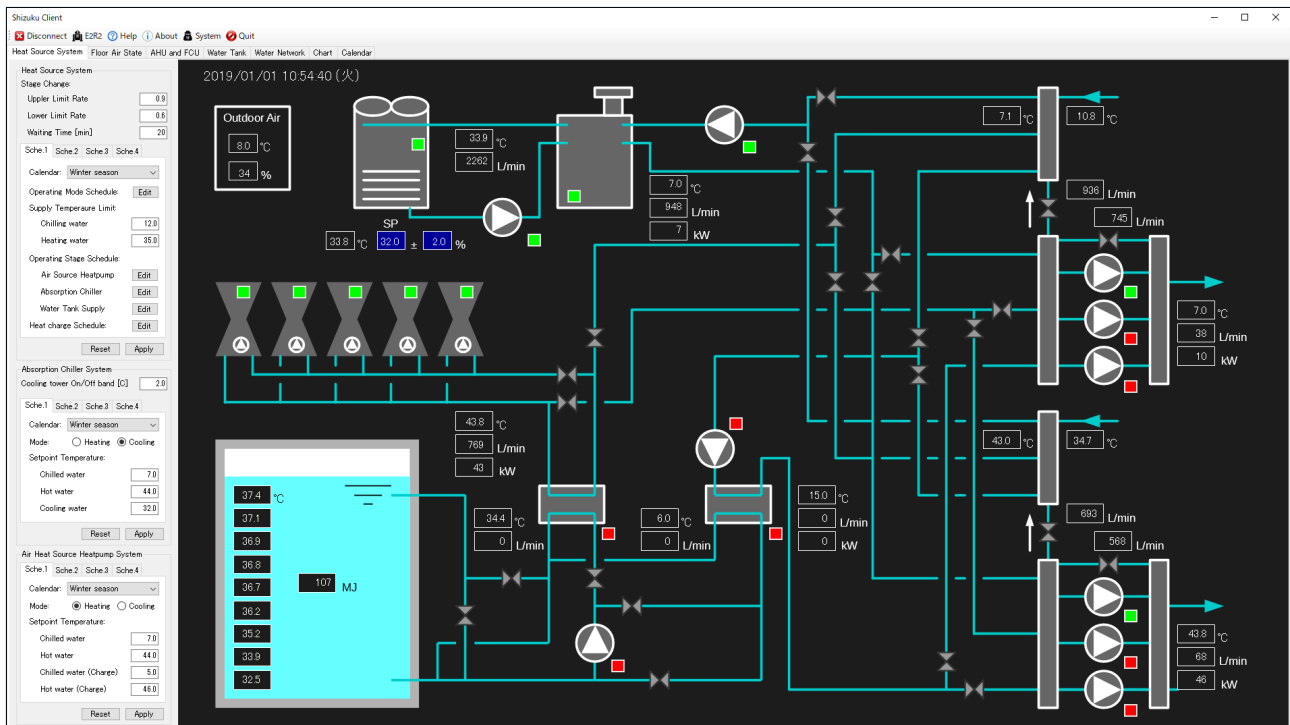
Figure 4.11 State of the heat source system during the day

The image shown in Figure 4.12 is displayed by clicking the "E2R2" button on the upper left control bar. ERR in the second line is the energy reduction rate, DRR in the third line is the dissatisfied reduction rate, and the number displayed in large letters at the top is E2R2 (see Chapter 2.3 for definitions). The purpose of this championship is to increase this value, but as we have not changed any control yet, "0" is displayed. In other words, the current evaluation is 0 points. In the following sections, some operational changes will be attempted to improve E2R2. Because an analysis result is present in Appendix 6, the operation will be tried to improve with reference to this.

Figure 4.12 Displaying E2R2

4.4 Change setpoint temperature of zones

Looking at Fig.21 in Appendic 6, it can be seen that the thermal sensation values for winter occupants are biased towards the cold side. First, let's check the current set point temperature. Figure 4.13 shows how to change the zone setpoint temperature. Click the "Floor Air State" tab and select 5th floor from the combo box to display the temperature and humidity status of each zone on the 5th floor. The temperature set value is displayed

next to the SP button for each zone, and all zones have a uniform temperature of 23 °C. When the SP button is clicked, a subwindow for changing the seasonal setpoint temperature is displayed as shown in Figure 4.13. There are four text boxes, because one year can be divided into four periods, each of which can have different temperature settings. By default, calendars named "Winter season", "Summer season", "Mid season" and "Whole year" are set for each of the four periods. We will explain how to define these calendars in Chapter 6, section 6.8. Change the setpoint temperature of Winter season from 23 to 23.5 and click Set buton to send the value to the emulator.
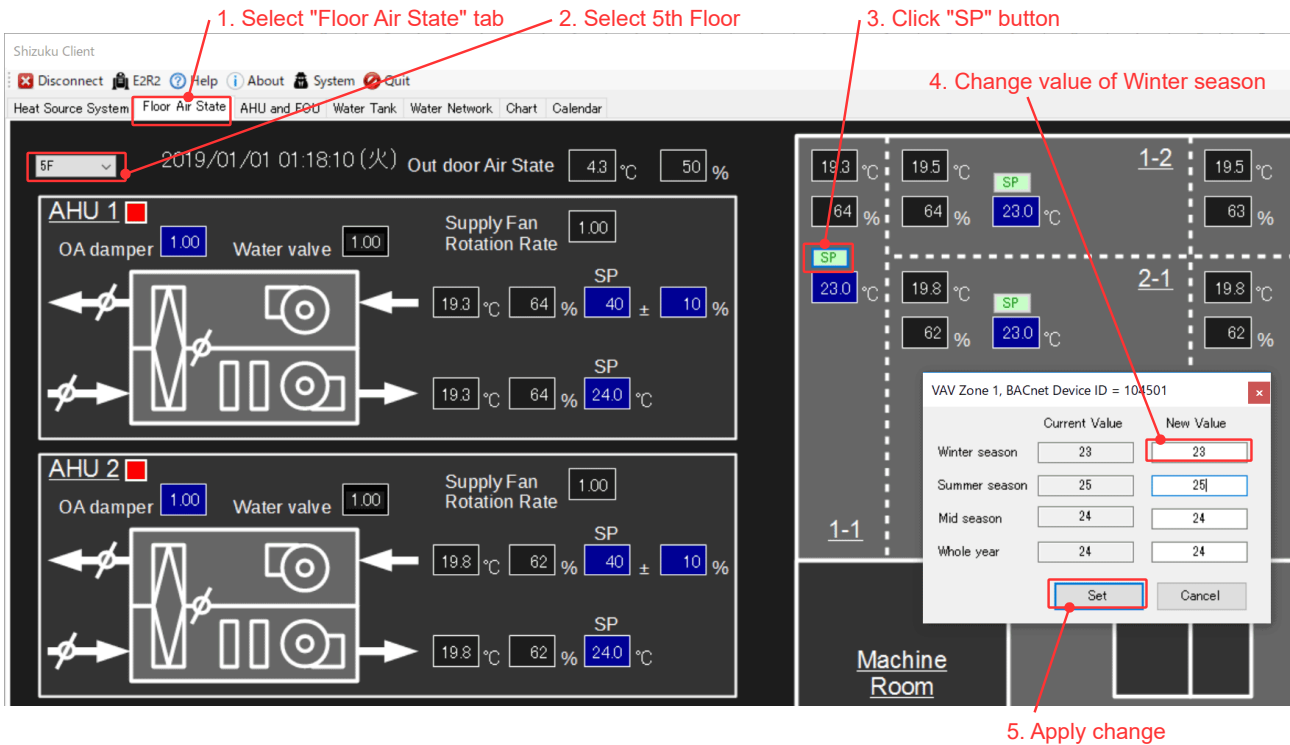
Figure 4.13 Procedure of changing zone setpoint temperature

We would like to change the setpoint temperature for all zones in the building, because the total number of zones is over 500, it is very cumbersome to repeat this task. Therefore, let's change the setpoint temperature at once by specifying BACnet Device ID using BACnet communication interface by Excel file. "ExcelInterface.xlsm" located in the same directory as the emulator is an Excel file for BACnet communication (details will be explained in Chapter 5). However, since this is a file that has not been set up yet, we will use the sample file that has already been set up. Move the sample file named "EI_ZoneTemperatureSetPoint.xlsm" in the "ExcelInterface_Sample" directory to the same directory as the emulator and then open it. Select the "PresentValueWriter" sheet as shown in Figure 4.14. Columns A to C are the information necessary to identify the BACnet Device in the emulator. In this sample file, the ID and instance number of BACnet Device, which manages temperature setting values of all zones in the building, are already entered. Column D is the setpoint temperature, which refers to the setpoint temperature for each period entered in the column L. So, change the

setpoint temperature for Winter (Season 1) listed in the column L from 23.0 °C to 23.5 °C. Finally, with clicking the "Send Write Property Request" button, the external program is started and the setting value are sent to the emulator via BACnet communication, as shown in Figure 4.15. After "Success" is displayed and it is confirmed that communication has been completed successfully, press any key to terminate the program.

Figure 4.14 Procedure of batch change of zone setpoint temperatures using Excel

Figure 4.15 Batch change results

Let's check the effect of changing the setpoint temperature. After a while, if you check E2R2, you should see something like Figure 4.16. The lowest line is the dissatisfied reduction rate (left: integrated value, right: current value). Dissatisfied occupants are reduced because green letters means positive values. However, the middle ERR (energy reduction rate) is a red letter which means a negative value. In other words, by increasing the setpoint temperature in winter, the energy consumed by the HVAC system has increased. For this reason, the

evaluation index E2R2 falls 0 points. If annual calculation is done by this operation change, ERR will be -1.9% and DRR will be 3.7%. In other words, a 1.9% increase in energy eliminated 3.7% of dissatisfaction. We have to reduce the energy in some way, because in this championship, we can not score unless the reduction of energy and the improvement of comfort are compatible.

Figure 4.16 Effect of setpoint temperature change

4.5 Change of operation time of heat sources and air handling units

According to Fig.22 in Appendix 6, the thermal sensation values are stable from afternoon to evening when compared in the morning. It can be expected that this is because the temperature of the building structure approaches room temperature and the radiation temperature stabilizes when sufficient time has passed since the air conditioning started. Also, according to Fig.17, it is clear that most of the occupants have returned home because the CO_2 level become close to the outside air at around 20:00 in any tenant. The heat source and the air handling units are operating every day until 22:00, but even if this time is shortened, the change in the thermal environment is small, and since there are almost no occupants at that time, it can be expected that there will be no impact on dissatisfaction rate.

Changing the operating time is more complicated than changing the setpoint temperature, so we use Excel file from the beginning this time. Move the sample file named "EI_Shutoff_2000.xlsm" in the "ExcelInterface_Sample" directory to the same directory as the emulator and then open it. It is necessary to change the shutoff time of the heat source, secondary pump, air handling unit and fan coil unit to 20:00. These settings can be changed in the "HeatSource_Schedule", "SecondaryPump_Schedule", "AHU_Schedule" and "FCU_Schedule" sheets respectively. This sample file has already been set to stop operation at 20:00. The details of this procedure will be explained in Chapter 5. Figure 4.17 shows the HeatSource_Schedule sheet. The operation mode from 7:00 to 20:00 is Heating, and the operation mode after 20:00 is set to Shutoff. By clicking the button at the top of each sheet, a command to change the operating time will be sent to the emulator.

The results after several days are shown in Figure 4.18. As a result of reducing energy consumption for two hours in the evening, the ERR has turned positive, though slightly. E2R2 also has changed to a positive value, as it reduces energy and improves comfort. Combined with the changes in the setpoint temperature discussed in the previous section, the annual ERR is 0.4%, the DRR is 4.3%, and the E2R2 is approximately 1.9 bps.

Figure 4.17 Change of operation time of heat sources

Figure 4.18 Result of changing the setpoint emperature and operation time

4.6 Export and upload of "controller file"

Because some operational change plans have been arrived at, based on the evaluations till previous section, let us now calculate the grade by uploading this control strategy to the server. To do this, the current control strategy needs to be exported to a file. Click "System" in the upper left corner of control bar to display the window for saving (Figure 4.19), and click "Make backup data". A message of save processing is displayed on the console screen of the emulator (FIgure 4.20), and a file named "controller.bin" is generated in the "Shizuku / Backup" directory. The control file (controller.bin) is automatically saved at 0:00 every day without performing the above processing, and the data of the past 5 days is also saved.
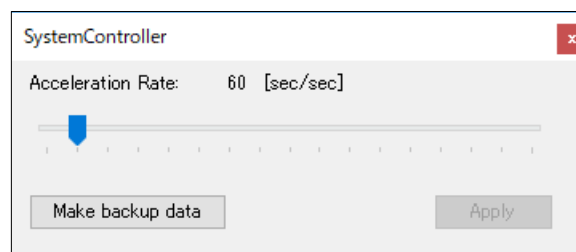
Figure 4.19 System controller window
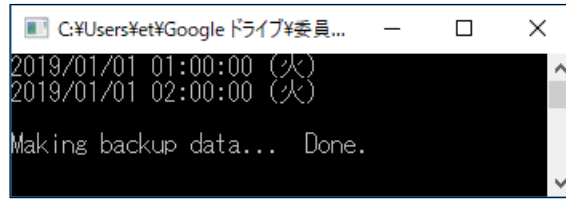
Figure 4.20 Saving process in console window

Figure 4.21 Managing emulator server with browser

Upload the control data (controller.bin) to the server. In this championship, a server is assigned for each participant, and you can easily access your server from a web browser (Figure 4.21). The address of the server is "http://xxx.xxx.xxx.xxx/~shizuku". "xxx.xxx.xxx.xxx" is the IP address assigned to each participant which will be notified at the start of the championship.

First process is uploading of control data. When uploading "controller.bin" which was exported above, calculation starts on the server side. A password is required for uploading, and this password will be distributed at the beginning of the championship. The calculation on the server is completed in about one day in real time. Because the current date and time of the emulator is displayed, you can check the progress of calculation. Additionally, even if you are in the middle of simulation, if you upload a new control file (controller.bin), calculation will be interrupted and a new calculation will be started. In this case, the calculation results that were obtained halfway will be discarded.

The second process is the generation of a graph for checking the calculation result. Select the desired date to check the calculation result from the calendar and select the desired operation data to display, and the trend of the 24-h value will be graphed.

The third area is a list of results of calculation in the past. The date and time of calculation, ERR, DRR, and E2R2 are displayed and you can download the control file (conroller.bin). The best results on this list will be posted in the score rankings. The score-based ranking is displayed on the top page of the WCCBO web site (http://www.wccbo.org), and you can always check your current ranking.

The fourth process is downloading the file necessary for remote control for real time tuning, whose details are explained in Chapter 8 (Remote control sample using BACnet).

4.7　Remote operation of the emulator

Currently, a central monitoring room has been planned for large-scale construction. A janitor residing in this room monitors the day-to-day operating state using a local computer in the monitoring room. However, as already started in some package systems and advanced cases, there is a high possibility that the collection of operating information and optimization will be performed remotely using internet lines in the future. There are several ways to communicate with the network of remote buildings using BACnet. In this section, a method using Virtual Private Network (VPN) is shown, which has many cases in particular.

In this championship, we set up an emulator on a Virtual Private Server (VPS) and run the emulator on this server. Because BACnet supports IP communication, it can communicate with other BACnet devices using IP address and port number. However, normally, a firewall is provided between subnetworks, and ports used for BACnet communication (generally 47808) are blocked, so it is impossible to communicate directly with the

remote BACnet Device across the local network. Therefore, connect the server and local PC on which simple BAS are running, with VPN. Specifically, run the VPN server on the server and connect using the VPN client on the local PC. This enables the local PC to run on the server's local network. Figure 4.22 shows the concept of VPN remote emulator operation.
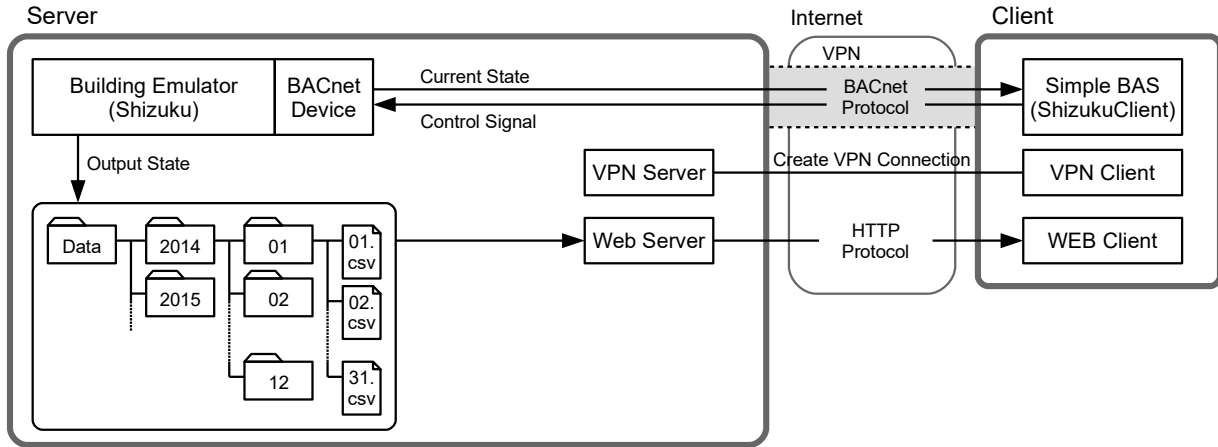
Figure 4.22 The concept of VPN remote emulator operation

The detailed procedure is discussed below. A VPN client is installed by default in Windows 10, and by using it, a VPN connection can be established without installing new software. First, select "VPN" from "Network and Internet settings" (Figure 4.23). By clicking the "Set up a new connection or network" button in the center, the setting window shown in Figure 4.24 appears. "Connection name" is a name for managing this VPN connection setting. Set the IP address of the server provided for each championship participant to "Server name or address". For "VPN type", select "L2TP / IPsec with pre-shared key". Select "User name and password" for "Type of sign-in info". When you set the information as shown in Figure 4.24 and click Save button, a new VPN connection is registered as shown in Figure 4.25. By clicking the "Connect" button you will be prompted for a user name and password as shown in Figure 4.26. Enter "emulator_user" as the user name and "emulator_pass" as the password and press OK, and the VPN connection will be established.

If you enter "ipconfig" in the command prompt, the IP address of the local PC is displayed and you can confirm that it is treated as one of the local networks on the VPN server side.
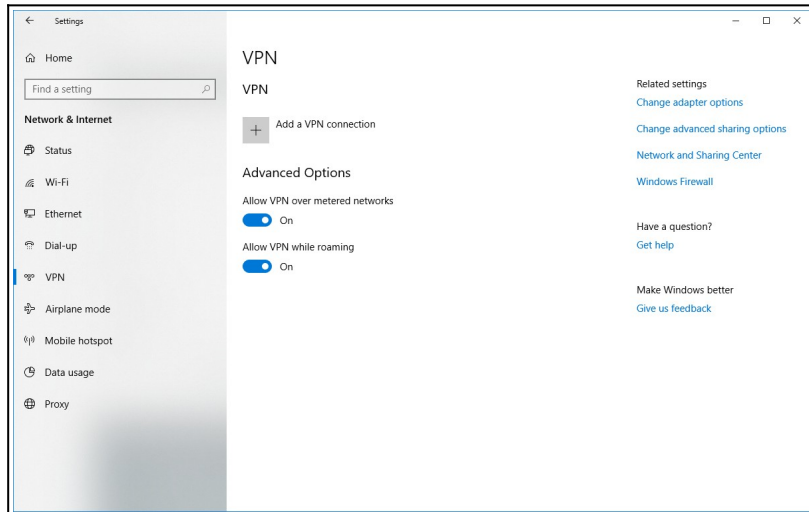
Figure 4.23 Network setting (VPN)
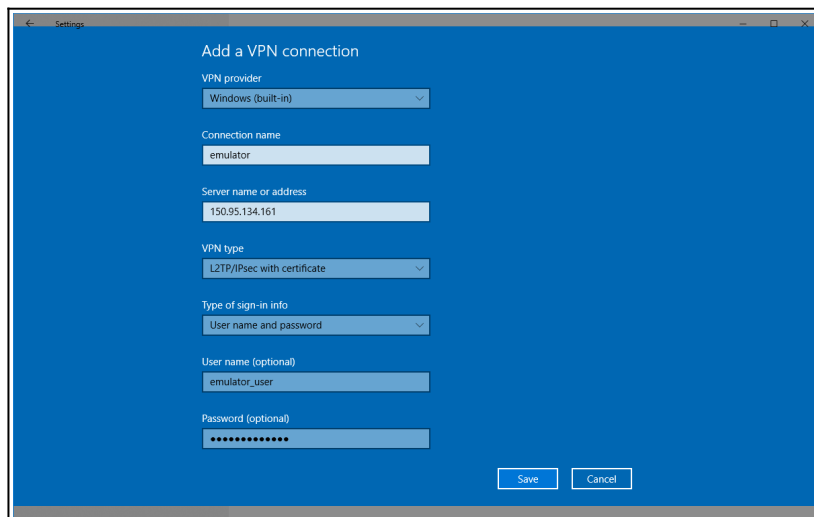
Figure 4.24 Settings for VPN connection
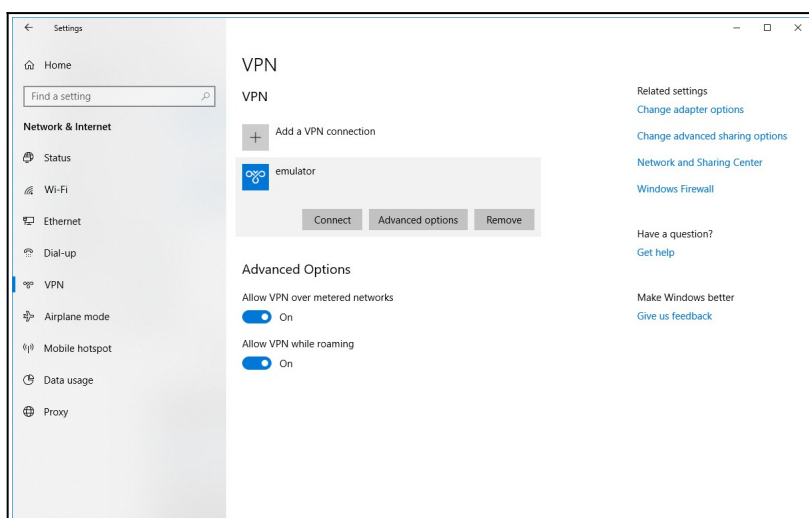
Figure 4.25 Adding VPN connection
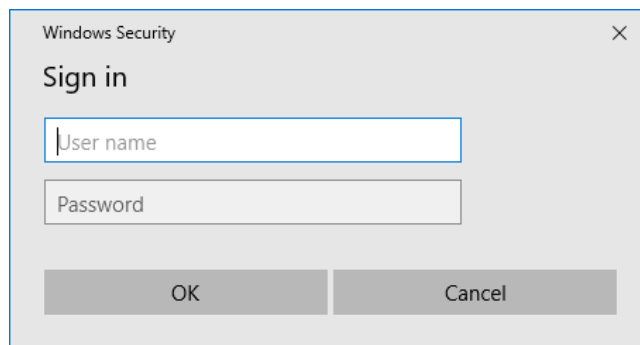
Figure 4.26 User name and password

When communicating with the BACnet device, it is necessary to identify the BACnet device. If each BACnet device has a different IP address, it can be specified based on the difference in IP address, but you require multiple BACnet devices coexisting on the same IP address. A typical example of this system is to run multiple BACnet devices on a single emulator. In such a case, you can identify the device by allocating a different port number for each BACnet Device. Therefore, to communicate with the BACnet device in the emulator, it is necessary to know which port number the emulator allocated to each BACnet device. When the emulator is executed, it writes the correspondence table between BACnet device and port number in "ExclusivePort.csv". When both emulator and the simple BAS are run on the local PC, the simple BAS automatically reads this file and there is no problem. However, in order to operate the emulator on the server side, "ExclusivePort.csv" must be downloaded from the server. Enter "http:// (server's IP address) /~shizuku/ExclusivePort.csv" in the URL bar of the browser and download the CSV file to the same directory as the simple BAS of the local PC.

After the above said tasks are accomplished, start simple BAS (ShizukuClient.exe). The subsequent operations are the same as the methods described in Chapter 4 and Chapter 6. The only difference is the emulator operating either locally or on the server side, and Simple BAS does not recognize the difference.

A dummy server will be established for testing remote emulator connection. The setting is as follows.

IP Address	: 150.95.134.161	Preshared key	: emulator
User name	: shizuku_user	Password	: shizuku_pass

Since the online competition lasts for a month, it is not practical to operate manually at all times. In order to get points in the online category, you will need to create a program and have a mechanism to automatically control with BACnet communication. You may develop a BACnet communication program from scratch, but we also provide a plug-in BACnet communication program to facilitate program development. The details of this will be explained in Chapter 8.

5. ExcelInterface operation manual

5.1 Structure of software

"ExcelInterface.xlsm" is an interface for performing BACnet communication with an emulator (Shizuku.exe) using Microsoft Excel. Since Excel itself does not have BACnet communication function, BACnet communication is realized by linking external programs and VBA by the structure shown in Figure 5.1. When using ExcelInterface, it is necessary to place "ExclusivePort.csv" and "ExcelCommunicator.exe" that the emulator output in the same directory as "ExcelInterface.xlsm". Also, of course, the emulator needs to be executed. Please do not forget to enable Excel macros.
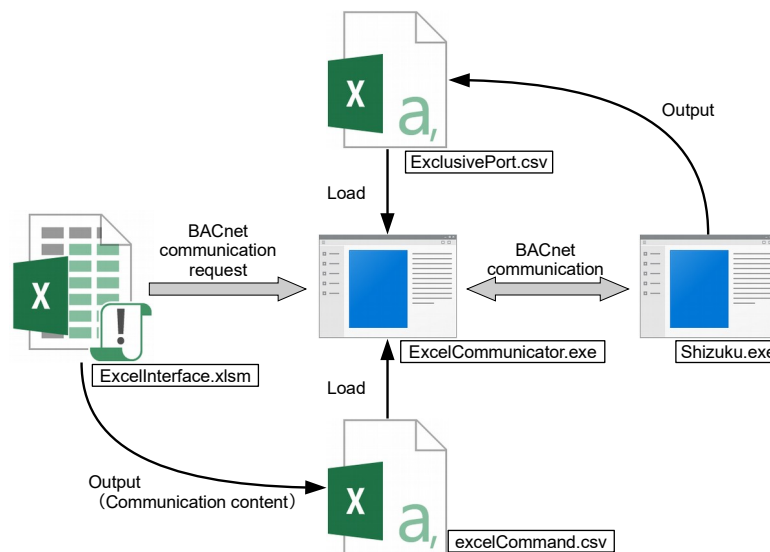
Figure 5.1 Structure of BACnet communication with ExcelInterface

ExcelInterface has separate sheets for each operation target. The following shows the function of each sheet.

1) Calendar sheet

Get calendar name list, set calendar name, and set date corresponding to calendar.

2) AHU_Schedule sheet

Set the seasonal operation mode (heating, cooling, ventilation, and shutoff) and air setpoint supply temperature of each air handling unit.

3) FCU_Schedule sheet

Set the seasonal operation mode (heating, cooling, blowing, and shutoff) of each fan coil unit.

4) HeatSource_Schedule sheet

Set the seasonal operation mode (heating, cooling, heating and cooling, and shutoff), the operation order of the heat source machine, and the heat storage time of water tank.

5) SecondaryPump_Schedule sheet

Set the onf/off time of the secondary pump system according to the season.

6) PresentValueWriter sheet

Identify BACnetDevice and write the current value of the instance.

7) DeviceList sheet

List of BACnetDevices in the emulator. This is information for using the PresentValueWriter sheet.

5.2　Setting calendar (Calendar sheet)

The function of the Calendar sheet is shown in Figure 5.2. In order to set a schedule, you first need to define a calendar. This means, for example, defining June to September as "Summer season" or December to March as "Winter season". By default, "Winter season (December to March)" "Summer season (June to September)" "Mid season (April, May, October, November)" and "Whole year" are defined. The list of calendar names defined in the emulator can be loaded with the "Load Calendar" button. To change the calendar name, rewrite column E. The date of which "*" is entered in the cells after column G belongs to each calendar. After setting, clicking the "Save Calendar" button sends the calendar name and a list of dates belonging to the calendar to the emulator.
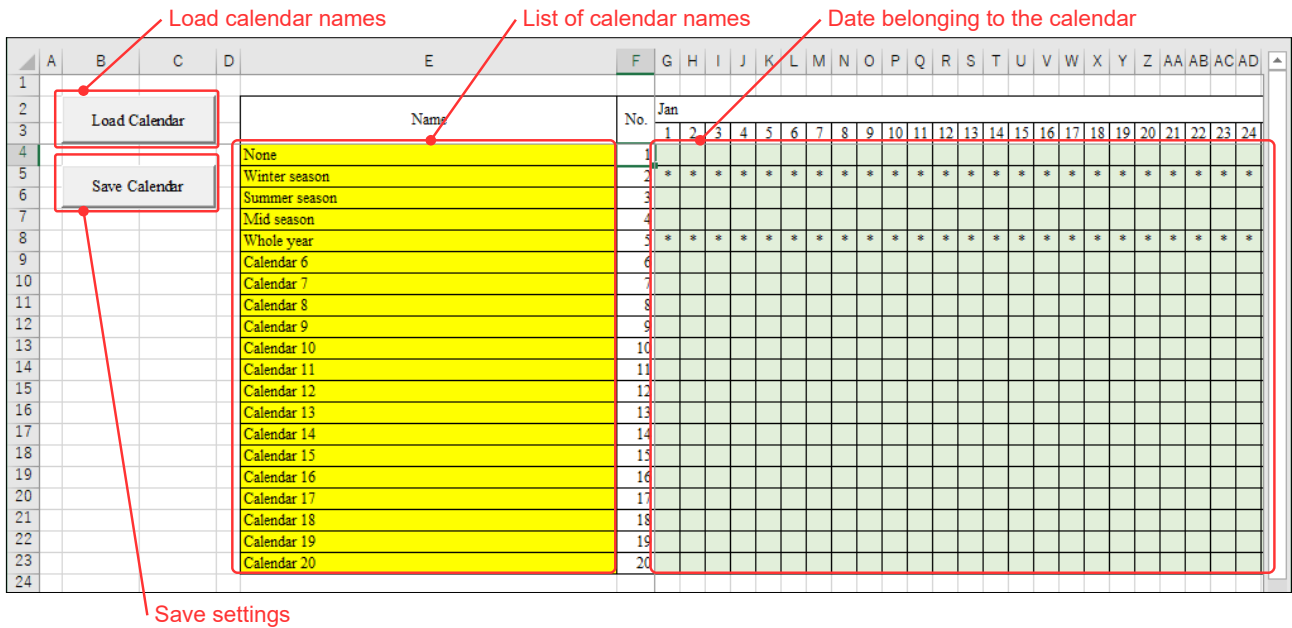
Figure 5.2 Function of the Calendar sheet

5.3   Setting AHU operating schedule (AHU_Schedule sheet)

The function of the AHU_Schedule sheet is shown in Figure 5.3. There are a total of 29 AHUs in the emulator. The schedule of AHU for which "True" is set in the cell of column A becomes the target of setting.

Each AHU can have 4 schedules. The example in Figure 5.3 is an example of setting the first schedule "Schedule 1". In this example, a calendar named "Winter season" is assigned to this schedule. In other words, "Schedule 1" is a schedule that defines how AHU operates from December to March. It is possible to set the operation for 24 hours of each day, and the operation mode is selected from "Shutoff, heating, cooling, ventilation". Supply air setpoint temperature can be any real number. In this example, heating operation is performed from 8:00 to 22:00 on Monday to Friday. However, since load reset control is enabled by default, supply air setpoint temperature setting works only when this is disabled. After all settings have been made, click the "Set AHU Schedule" button to send the settings to the emulator.

Although ExcelInterface can only set an hourly schedule, the emulator itself can set a schedule in minutes. To create such a detailed schedule, you need to use the simple BAS in Chapter 6 or create your own program.
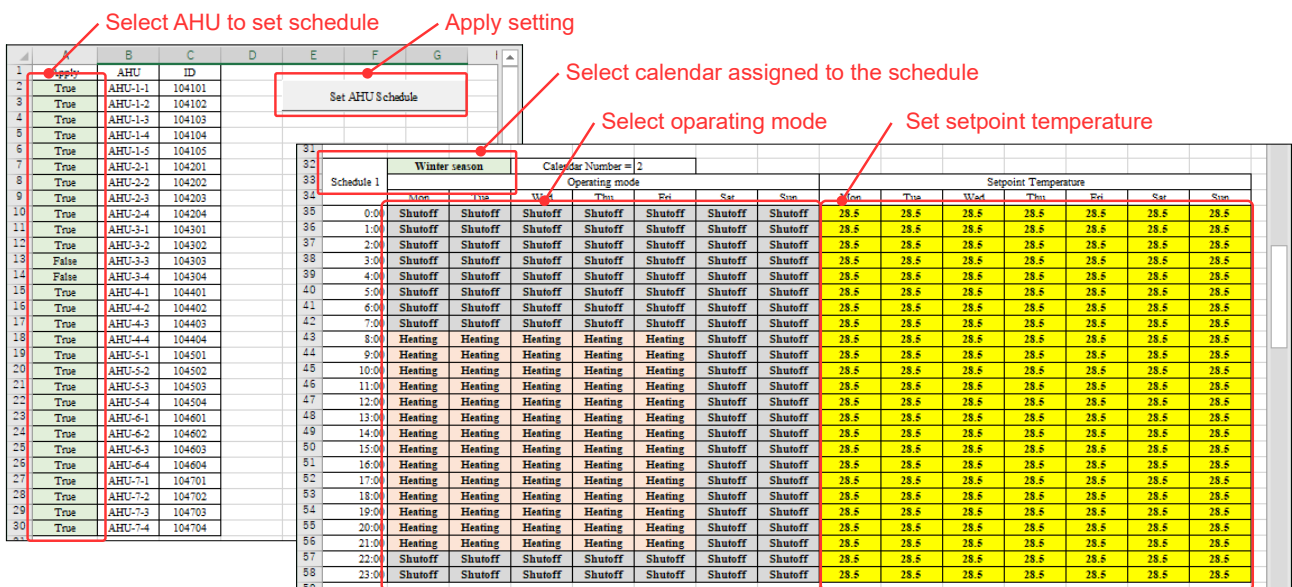
Figure 5.3 Function of the AHU_Schedule sheet

5.4   Setting FCU operating schedule (FCU_Schedule sheet)

The function of the FCU_Schedule sheet is shown in Figure 5.4. The usage is almost the same as the setting of AHU. Select the FCU to be set, select the calendar and operation mode for each hour, and click the Set FCU Schedule button to send the settings to the emulator. In the example in Figure 5.4, heating schedule is set for Monday to Friday 8:00 to 22:00 for Winter season.
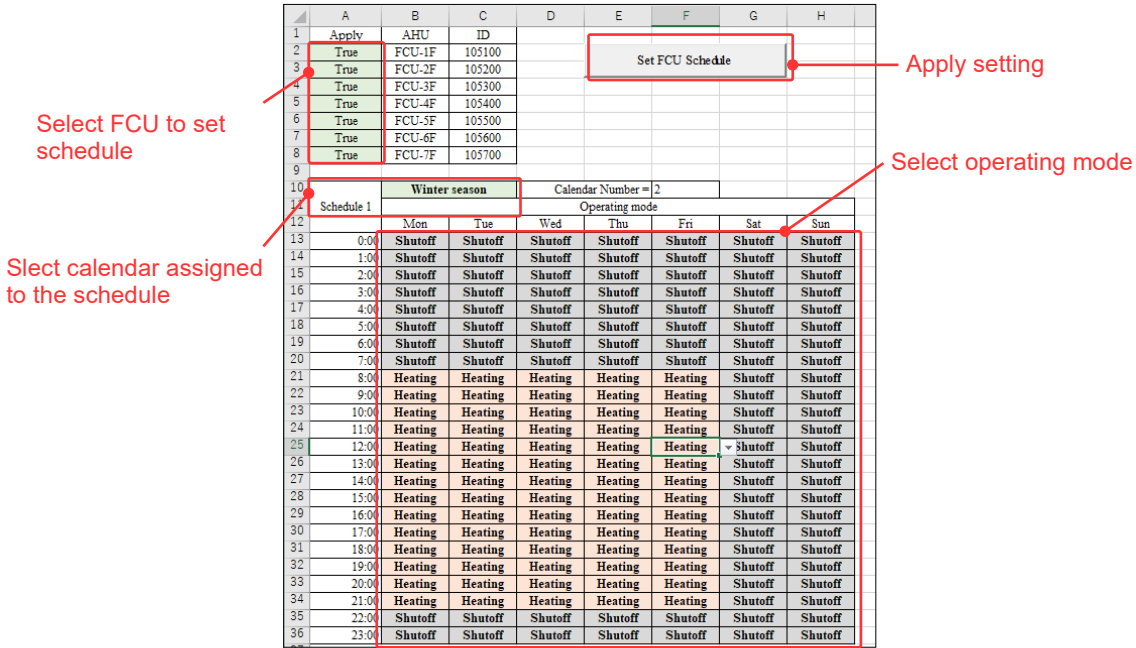
Figure 5.4 Function of the FCU_Schedule sheet

5.5   Setting heat sources operating schedule (HeatSource_Schedule sheet)

The function of the HeatSource_Schedule sheet is shown in Figure 5.5. The sheet is same as AHU and

FCU in that 24 hours are set for each day of the week for 4 seasons. In row B to H, select the operation mode for

the entire heat source system from "Heating, Cooling, Both, and Shutoff". In the example in Figure 5.5, heating is

performed on a weekday from 7:00 to 22:00. The reason why the start-up is one hour earlier than AHU and FCU

is because the heat source needs time to start up. The columns I to O, P to V, and W to AC are the operating order

of air heat source heat pump, direct absorption chiller, and heat release from heat storage tank, respectively. In the

example in Figure 5.5, the heat storage tank starts first, then the direct absorption chiller starts , and finally the

heat pump starts. In addition to the entire heat source system, it is also necessary to select the operation mode of

each heat source machine from "heating, cooling, shutoff". This is to determine whether the individual heat

sources should operate as "cooling" or "heating" when the operating mode of entire heat source system is set to

"heating and cooling". AD ~ AJ column is the setting of heat charge time of the heat storage tank. In this example,

heat charging time is set to 22:00 to 8:00. Since heat charge operation is performed for heat release operation of

the next day, it should be noted that it is not performed on Friday night but started from Sunday night.

5.6   Setting secondary pump operating schedule (SecondaryPump_Schedule sheet)

The function of the SecondaryPump_Schedule sheet is shown in Figure 5.6. Set up a 24-hour operation

for each day of the week for the chilled and hot water secondary pump. In this example, only the hot water

secondary pump is operated in the winter from 7:00 to 22:00.

Figure 5.5 Function of the HeatSource_Schedule sheet

Figure 5.6 Function of the SecondaryPump_Schedule sheet
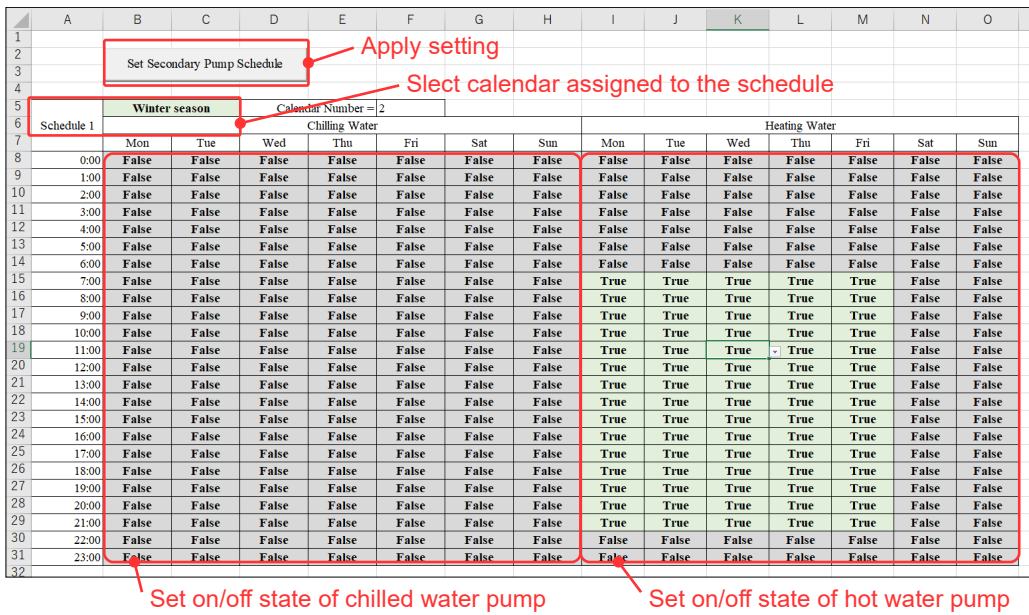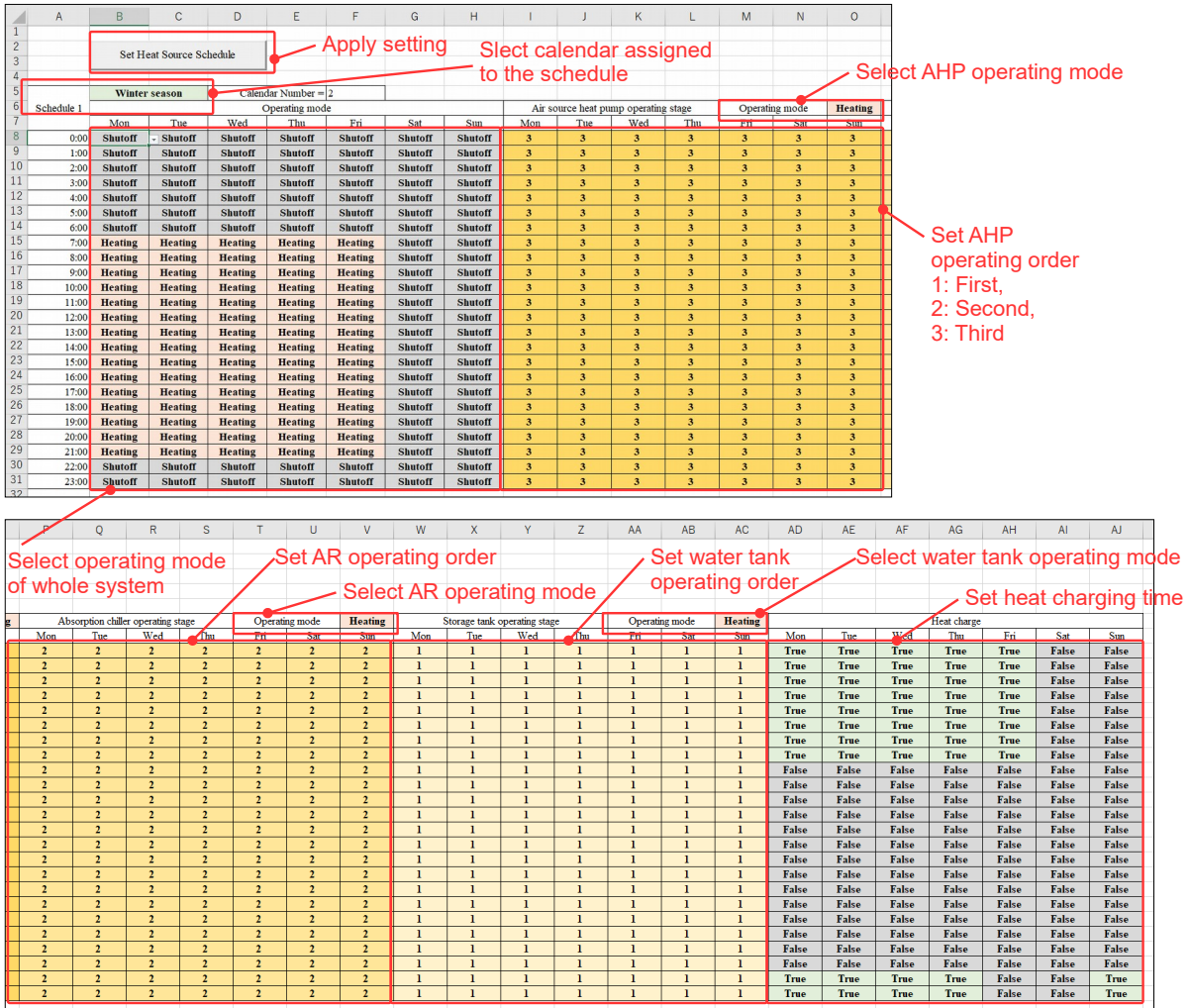
5.7　Direct setting for each BACnet Device (PresentValueWriter sheet)

Figure 5.7 shows the PresentValueWriter sheet. This sheet is for writing values directly to BACnet Deivce held by the emulator.
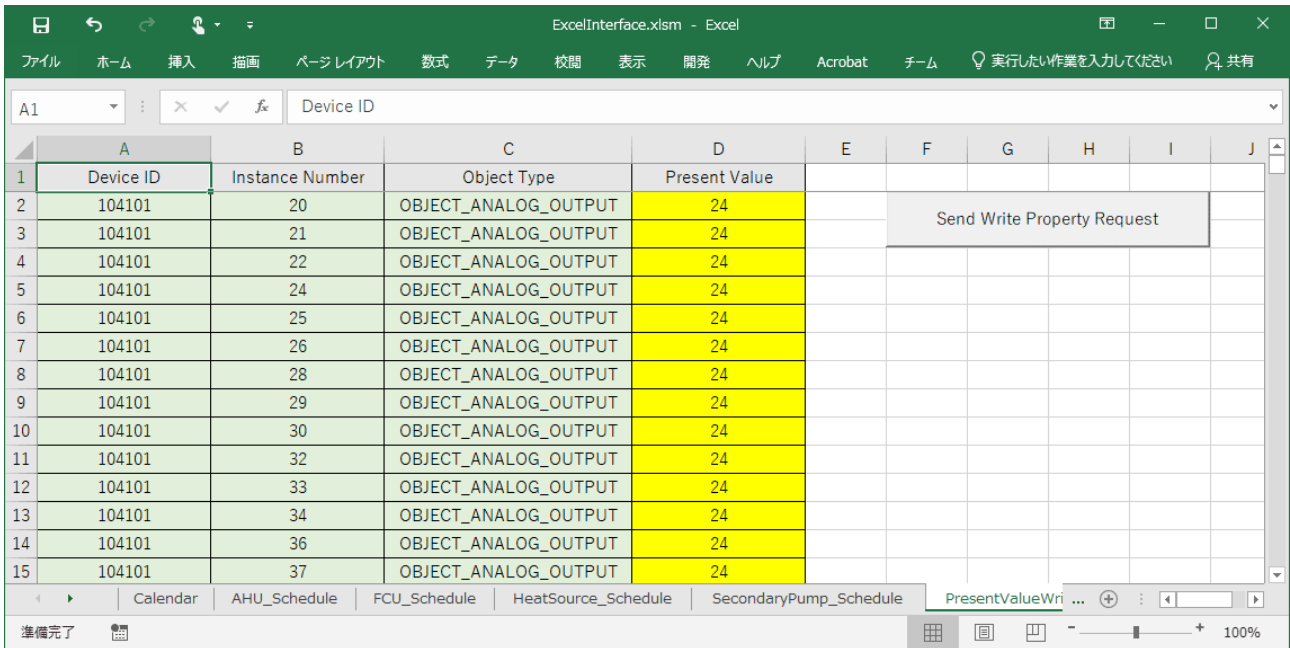
Figure 5.7 Function of the PresentValueWriter sheet

In general, BACnet uses three values "Device ID", "Instance Number", and "Object Type" to manage information. The details of how to manage information in BACnet will be explained in Chapter 8. These three values are represented in columns A, B, and C in Figure 5.7. For example, Device ID "104101" represents the controller of AHU-1-1. Instance Number "20" represents the set point temperature of Zone 1 (Season 1). Thus, the second line of the sheet shown in Figure 5.7 shows the set point temperature of zone 1 of AHU-1-1 during winter. There are various types of Object Type, including analog numbers, binaries, dates, schedules, strings, and so on. In this Excel sheet, you can control either "OBJECT_ANALOG_OUTPUT" representing integer or real number, or "OBJECT_BINARY_OUTPUT" representing binary value of True / False. There is a list on the "DeviceList" sheet of the Excel file shown in Figure 5.7. Appendix 5 is this list.

Figure 5.7 shows an example of changing the set point temperature of the 1st floor perimeter zone during winter. This example changes the set point temperature of all zones to 24 °C. Finally, clicking "Send Write Property Request" will communicate with the emulator using the external program.

5.8   ExcelInterface Samples

In the "ExcelInterface_Samples" directory, there are sample files for which operation change settings have been made. The operation change by each sample file is shown in Table 5.1. The sheet used to reflect the settings depends on the sample, so the list of sheets that should reflect the settings is described in the "SheetUsed" sheet.

Table 5.1 Operation change of each sample file

No.	Operation change	File name
1	Change zone setpoint temperature in summer from 25.0°C to 24.5°C and setpoint temperature in winter from 23.0°C to 23.5°C.	EI_ZoneTSP_0.5
2	Change zone setpoint temperature to 24.0°C annually.	EI_ZoneTSP_1.0
3	Change the operation of the heat source to the order of air heat source heat pump, direct absorption chiller, and disable water heat charging.	EI_NoThermalStorage
4	Change the operation of the heat source in the following order: heat release from storage tank, air heat source heat pump, direct absorption chiller.	EI_HeatSourceOrder
5	A new calendars are defined by dividing the midseason (April, May, October, November) into midseason 1 (May and October) and midseason 2 (April and November). The operation of the midseason 1 is set to cooling, and the midseason 2 is set to heating. Reset the operation schedule of the heat source, AHU, FCU and secondary pump according to this calendar.	EI_MidSeasonHeating
6	With the same calendar settings as No.5, set the midseason 2 to ventilation operation. During this season, the heat source and the secondary pump is shutoffed, and the air conditioner operates in ventilation mode.	EI_MidSeasonVentilation
7	Change chilled water supply temperature from 7°C to 9°C and hot water from 44°C to 42°C. The heat charge and release temperature of the water tank also changed by 2°C accordingly.	EI_WaterTSP_1
8	Change chilled water supply temperature from 7°C to 5°C and hot water from 44°C to 46°C. The heat charge and release temperature of the water tank also changed by 2°C accordingly.	EI_WaterTSP_2
9	Change the air conditioning shutoff time from 22:00 to 20:00. Change the schedule of heat source, secondary pump, AHU, and FCU.	EI_Shutoff_2000
10	Change the air conditioning shutoff time from 22:00 to 18:00. Change the schedule of heat source, secondary pump, AHU, and FCU.	EI_Shutoff_1800
11	Change the equation for calculating the estimated differential pressure of the secondary pump, so that the estimated value is 250 kPa at the maximum flow rate and 100 kPa at the minimum flow rate.	EI_PumpControl
12	Change the threshold for starting the heat source from 0.95 to 0.95, and the threshold for stopping from 0.60 to 0.85.	EI_HeatSourceStageLimit
13	Reduce the opening rate of the OA damper of the AHU within the range where the CO_2 level of each tenant does not exceed 1000 ppm.	EI_OADamper
14	Change proportional gain of PID controller of VAV from 0.3 to 0.1.	EI_VAV_PID_1
15	Change proportional gain of PID controller of VAV from 0.3 to 0.9.	EI_VAV_PID_2

The result of reflecting each operation change of Table 5.1 is shown in Figure 5.8.

No. 1 is the operation change implemented in the tutorial in Section 4.4. Although the dissatisfaction rate decreases due to the improvement of the indoor thermal environment, energy consumption increases due to the increase in heat load. No. 2 is a change that makes the effect even larger, and the tendency to reduce dissatisfaction and increase energy is further expanded. In No. 3, energy consumption is reduced because air heat source heat pumps with higher COP starts faster than direct absorption chiller whose COP is lower. In No. 4, energy consumption is further reduced by using a heat storage tank to increase the operating ratio of the AHP.

These changes have little effect on the indoor thermal environment. No.5 switches the operation from cooling to heating in the midseason where the room temperature is slightly low, so the thermal environment is improved. However, energy consumption increases because the heat load increases. No. 6 switches the operation from cooling to ventilating in the midseason. This change can improve the thermal environment and reduce energy consumption. The effects of No. 7 and No. 8 on energy consumption and thermal environment are relatively small. Instead of changing the temperature by 2 °C uniformly, we should look for the appropriate temperature for both chilled and hot water. No. 9 is the change implemented in the tutorial in Section 4.5. You can save energy with little impact on thermal comfort. No. 10 is the case where the air conditioning operation time is further shortened. In this case, dissatisfaction rate will increase because there are occupants who work overtime. No. 11 reduces the energy consumption of the pump, but the impact on the energy of the whole building is not very large. No. 12 has almost no effect on the thermal environment and reduces energy by about 0.5%. No. 13 reduces outdoor air load in winter and summer. However, if there is more outdoor air intake in the midseason, internal heat load is offset and the overall heat load decreases. Therefore, there is little change in energy consumption over the year. Control by season is required. In No.14, the proportional gain is too small, so the offset remains and the dissatisfaction rate increases. Energy is reduced because load is reduced due to control failure. On the contrary, in No. 15, overshoot occurs because the proportional gain is too large. However, since the default setpoint temperature is high in summer and low in winter, overshooting makes zone comfortable and the rate of dissatisfaction decreases.
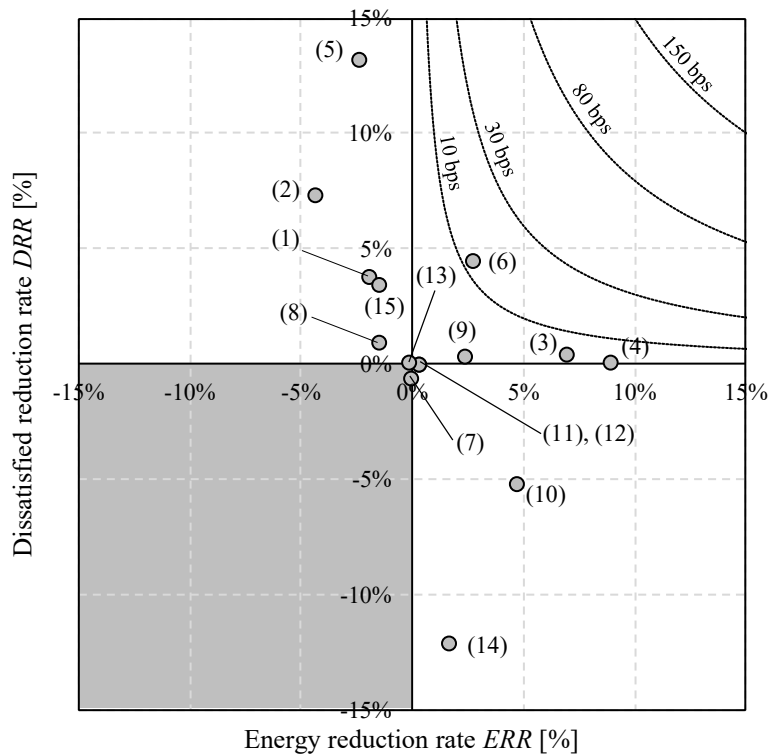
Figure 5.8 Result of operation changes

6. Simple BAS operation manual

6.1 Structure of software

Simple BAS starts by double clicking "ShizukuClient.exe". The startup screen is shown in Figure 6.1. Monitor resolution requires 1920 × 1080 or higher. Before connecting to the emulator, default information is displayed as shown in figure 6.1.
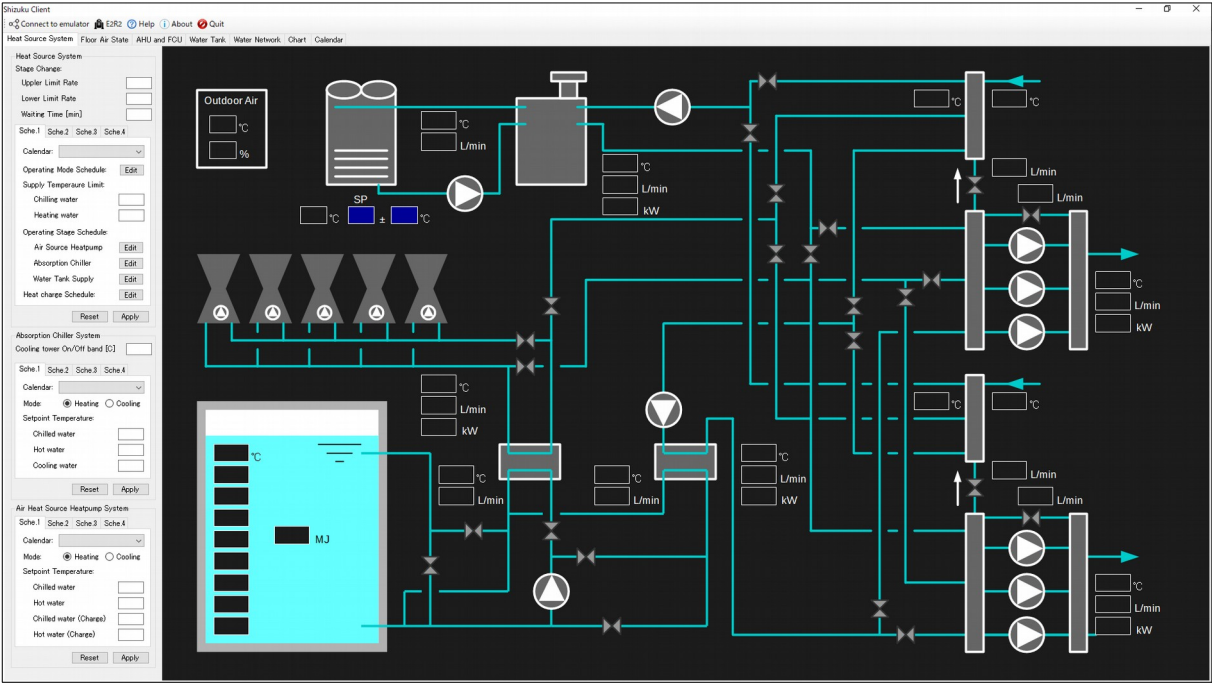
Figure 6.1 Startup screen

There are control buttons on the upper left corner of the window, and the operation related to the whole system can be performed with these buttons. A tab is displayed just below it, which is switches according to the system to be operated. By default, "Heat Source System" tab is selected.
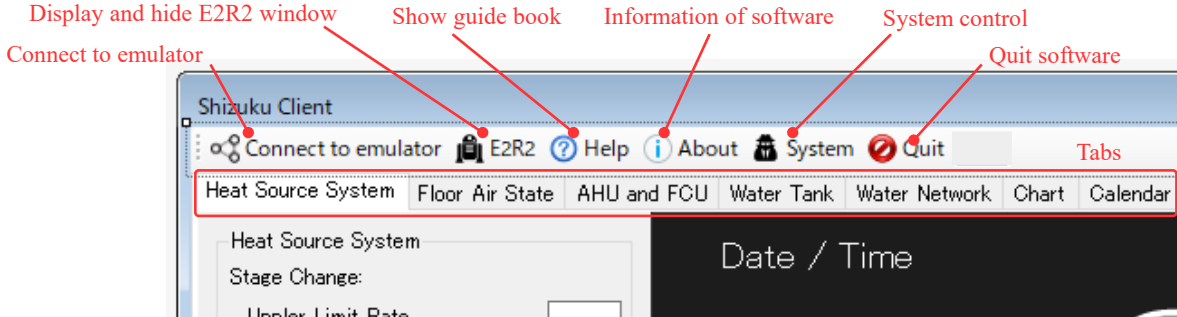
Figure 6.2 Control buttons and tabs

The function of the control buttons are as follows.

1) "Connect to emulator" button

This is a button for connecting to the emulator. In order to connect, it is necessary for the emulator to be running on the local PC or server, and if the emulator cannot be found, an error window will be displayed as shown in Figure 6.3. If the connection is successful, Simple BAS will automatically receive data from the

emulator and start redrawing the screen. The data reception interval is 1 s in real time (it can be changed with the initial setting file).
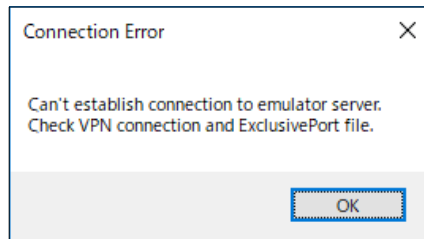
Figure 6.3 Error message when simple BAS can't fine emulator system

2) "E2R2" button

A floating window showing the emulator's current E2R2 (Effective Energy Reduction Rate) value is displayed. This window is displayed in the foreground, and it switches between display and non-display each time the button is clicked.

The ERR (Energy Reduction Rate) is shown on the lower left corner, the DRR (Dissatisfied Occupant Reduction Rate) is shown on the bottom right corner, and E2R2 which is the product of both is shown at the top. In this championship, maximizing E2R2 is defined as "optimization" (explained in Chapter 2.3). The unit of E2R2 is the basis point, which is a value with 0.0001 as 1.
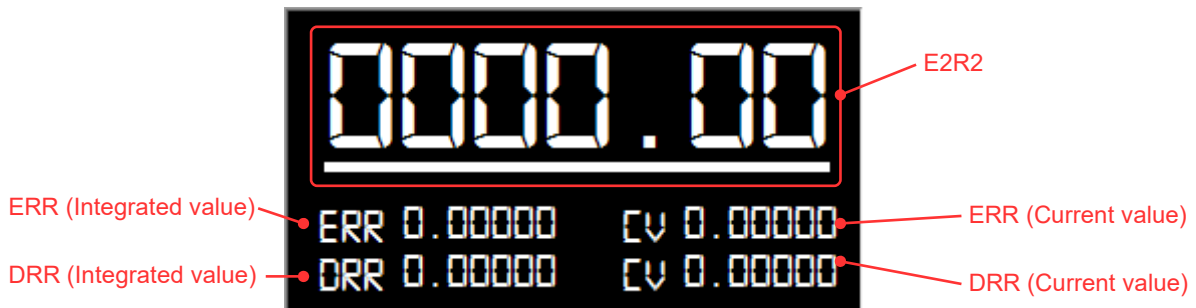
Figure 6.4 Floating window showing E2R2

3) "Help" button

PDF data of this guide book is displayed.

4) "About" button

A description of the simplified BAS software is displayed.

5) "System" button

Clicking this will display the window shown in Figure 6.5 and you can change the simulation speed of the emulator. In this example the acceleration rate is 60 and the emulator works at the rate of 60 s per real second. However, this acceleration depends on the performance of the PC running the emulator. For computers with Intel core i7 6500 U (2.5 GHz, 2 cores, 4 threads) an acceleration of 1,000 times the real time was possible. In actual championship, we will operate at 12 times the real time and slowly calculate the data for one year, over a month.

6) "Quit" button

Quit simple BAS software
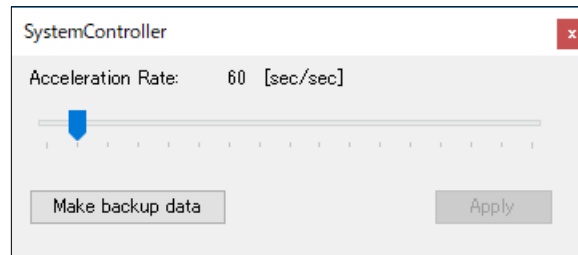
Figure 6.5 System Controller window

Simple BAS has seven tabs as shown below. Each will be explained in the following sections.

1) "Heat Source System" tab

Displays the state of the primary heat source system and changes the control.

2) "Floor Air State" tab

Displays the thermal environment on the specific floor.

3) "AHU and FCU" tab

Displays the state of each air conditioner and fan coil unit and changes the control.

4) "Water Tank" tab

Displays the state of the water tank and changes the control.

5) "Water Network" tab

Displays the state of cold and hot water flow network.

6) "Chart" tab

Creates a trend chart of operation data.

7) "Calendar" tab

Defines the "calendar" used for schedule settings.

6.2   Controlling heat source system (Heat Source System tab)

The "Heat Source System" tab is shown in Figure 6.6. The function of this tab is largely divided into the current operation status display section on the right side and the control change section on the left side.
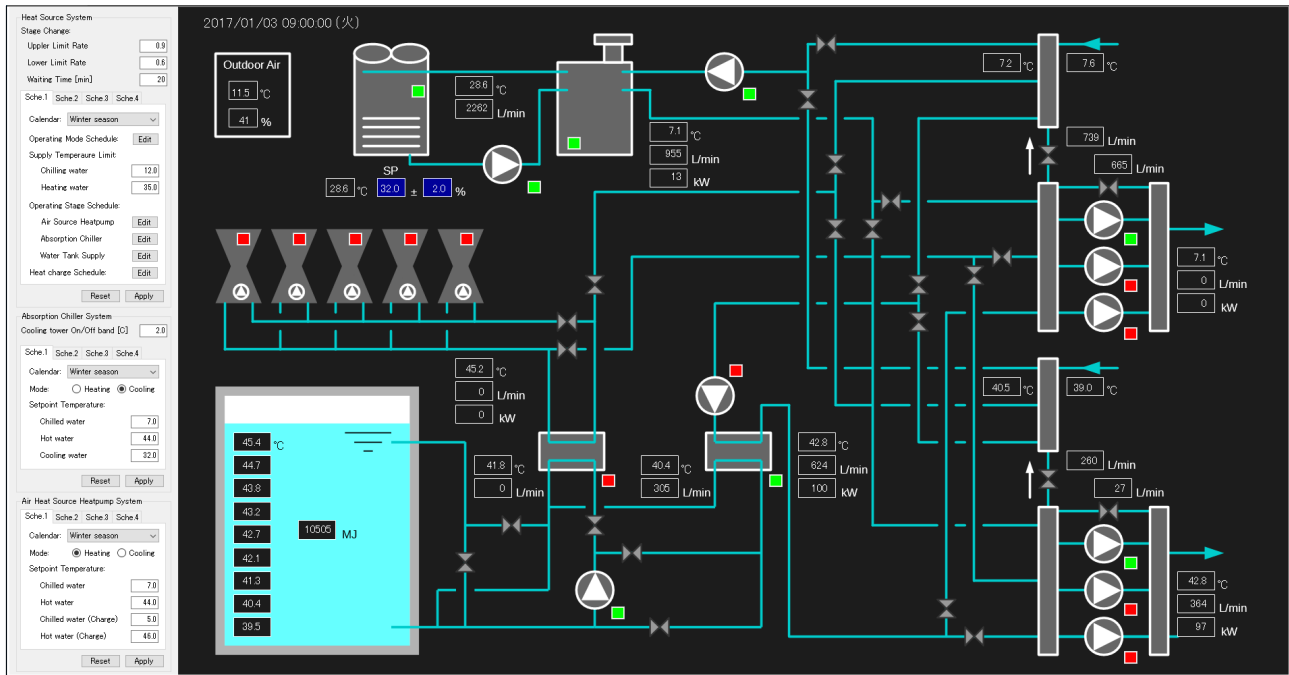
Figure 6.6 Heat Source System tab

In the operation status display section on the right side, the current state (water temperature, water flow rate, On / Off state) of the heat source of primary side system is displayed.

The control change section on the left side is divided into control related to the entire heat source system, control related to the air heat source heat pump, and control related to the absorption chiller.

Figure 6.7 shows the control related to the entire heat source system. The above three text boxes are the thresholds for changing the number of heat sources to be operated. For example, when upper limit rate is 0.9, start the next heat source when the partial load rate of the heat source exceeds 90%. Likewise, for example, if the lower limit rate is 0.6, stop one heat source when the partial load rate falls below 60%. Furthermore, to prevent frequent changes in the number of operating units, you can set the waiting time.

Four schedules can be set to operate individually for each season. The four tabs at the bottom of the controls show schedules. As explained in section 6.8, you can define 20 types of calendars for scheduled operation. You can select the calendar to be used by selecting the combo box. For example, if you want to set a summer schedule, define the calendar as "6/1 - 9/30" and select this calendar from the combo box.

In addition to designating the seasonal operation, you need to set the time during which you will be operating in the day. By clicking button No. 4, the schedule editor shown in figure 6.8 appears, and you can set an hourly schedule.
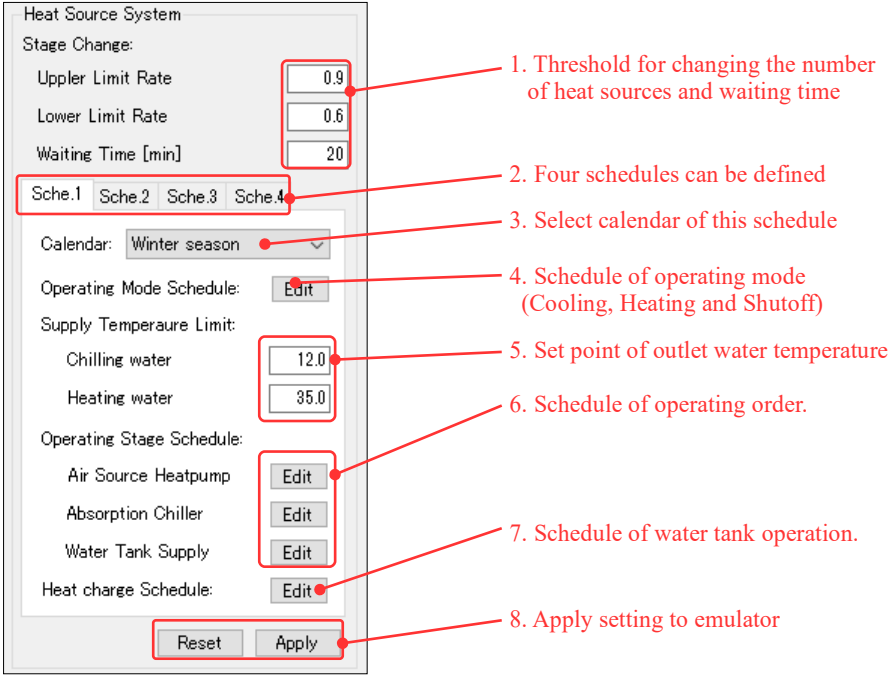
Figure 6.7 The control related to the entire heat source system
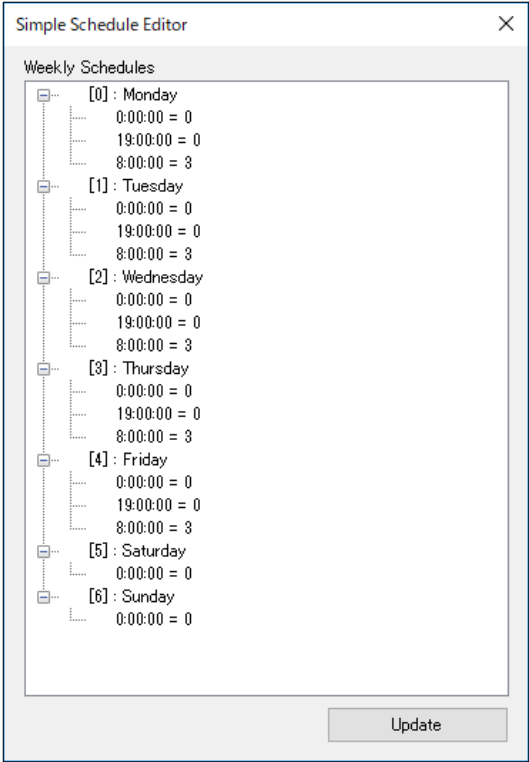
Figure 6.8 Schedule editor window

It is possible to set the operation mode for each time by days of the week. Integer corresponds to each operation mode: 0 is shutoff, 1 is cooling mode, 2 is heating mode, and 3 is cooling and heating mode, respectively. In the example in Figure 6.8, system will be in heating mode at 8:00 am on Monday to Friday and will shut off at 19:00 in the evening. The system will be shut off all day on Saturdays and Sundays. Table 6.1 shows the correspondence between integer and operation mode used in schedule setting. Details of each schedule

will be described later.

Table 6.1 List of operation mode

Schedule	Operation mode
Heat source	0: Shutoff, 1: Cooling, 2: Heating, 3: Both Cooling and Heating
Heat source operating order	0: Allways shutoff, 1: First, 2: Second, 3: Third
Heat charge	false: Stop, true: Charge
AHU	0: Shutoff, 1: Ventilation, 2: Cooling, 3: Heating
Secondary pump	false: Shutoff, true: Operate
FCU	0: Shutoff, 1: Fan circulation, 2: Cooling, 3: Heating

The sSetpoint temperature of chilled cold water and heating hot water is done using the text box (No. 5). This is the setpoint temperature of the whole heat source system, and when the heat demand rises and this temperature can notcannot be maintained, system increases the number of operating heat source. The setpoint temperature for individual heat sources can be set to a be a different value each.

You can also set the schedule by time for the operating order of the heat source. For example, you can schedule to release heat from the water heat storage tank preferentially during daytime hours with at high electricity usage rates. This schedule can be set with middle the three buttons in the middle (No. 6). From the top, it represents the schedule of an air heat source heat pump, absorption chiller, heat release from water heat storage tank. The numeric values that can be set are 0, 1, 2, 3. 0 means shutoff, 1 means operates first, 2 means operates second, 3 means operates third. and 1,2,3 indicate the order of operation, respectively.

The bButton of No. 7 is a the schedule setting of water heat storage tank operation. A number of 0 indicates turn off heat charging , and 1 indicates heat charging. In order to charge heat for the next day's air conditioning, by default, heat charge is valid from Sunday to Thursday from 23:00 until 7:00 morning.

No. 8 is the reflection ofis setting and initialization. After updating the setting, on clicking Apply, the setting is transferedtransferred to the emulator. If you click Reset, all settings will be restored to the value of the current control value of the emulator.

The controls for a single heat source machine are shown in Figure 6.9. An air heat source heat pump and an absorbing chiller are present, and the control method is almost the same. The cooling tower of the absorption chiller controls the temperature of cold water by turning on / off the fan. This temperature band is set using the No. 1 text box. For example, if the cooling water temperature setting is 32 °C and the temperature band is 1 °C, the fan stops at 31 °C or lower, and the fan starts at 33 °C or higher.

Four schedules can be set for the heat source, and it is selected with the No. 2 tab. Select the calendar corresponding to each schedule using No. 3 combo box. No. 4 is to select the operation mode as either cooling or heating. The text box of No. 5 is the setpoint temperature of cold water, hot water, cooling water. In the case of the air heat source heat pump, the setpoint temperature can be changed between thermal storage operation and normal

operation. When the water heat storage tank is used, heat exchange is needed to charge and release; thus, it is necessary to lower the temperature compared with normal operation. Because the design temperature difference of the heat exchanger is 1 °C by default, the cold / hot water temperature during normal operation is 7 °C and 44 °C, the temperature during heat storage operation is 5 °C and 46 °C.
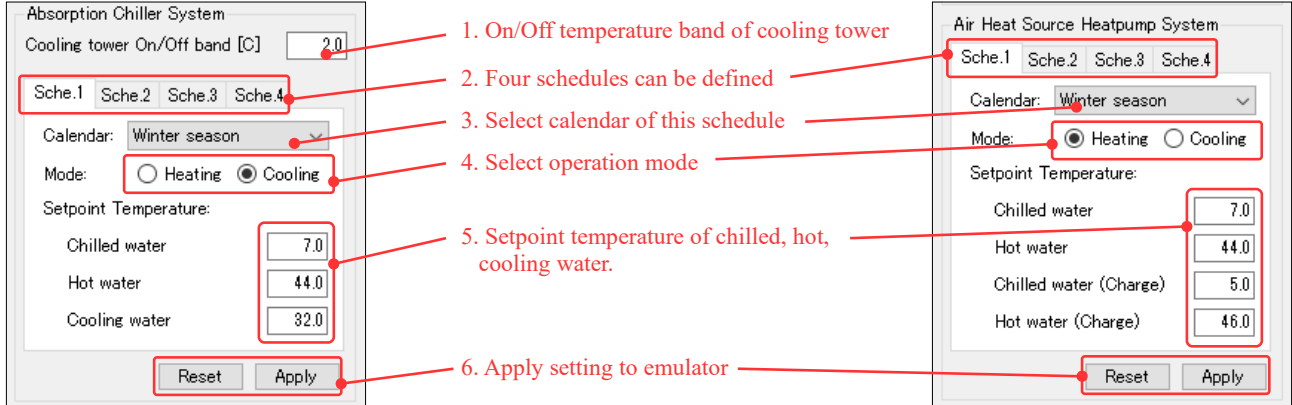
Figure 6.9 The controls for a single heat source machine
(Left: Absorption chiller, Right: Air heat source heat pump)

6.3 Thermal environment on the specific floor ("Floor Air State" tab)

The "Floor Air State" tab is shown in figure 6.10. The statuses displayed are supply and return air temperature and humidity, cold and hot water valve opening rate of the four air conditioners, status of the two fan coil units, temperature and humidity of each zone, and the CO_2 level. Switch the floor to be displayed with the combo box in the upper left corner. As shown in Figure 6.11, clicking the temperature setting button of each zone opens a window for setting the temperature for each season.
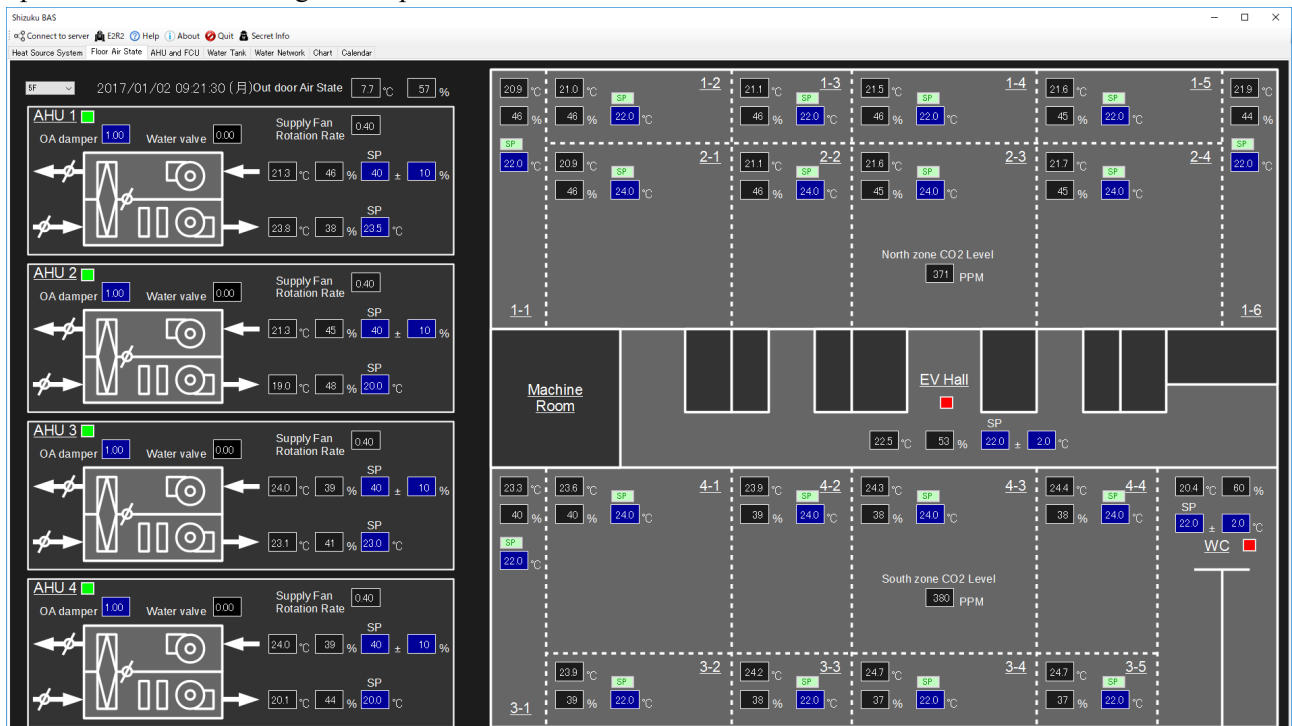
Figure 6.10 "Floor Air State" tab
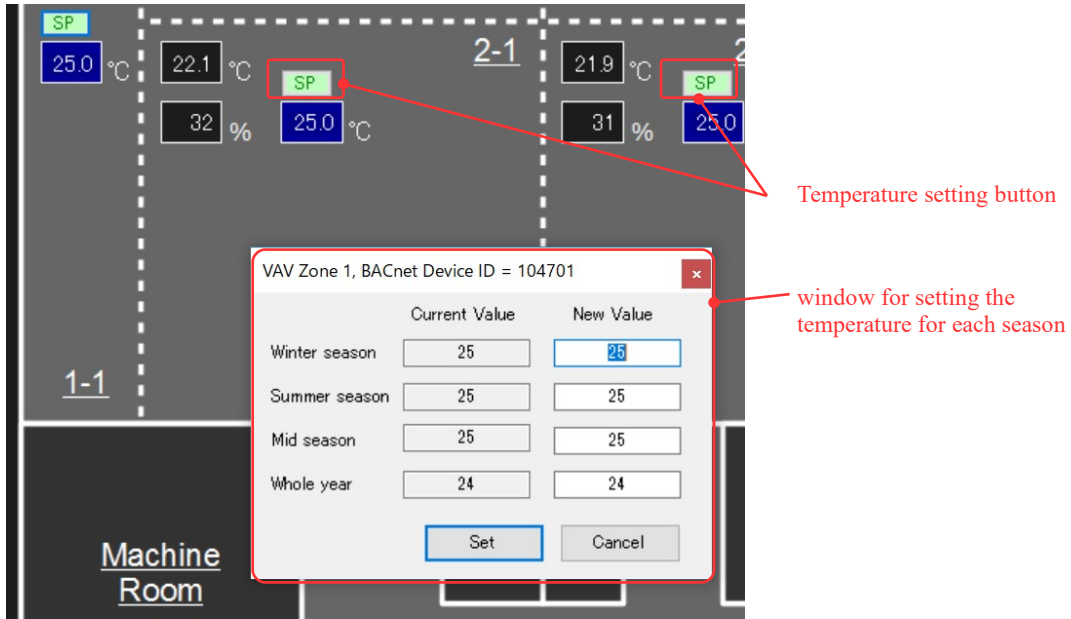
Figure 6.11 Changing setpoint temperature of zone

6.4　Controlling AHU and FCU ("AHU and FCU" tab)

Figure 6.12 shows the AHU and FCU tab. With this control, you can display the status and change operation of a single air conditioner and fan coil unit. On the left side is the control setting part and the right side is the status display part. Figure 6.13 shows the control setting part on the left.
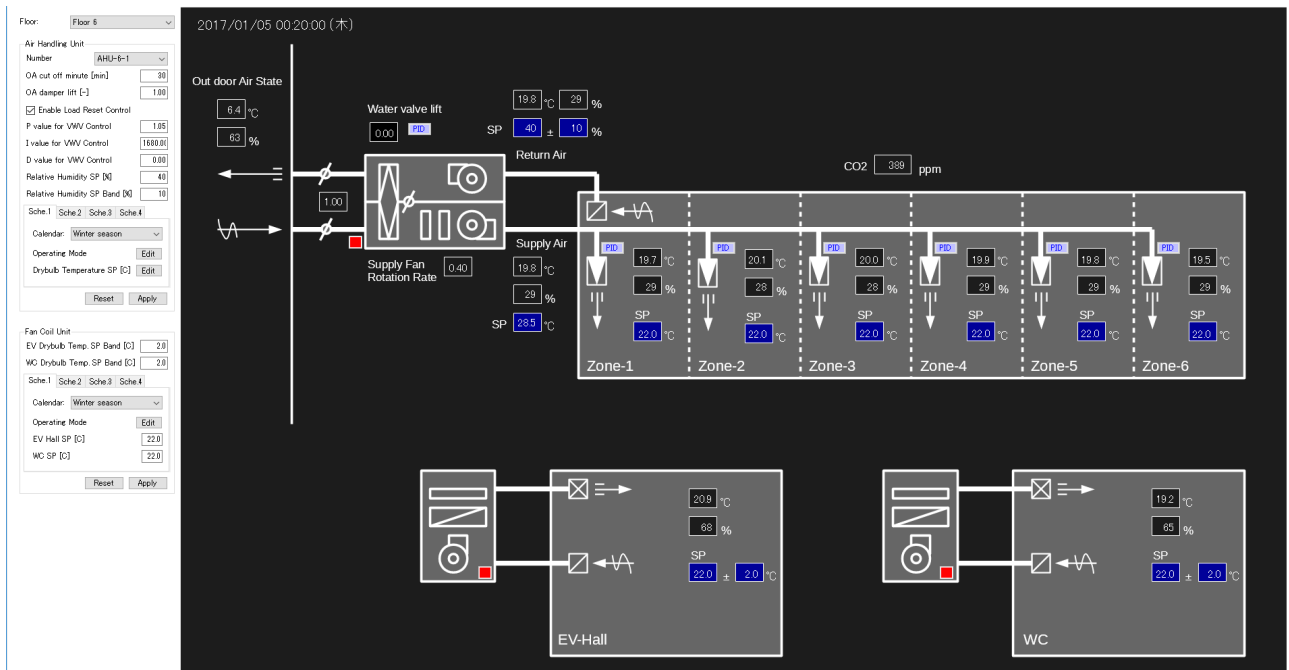
Figure 6.12 "AHU and FCU" tab
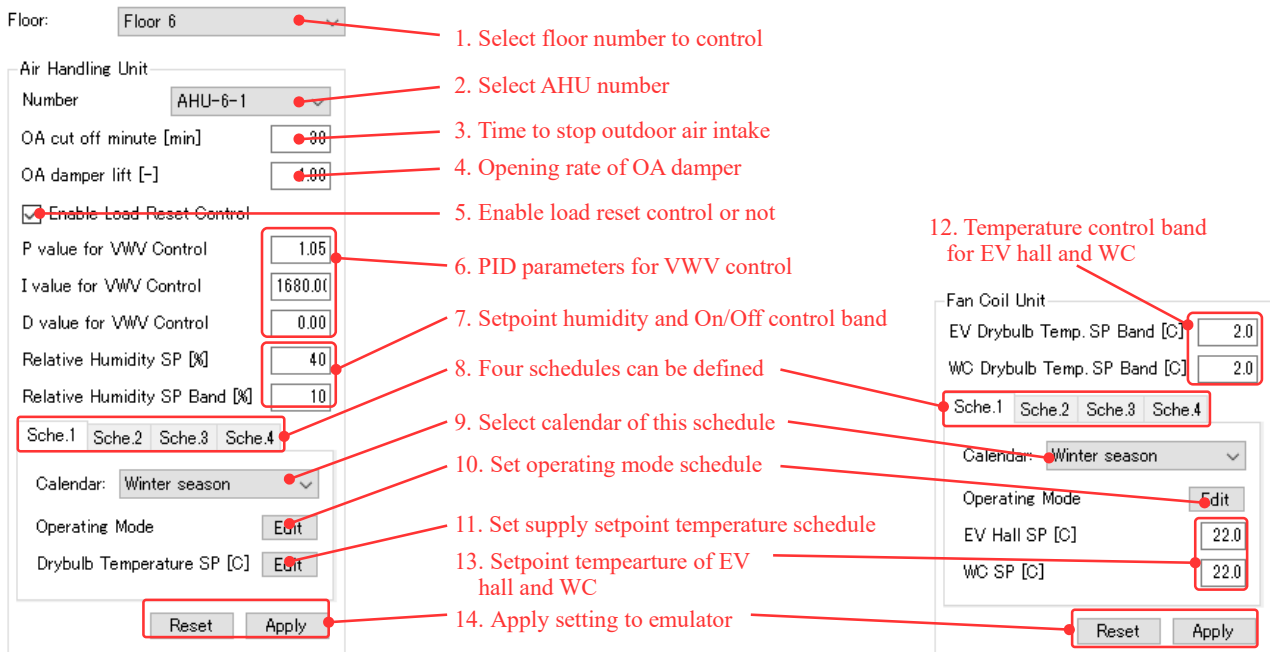
Figure 6.13 The controls of air conditioner and fan coil unit

First, by selecting the combo boxes No.1 and No.2, identify the air conditioner to set and change the control.

To reduce the outdoor air heat load during preheating operation, outside air intake can be set to 0 for a certain period of time after startup. This time is set in the text box of No. 3. No. 4 is the opening rate of the OA damper. For houses with low number of occupants and CO2 concentration, reduced outside air volume is sufficient for operation. No. 5 is to switch between load reset controls. Basically, the supply air temperature of the air conditioner is controlled according to the supply air temperature setting schedule set in No. 11. However, when load reset control is enabled, temperature setting automatically changes based on the air volume. The cold and hot water valve of the air conditioner changes based on the opening rate, so. the supply air temperature becomes the setpoint value. The PID parameter for controlling the opening rate of this valve can be changed using text box of No. 6.

The supply air relative humidity of the air conditioner is controlled with ON / OFF. The setpoint humidity and ON / OFF control band can be set using text box no. 7. For example, when the setpoint humidity is 40% and the control band is 10%, humidification starts at 30% and stops at 50%. Both air conditioner and the fan coil unit can be used to set the four schedules and change the operation. Switching this schedule is done in the tab No. 8. Select the calendar to be used with the combo box No. 9. No.10 is the operation schedule by time. The operation mode of the air conditioner is 0: Shutoff, 1: Ventilation, 2: Cooling, 3: Heating. The operation mode of the fan coil unit is 0: Shutoff, 1: Fan circulation, 2: Cooling, 3: Heating. No.11 is the schedule setting of setpoint temperature by time. The temperature of elevator hall and the restroom are controlled by ON / OFF by the fan coil

unit. Set this temperature band with the text box No.12. The setpoint temperature can be set with No. 13 for each season. When all settings are completed, click the Apply button No. 14 to apply the setting to the emulator.

In each air conditioning zone there is a PID parameter setting button for adjusting the opening rate of the VAV damper as shown in the left side of Figure 6.14. When this button is clicked, the PID parameter can be set using the window on the right of Figure 6.14.
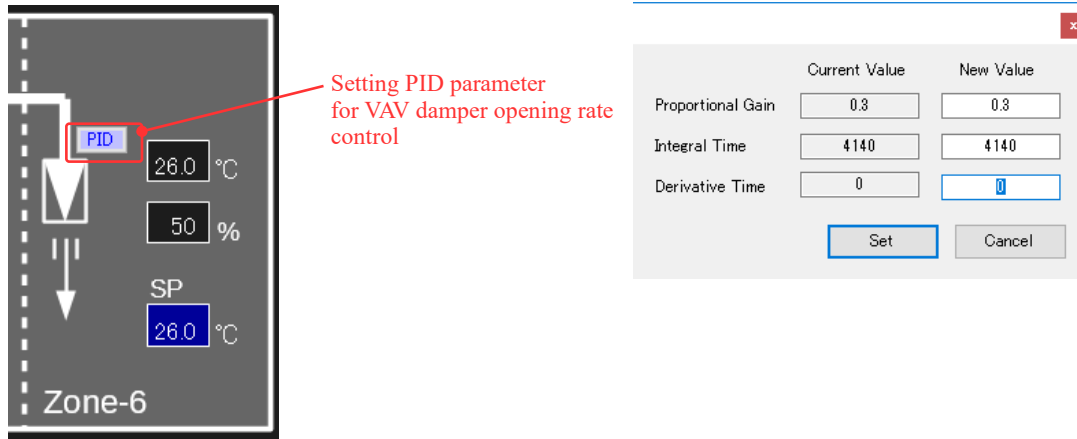
Figure 6.14 PID parameter setting window for VAV damper opening rate control

6.5   Control water storage tank ("Water tank" tab)

Figure 6.15 shows the Water tank tab. The chart on the right shows the temperature change of each layer in the water tank. The temperature change over the past two days is displayed. On the left side is the control of the water storage tank whose details are shown in figure 6.16.
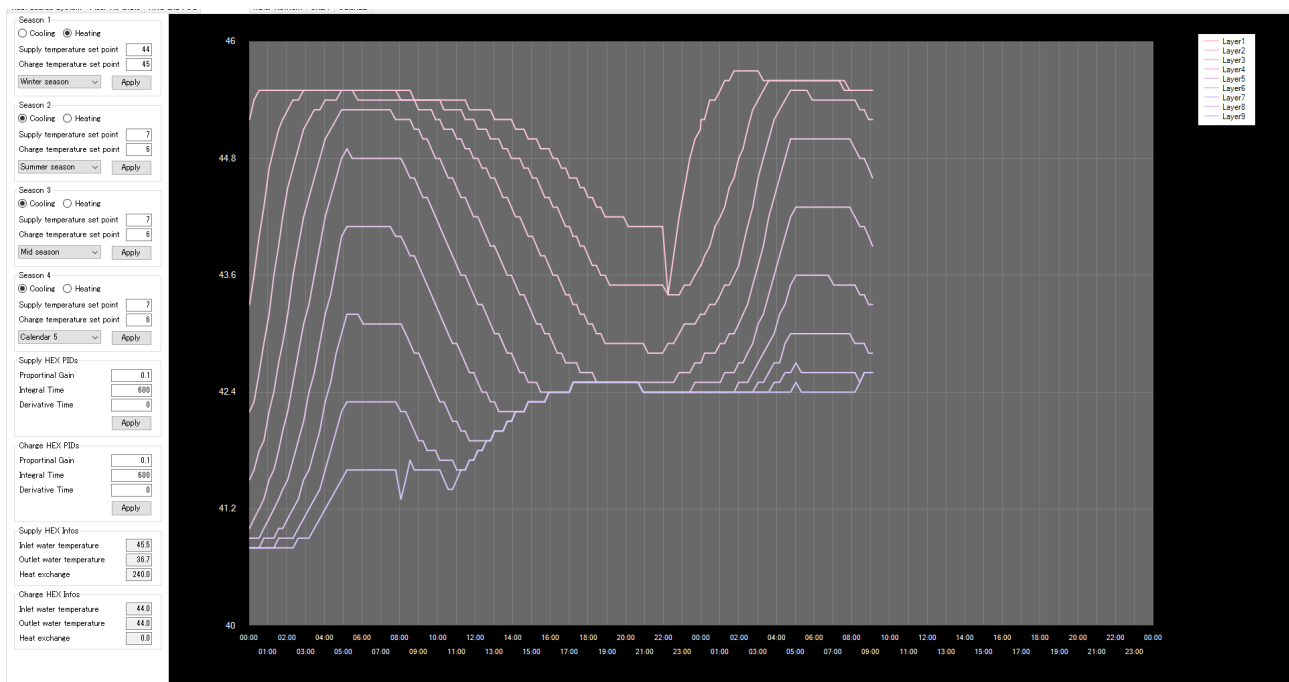
Figure 6.15 "Water tank" tab
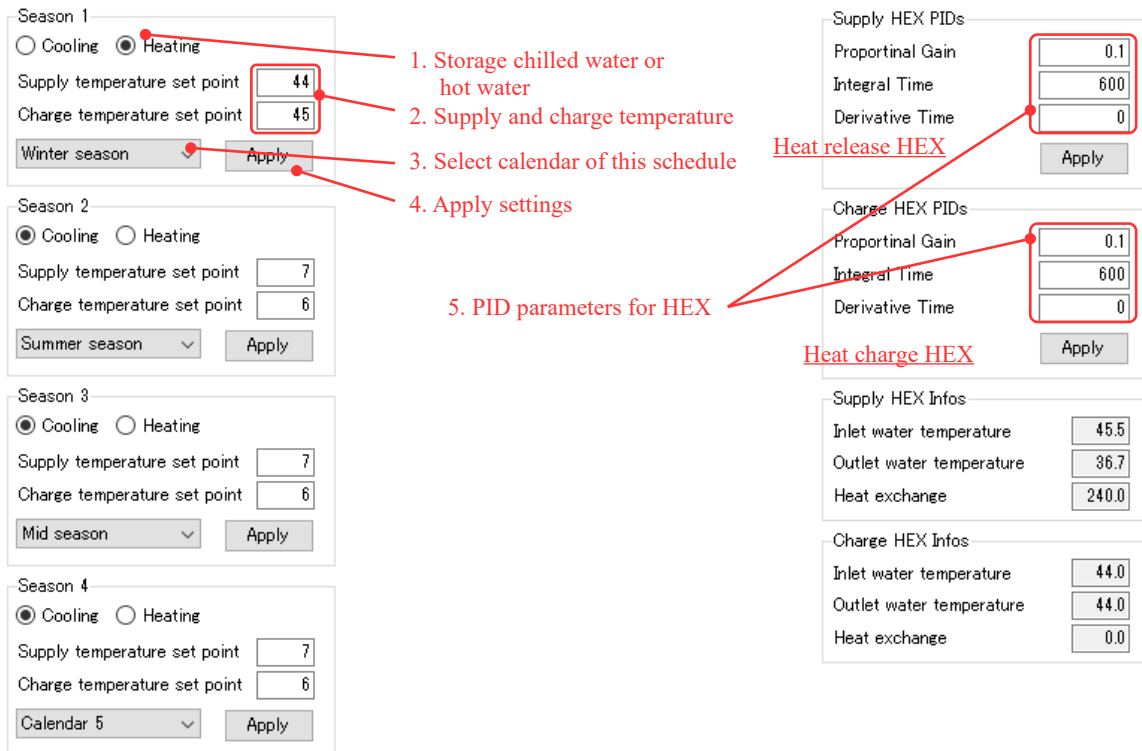
Figure 6.16 Controls for water tank

The radio button of No.1 is to switch between operation as a cold water or a hot water tank. Heat storage and release temperature can be set by text box No.2. In this example, the heat exchanger is controlled to charge hot water at 45 °C and release hot water at 44 ° C.

The temperature is controlled by the opening rate of the two-way valve of the heat exchanger. The PID parameter for this control is set in the text box of No.5. The water tank can set four control schedules. Select the calendar that each schedule uses using combo box No.3.

6.6 Control chilled and hot water flow network ("Water Network" tab)

Figure 6.17 shows the Water Network tab. This control displays the amount of water flowing through each pipe and the opening rate of the valves. You can switch between cold water circuit and hot water circuit in the radio box at the upper left corner of the control. The differential pressure of the secondary pump can be set using the primary equation of water flow. By default, the differential pressure is 150 kPa regardless of the water flow rate. Four schedules can be defined based on the time of water supply.

Figure 6.17 "Water Network" tab

Figure 6.18 Controls for water network

6.7   Making trend chart ("Chart" tab)

Figure 6.19 shows the Chart tab. This is a control for displaying the trend of specific operation data, and it is possible to display three data at the same time. If you select BACnet device in the combo box No.1 at the top, the instance list included in the device is set in the combo box No.2. Next, if you select an instance number from the combo box in No.2, the current value of that instance will be plotted on the chart.
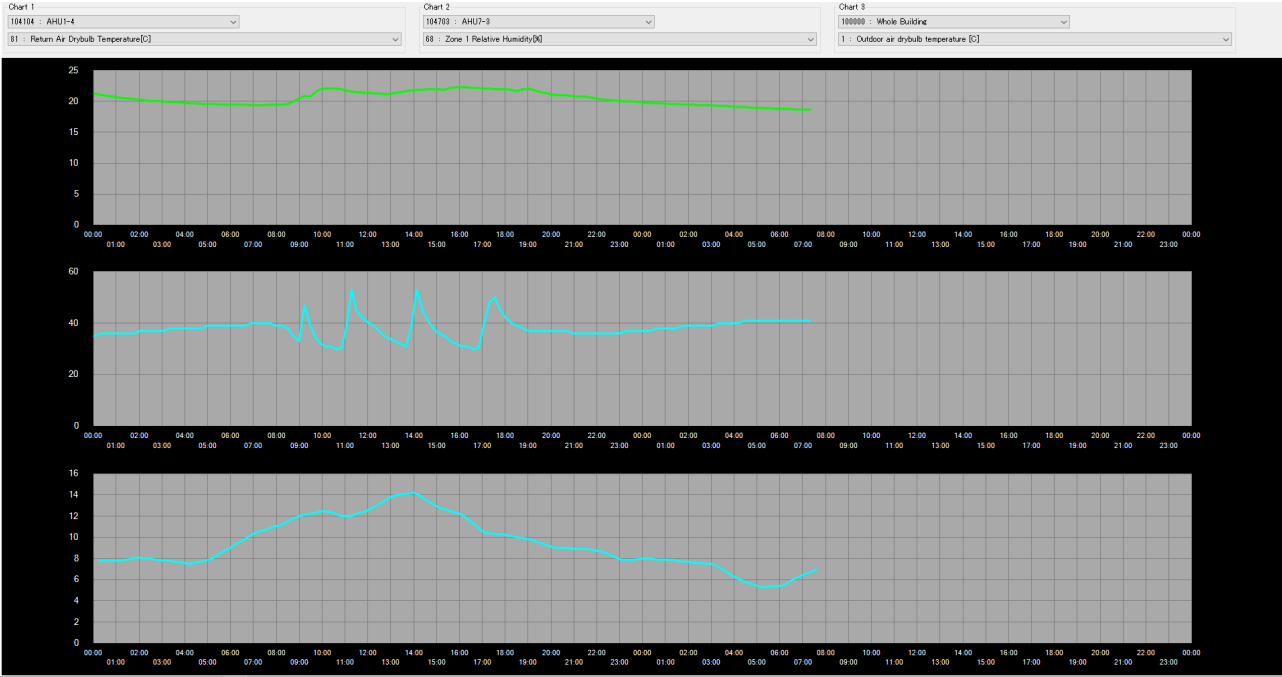
Figure 6.19 "Chart" tab
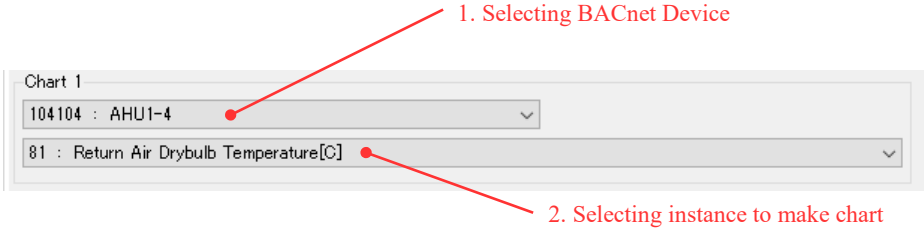
Figure 6.20 Selecting data to draw chart

6.8 Making calendar ("Calendar" tab)

Figure 6.21 shows the Calendar tab. With this control, you can define a calendar to use for schedule setting.

Use the control on the upper left corner (figure 6.22) to define the calendar. The list in No.1 is a defined calendar and you can create a maximum of 20. By default, four calendars are defined: "holidays", "winter season (Dec., Jan., Feb., and Mar.)", "summer season (Jun., Jul., Aug., and Sep.)" and "mid-season (Apr., May, Oct., and Nov.)".

When you select a calendar from the list, the corresponding information (Name and time period) is displayed in textbox (No. 2) and list box (No.3). List box No.3 is a list of periods included in the calendar. In this example, a calendar "winter season" is defined, and the period included in this calendar is four months of December, January, February, and March.
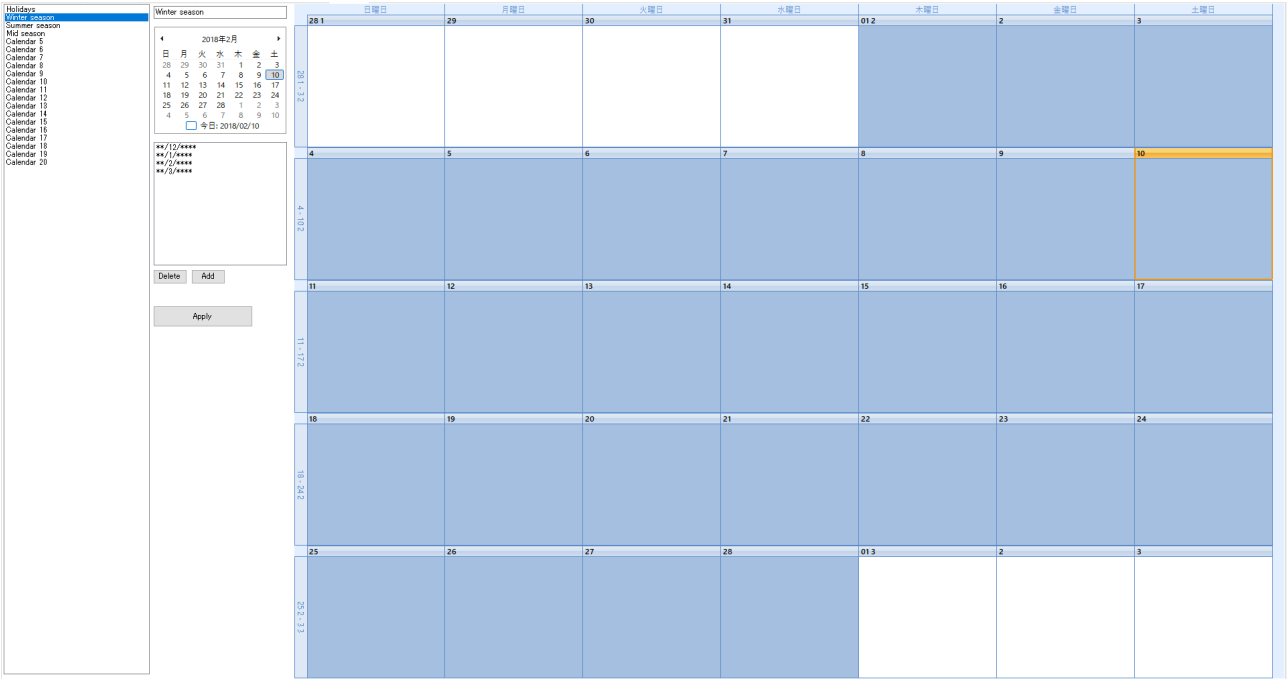
Figure 6.21 "Calendar" tab
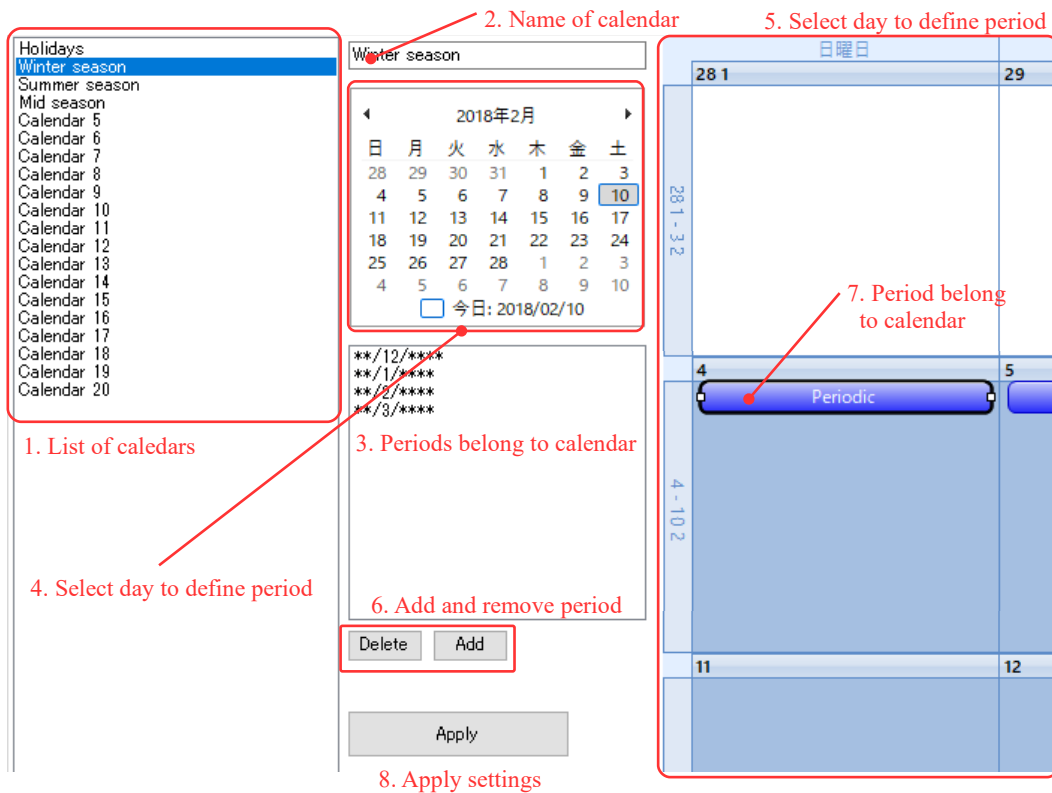
Figure 6.22 Controls to define calendar

To add a new period to the calendar, first select the date that includes the period you need to add from the calendar control (No.4). When selected, the month is displayed in detail in the No.5 control. Select a date and press the add button (No.6) to add a new period. The new period is displayed in the No.3 list box, and it is displayed as No. 7 in the No. 5 control.

If you wish to modify the added period, double click on the period you want to modify in the No.3 list box. The window shown in Figure 6.23 is displayed. You can set the day of the week, day, month, year as shown on the left of Figure 6.23. Select the day of week, date, and month from the drop box as shown in the right of Figure 6.23. "*" is a wild card. For example, if the year is set to "****", it means every year.

To delete the period, select the displayed period as shown in No.7 and press Delete. After setting the period, press Apply (No.8) to set the calendar to the emulator.
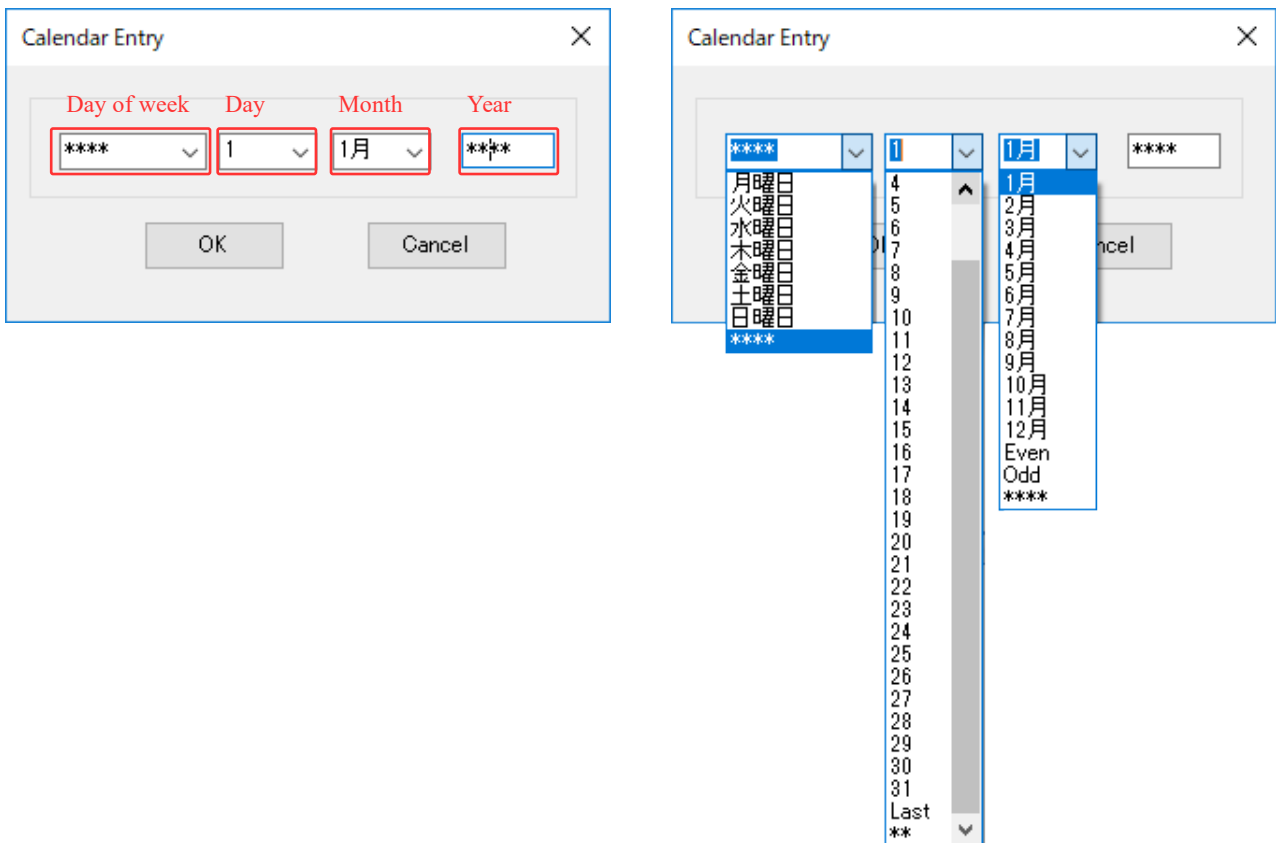
Figure 6.23 Editing period

7. Initial setting of emulator and simple BAS

You can change the operation of the emulator and simple BAS by editing the initialization file (setting.ini) in the initFiles directory. The contents of the initialization file are shown in Figure 7.1. It has the format of "setting item = setting value;", and you can change the behavior of the software by editing the "setting value".

```
CONTROL_SPEED=true;
ACCELERATION_RATE=60;
SIMULATION_START_DATE=2019/1/1;
SIMULATION_YEARS=1;
TIME_STEP=10;
THREAD_NUMBER=4;
MAKE_REF_BUILDING=true;
DATA_OUTPUT_TSPAN=1;
DATA_SAVE_YEARS=1;
OUTPUT_REF_BUILDING=false;
RANDOM_SEED=100;
BUILDING_NUMBER=1;
RELOAD_MSEC=1000;
BACKUP_NUMBER=5;
INITIAL_TEMP=20.0;
```
Figure 7.1 Contents of "setting.ini" file

1) Settings related to calculation speed

"CONTROL_SPEED" is to decide whether to control the execution speed of the emulator or not. If false, the calculation speed is not controlled, and calculation is performed at the maximum speed according to the maximum capability of the computer. If true, it controls the time progress of the emulator with acceleration with respect to real time. In this case, set the value to "ACCELERATION_RATE". In the example shown in Figure 7.1, the emulator speed is set to be 60 times the real time. Therefore, it will be calculated for one year in about 60 real days.

2) Settings related to the calculation progress method

"SIMULATION_START_DATE" is the date at the start of calculation. The emulator will start from 0:00:00 on the date set here. "SIMULATION_YEARS" is a setting to decide the number of years to simulate. Set 0 to continue simulation infinitely. "TIME_STEP" is the calculation time interval. In ordinary building energy simulation tools, it is often set to 1 h (= 3600 s), but as the emulator calculates various control equipment, it is preferable to set it to 10 s.

This emulator can perform high-speed calculation by multiple threads. This number can be set with "THREAD_NUMBER". Because the office building to be simulated is divided for each floor and parallel calculation is carried out, up to 8 threads can be expected to increase the speed.

As explained in Chapter 2.3 of Definition of "Optimization", in order to evaluate operational skills, in the emulator, the reference building that operated with standard control and the building whose operation was changed, are calculated. Therefore, if evaluation of operational skills is unnecessary, stopping the calculation of

reference building doubles the simulation speed. The reference building generation can be set by "MAKE_REF_BUILDING".

3) Settings related to data exportation

The emulator writes its internal state to a file at specific time intervals. "DATA_OUTPUT_TSPAN" is the time interval [min] for writing data. If you export data at 1-min intervals, the amount of data per year will be less than 10 GB. If the hard disk runs short of memory, the emulator automatically deletes the old data. "DATA_SAVE_YEARS" is a setting to decide the number years to save. In the example in Figure 7.1, the data of past one year is saved. If "OUTPUT_REF_BUILDING" is set to True, not only the building that changed the operation, but also the operation data of the reference building will be outputted.

4) Settings related to starting the emulator

The emulator uses random numbers to generate weather state and behavior of occupants. The seed for this random number generation is set with "RANDOM_SEED".

"BUILDING_NUMBER" is a building identification number. The BACnet device ID in the emulator is allocated based on this number. Therefore, by changing the building identification number, it is possible to maintain the BACnet device ID unique. This is useful when you want to place multiple emulators on the same network, for example, district heating / cooling.

5) Settings related to simplified BAS interface

"RELOAD_MSEC" is the time interval for redrawing the state with the simple BAS. In the example in Figure 7.1, it is 1 s (= 1,000 m sec). Redrawing rarely increases the load on the data communication of the emulator, so it should be a good value for this level.

8.   Remote control sample using BACnet

8.1   Significance of BACnet Communication

BACnet (A Data Communication Protocol for $\underline{B}$uilding $\underline{A}$utomation and $\underline{C}$ontrol $\underline{Net}$work) is an open communication protocol for integrally managing building facilities (air conditioning, electricity, sanitary, crime prevention, fire prevention, etc.). After being standardized by the ASHRAE in the United States in 1995, it became the ISO standard in 2003, and today adopted as a communication system of many building facility systems.

An important feature of the emulator developed for this championship is that it is possible to change the operation using this BACnet communication. Most of the existing building energy simulation software have changed the operation using a specific format file for each software or directly writing it to the source code. Therefore, in order to introduce an optimization method researched using these simulation software into the real building system, it was necessary to prepare a program linking the virtual and the real world.

The emulator used in this championship depicts clearly the uncertain and nonstationary nature of the real world by a probabilistic and dynamic model. If optimization is done for such highly realistic building model and control can be done by BACnet communication, the optimization method has very high practicality for real buildings as well. Thus, BACnet communication has been integrated with this emulator.

In this chapter, remote operational procedure of the emulator of the server is explained by BACnet communication. It also shows how to develop a simple optimization program that communicates with the emulator via BACnet.

8.2   Structure of BACnet Deivce

BACnet holds information in a hierarchical structure, and if you do not know this structure, you can not manage information with BACnet. Figure 8.1 shows the hierarchical structure of BACnet Device. There are one or more BACnet Devices in the network, which are distinguished by their unique Device ID. Two different BACnet Devices are shown in Figure 8.1, with the Device ID on the left being 104701 and the device ID on the right being 104702. The left (104701) is the controller of the perimeter AHU, and the right (104702) is the controller of the interior AHU of north side of the 7th floor. Each BACnet Device has one or more Objects. For example, AHU's air supply temperature, return air temperature, fan rotation speed, opening rate of chilled and hot water valve, on/off status, etc. You can identify Object by combining Instance Number and Object Type. Instance

Number is an integer and must not be duplicated in Device. Object Type represents the information that Object handles, and there are various types such as analog number, binary, date, schedule, and character string. In the example in Figure 8.1, the object on the left has an Instance Number of 1 and represents a read-only integer / real number (Analog Input), and the object on the right has an Instance Number of 2 and represents a writable boolean (Binary Output). Each Object contains one or more Property. Property holds various information about the Object. For example, the name, the description, the maximum and minimum value, and the current value of the Object. In the example in Figure 8.1, the object on the left side holds the name (Property ID = 77) and the current value (Property ID = 85) of the Object. In the Championships, it is sufficient to use the current value (Property ID = 85). In ExcelInterface described in Chapter 5 section 5.7, only Device ID and Object Type are set, and Property is assumed to be the current value.
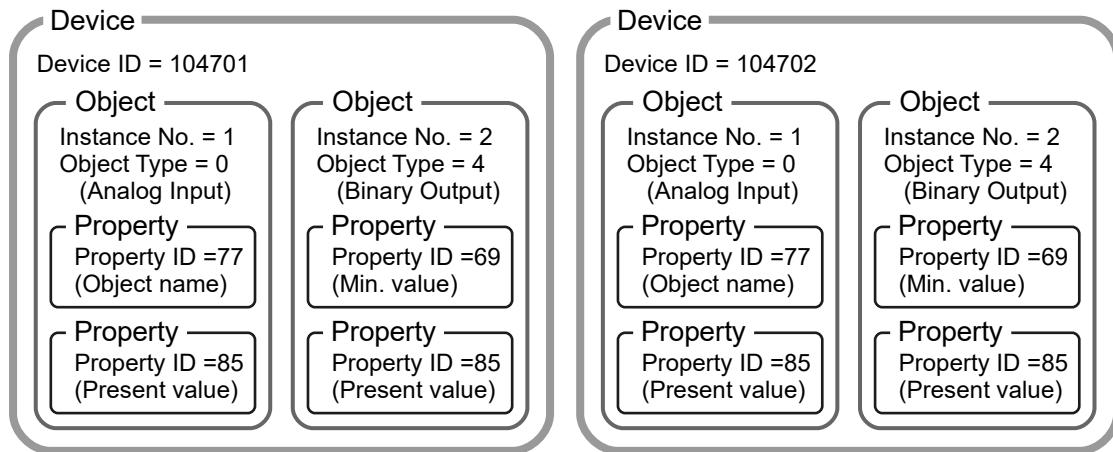
Figure 8.1 Hierarchical structure of BACnet Device

The BACnet device must have a unique ID in the range of 0 to 419403. In this emulator, the ID is given by the rule shown in Figure 8.2. The upper two digits (A, B) are the building number. In this championship, only 1 building is subject to calculation and a fixed value of "01" is used. The third and fourth digits (C, D) are allocated according to the type of controller as given below.

00: Special instrument (outside temperature, humidity, solar radiation)

01: Heat source controller (start / stop of heat source, schedule management)

02: Water tank controller (heat storage and release schedule, temperature control)

03: Pump controller (rotation speed control, operation stage)

04: AHU controller (cold and hot water valve control, fan rotation speed control, VAV control)

05: FCU controller (ON / OFF control set point temperature, operation mode)

06: Blind controller (pulled down or not, slat angle)

07: Office worker (clo value, thermal sensation, presence / absence)

99: Other general purpose devices (simulation speed, saving data)

The lower 3 digits (E, F, G) are allocated according to the number of controllers. In this emulator, the third digit is the floor number, and the first and second digits are the equipment number. For example, for fourth controller on the second floor, is the equipment number is 204. Thus, the device ID for controller of AHU-2-4 becomes "104204". The important BACnet Device to challenge the online category is the No. 199999 Device. Instance 0 of this Device manages the acceleration rate of the emulation speed. If you have confidence in the speed of your optimization program, you will be able to speed up and take on the challenge over and over in a one-month competition period. However, if the optimization program is slow, control can not catch up without slowing down the emulator execution speed.
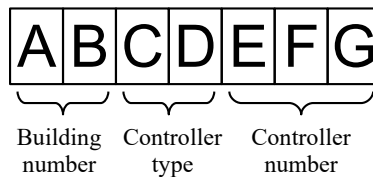
Figure 8.2 Rules of setting BACnet device ID

8.3 Development of plug-in type BACnet communication program (C#, Basic, C++)

As BACnet is an open protocol, libraries are developed in various programming languages (Java, Node.js, C#, C++, python, etc.). However, since these libraries contain all the features of BACnet, they are difficult for beginners to use. Therefore, we extracted only the minimum functions necessary to operate the emulator and provided a means to develop a BACnet communication program in a plug-in format.

Figure 8.3 shows the method of BACnet communication using plug-in. Competitors develop control programs according to a specific format (described later) and store compiled assemblies in the "Communicators" directory. When you run the emulator offline locally, the emulator dynamically loads the assemblies in this directory and simulates while reflecting their control. For online optimization, after establishing a VPN connection, start RemoteCommunicator.exe, a remote communication program. The remote communication program dynamically loads the assembly in the directory and communicates with the server side emulator via BACnet. Local validation and remote control can be performed with the same program, reducing the risk of bugs.

Plug-ins are created using object-oriented language inheritance. In the emulator, "AbstractShizukuBACnetCommunicator" which is an abstract class of plug-in is defined. If you compile a child class derived from this class and store it in the Communicators directory, it will be dynamically loaded when the emulator is run.

The following is an example of developing a plug-in that performs PMV constant control. This example is stored in the "SampleCommunicators" project in the "Shizuku Solution" in the distributed source code.

Figure 8.4 shows the function of the sample program to be developed. This is a sample that performs PMV constant control. First, the sample program uses BACnet's ReadPropertyMultiple service to request

information from the emulator. In response, the emulator sends the relative humidity and mean radiation temperature data of each air conditioning zone. Based on this data, the sample program estimates the dry-bulb temperature so that the PMV of the zone becomes zero. Next, using the WriteProperty service of BACnet, this dry bulb temperature is sent to the emulator as the set point of dry bulb temperature of the zone.
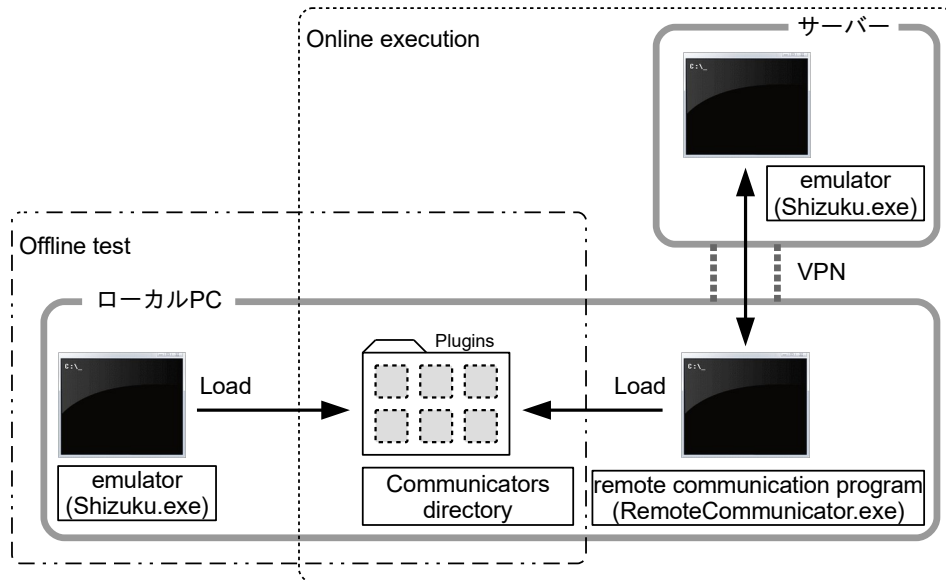
Figure 8.3 Structure of BACnet communication using plug-in
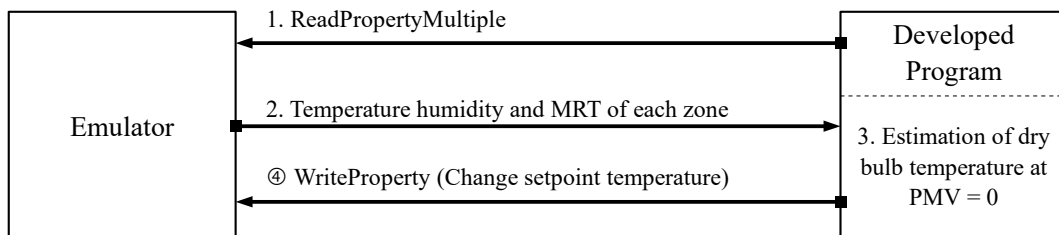
Figure 8.4 Function of the sample program

Samples of control device class is shown in Table 8.1.

The third line refers to the namespace in which the abstract class of the control device is defined. In abstract classes, several methods for BACnet communication are also defined. The fourth line is a namespace in which functions for estimating dry bulb temperature are defined from PMV. Popolo (www.hvacsimulator.net) which is an open source building thermal environment calculation library is used.

Lines 8 to 105 are the control class to be developed, and the class name is "ConstantPMVControl". In line 9, it is declared that it derives from the abstract class "AbstractShizukuBACnetCommunicator", and it becomes the control class which can be loaded by the emulator.

As the control class is called at short time intervals, updating the BACnet communication and the control value every time causes an enormous computational load. Therefore, if the time in the emulator is not advanced by much, it is desirable not to update the control value and skip the communication. Thus, the communication time interval setting is 13 lines. In this case, when 300 s have elapsed in the emulator, the control

value is updated and communication is made. The previous communication date and time is held in the DateTime type variable of line 16.

Lines 19 is constructor. No special initialization process is performed on this sample.

Lines 23 to 74 indicate main processing. The argument is the current date and time inside the emulator.

Because it is a PMV constant control, the control is enabled only between 8:00 - 23:00 when the office staff stay in the building (line 26). In line 28, the current date and time are compared with the previous communication date and time, and only when 300 s have elapsed, the control is updated. There are four air conditioners in each floor, totaling 28 units. The calculation loop for this is given in lines 31 and 33. In line 36, the BACnet device ID of the air conditioner controller is specified based on the floor number and air conditioner number. BACnet Device ID is summarized in "List of BACnet Devices" in Appendix 5.

There are various functions of BACnet communication, and the most basic processing functions are "ReadPropertyRequest" for reading the value of a single BACnet Device, "ReadPropertyMultiple Request" for reading the value of multiple BACnet Devices, and "WritePropertyRequest" for writing the value of single BACnet Device. In this sample, we first use "ReadPropertyMultipleRequest" to read a list of relative humidity and mean radiant temperature of multiple zones held by each air conditioner controller. Create a list of object information you want to communicate at lines 39 ~ 53. For example, in line 41, an object of the Analog Input Type with instance number 68 is specified. Instance numbers 68 to 73 are objects holding information about relative humidity, numbers 95 to 100 are objects holding information on mean radiant temperature. In line 56, BACnet communication is performed by passing the BACnet device ID and object information list by ReadPropertyMultipleRequest method. When the communication is successful, the result is assigned to the third argument.

Lines 58 to 70 are calculation when ReadPropertyMultipleRequest succeeds. The setpoint temperature of each zone is rewritten using WritePropertyRequest. Relative humidity and mean radiant temperature are read on lines 61 and 62, and the setpoint dry-bulb temperature at which PMV becomes 0.0 is estimated based on these values on lines 64 to 66. Popolo is used for estimation. Please refer to Ref. 12 for details on this method. Lines 67 and 68 are the specifications of objects. An object of the Analog Output Type with instance numbers 74 to 79 is specified. Analog Output is a writable object, and Analog Input is a read only object. Instance numbers 74 to 79 are setpoint dry bulb temperature and denote writable objects. In line 69, BACnet communication is performed using the ReadPropertyRequest method.

The WritePriority of the third argument of the ReadPropertyRequest method is important. In BACnet, control priorities can be set in 16 levels. The lower the number, the higher the priority. For example, Priority 1 or 2

is used for fire restoration command, fire interlock control and so on. Changing the control value by the scheduler in the emulator or changing the control value using simple BAS is performed in Priority 8. Therefore, when developing the original control class, if you update the value with Priority 8 or higher, the value is overwritten by the scheduler in the emulator. Thus, in line 69, setting it to Priority 7 prevents the scheduler from overwriting the value . On the other hand, when stopping the original controller, it is necessary to allow overwriting by the standard scheduler again. In this case, override the value with null with high priority.

Lines 95 to 104 are samples of ReadPropertyRequest. This is just a sample and is not used for this control.

Table 8.1 Source code of PMV constant control plug-in

```
1  using System;
2
3  using Shizuku;
4  using Popolo.HumanBody;
5
6  namespace SampleCommunicators
7  {
8    /// <summary>PMV 一定制御機器</summary>
9    public class ConstantPMVController : AbstractShizukuBACnetCommunicator
10   {
11
12     /// <summary>通信の時間間隔[sec]</summary>
13     private const int COMMUNICATION_INTERVAL = 300;
14
15     /// <summary>前回の通信日時</summary>
16     private DateTime lastCommunicateDTime = new DateTime(1000, 1, 1, 0, 0, 0);
17
18     /// <summary>インスタンスを初期化する</summary>
19     public ConstantPMVController() : base(){  }
20
21     /// <summary>Shizuku に含まれる BACnetDeivce と通信する</summary>
22     /// <param name="dtNow">エミュレータの現在の日時</param>
23     public override void Communicate(DateTime dtNow)
24     {
25       //8:00-23:00 のみ制御
26       if (dtNow.Hour < 8 || 23 < dtNow.Hour) return;
27       //一定間隔で通信を実行：毎回通信すると重たい！
28       if ((dtNow - lastCommunicateDTime).TotalSeconds < COMMUNICATION_INTERVAL) return;
29       lastCommunicateDTime = dtNow;
30
31       for (int flNum = 1; flNum <= 7; flNum++)  //1-7F の各階
32       {
33         for (int znNum = 1; znNum <= 4; znNum++)  //1-4 の各空調機
34         {
35           //各空調機コントローラの BACnetDevice ID
36           uint dvID = (uint)(104000 + flNum * 100 + znNum);
37
38           //読み出すオブジェクト ID リストを作成
39           bacnetObjectID[] objIDs = new bacnetObjectID[]
40           {
41             new bacnetObjectID(bacnetObjectType.analogInput, 68),
42             new bacnetObjectID(bacnetObjectType.analogInput, 69),
43             new bacnetObjectID(bacnetObjectType.analogInput, 70),
44             new bacnetObjectID(bacnetObjectType.analogInput, 71),
45             new bacnetObjectID(bacnetObjectType.analogInput, 72),
46             new bacnetObjectID(bacnetObjectType.analogInput, 73),
47             new bacnetObjectID(bacnetObjectType.analogInput, 95),
48             new bacnetObjectID(bacnetObjectType.analogInput, 96),
49             new bacnetObjectID(bacnetObjectType.analogInput, 97),
50             new bacnetObjectID(bacnetObjectType.analogInput, 98),
51             new bacnetObjectID(bacnetObjectType.analogInput, 99),
```

```
52              new bacnetObjectID(bacnetObjectType.analogInput, 100),
53          };
54
55          object[] rslts;
56          if (readPropertyMultipleRequest(dvID, objIDs, out rslts))
57          {
58            //各ゾーンの乾球温度 SP を更新する
59            for (int znN = 0; znN < 6; znN++)
60            {
61              double relHumid = (double)rslts[znN];
62              double radTemp = (double)rslts[6 + znN];
63              //PMV=0.0 となる乾球温度を逆算
64              double setPoint = ThermalComfort.GetDrybulbTemperature
65                (0, radTemp, relHumid, 0.1, 0.9, 1.2, 0);
66              setPoint = Math.Max(16, Math.Min(30, setPoint));
67              bacnetObjectID bID =
68                new bacnetObjectID(bacnetObjectType.analogOutput, (uint)(znN + 74));
69              writePropertyRequest(dvID, bID, setPoint, 7);
70            }
71          }
72        }
73      }
74    }
75
76    /// <summary>通信を終了する</summary>
77    /// <param name="dtNow">エミュレータの現在の日時</param>
78    public override void EndCommunication(DateTime dtNow)
79    {
80      for (int flNum = 1; flNum <= 7; flNum++)  //1-7F の各階
81      {
82        for (int znNum = 1; znNum <= 4; znNum++)  //1-4 の各空調機
83        {
84          //各空調機コントローラの BACnetDevice ID
85          uint dvID = (uint)(104000 + flNum * 100 + znNum);
86          for (int znN = 0; znN < 6; znN++)
87          {
88            bacnetObjectID bID = new bacnetObjectID(bacnetObjectType.analogOutput, (uint)(znN + 74));
89            writePropertyRequest(dvID, bID, null, 7);
90          }
91        }
92      }
93    }
94
95    /// <summary>readPropertyRequest のサンプル</summary>
96    private void readPropertySample()
97    {
98      //7F の AHU-1 のゾーン 1 の室温設定値を取得してコンソールに書き出す
99      bacnetObjectID bID = new bacnetObjectID(bacnetObjectType.analogOutput, 74);
100     object tmp;
101     if (readPropertyRequest(104701, bID, out tmp))
102       Console.WriteLine(((double)tmp).ToString());
103     else Console.WriteLine("ReadPropertyRequest error.");
104   }
105 }
106 }
```

If you compile the program above and place the created DLL in "Communicators" directory, the DLL will be loaded at emulator startup. As the dry bulb temperature is controlled finely according to mean radiant temperature and relative humidity, comfort improves and DRR increases greatly.

Shown above is an example of calculation on the local PC. Even when remotely controlling the emulator on the server side, you can use the same program. First, establish a VPN connection with the server as described in section 4.7 and start "RemoteCommunicator.exe" in the local PC emulator directory. The DLL in the Communicators directory is loaded, communication with the emulator on the server side is performed at 1 s

intervals of real time, and control by the developed control class is performed.
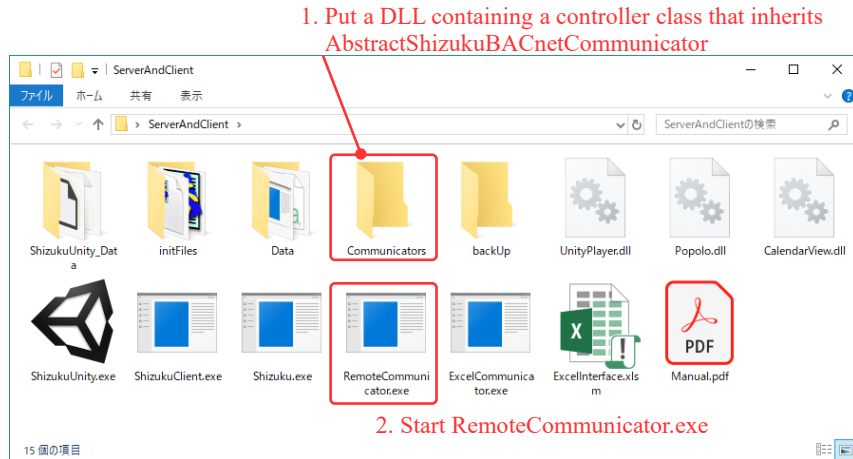
Figure 8.5 Method of remote control by original control equipment

During the real-time tuning challenge period of this championship, competition is for such remote control improvement. When calculating with the local PC, the progress of the calculation on the building model stops until the calculation of the control equipment is completed, but in real time tuning, it is necessary make sure the calculation on the server side proceeds. In the case of real buildings, the flow of time on the building side of the server will not wait for the progress of control equipment calculations.

The "AbstractShizukuBACnetCommunicator" class used in the program in Table 8.1 is intended to make it easy to create control device classes; thus, only a part of BACnet communication functions is taken out. If you use the library directly and use all the functions of BACnet communication, finer control is also possible. "http://bacnet.sourceforge.net" introduces libraries for BACnet communication developed in various programming languages.

8.4   BACnet communication by JavaScript (Node.js + BACstack)

BACstack is a BACnet communication library by JavaScript. In order to use BACstack, it is necessary to install Node.js which is server side JavaScript. If you download and install the installer from "http://nodejs.org", you can use Node.js from the command prompt. BACstack is a module to perform BACnet communication in Node.js, and BACstack will be introduced if you enter the following command.

> npm install --save bacstack

Write BACnet communication program with a text editor, and call it from Node.js to carry out BACnet communication. For example, if the program file is "bacstackSample.js", you can execute it with the following command.

> node bacstackSample.js

An example of the supply temperature control program by JavaScript is shown in Table 8.2. Lines 1 to 3 are the loading of modules. Line 1 is a module for file I/O functions, line 2 is file reading functions, and line 3 is

BACnet communication functions.

Line 6 is the IP address of the PC that communicates, and you need to rewrite it according to your own environment. Lines 7 to 9 are the BACnet Object Type and Property ID, and line 11 is the supply air setpoint temperature value.

Lines 13 to 30 are the functions for reading ExclusivePort.csv. Outputs the IP address of the PC on which the emulator is running and the port number for the BACnet Device ID as an dictionary. Execute this function on line 33 to obtain the necessary information for BACnet communication.

Create a client for BACnet communication on lines 35-39. Initialize by giving the client side IP address and the BACnet Device port number of the communication partner. As shown on line 38, the port number is obtained using the dictionary of Device ID and port number created from ExclusivePort.csv. Here, 104401 set to DV_NUM is the Device ID of AHU4-1.

The items to be read from BACnet Device are specified in 41 to 45 lines. In this example, the values of AHU supply air temperature (line 43) and the opening rate of the two-way valve of the chilled / hot water coil (line 44) are obtained. As with the previous examples, specify the communication partner by specifying the BACnet Object Type, Instance Number, and BACnet Property ID. Iterate over the 48 to 66 lines. Execute 49 ~ 65 lines every second. At line 50, ReadPropertyMultiple is performed to obtain the AHU supply air temperature and two-way valve opening rate from BACnet Device. Output the result of communication to the console on lines 51-53. Update the opening value on lines 56 and 57. If the temperature is higher than the set value SUPPLY_TEMP (defined on line 11), the two-way valve is closed, and if it is lower, it is opened. Since this example assumes heating operation, it is necessary to add switching process according to the season. The updated opening value is sent to the BACnet Device using the WriteProperty method on lines 59-64. Also in the case of WriteProperty, it is necessary to specify Object Type, Instance Number and BACnet Property ID (line 59). The line 60 is the type of numerical value, and it is a real number (BACNET_APPLICATION_TAG_REAL). Line 61 is the Write Priority. As described in the previous section, in order to prevent the PID controller from re-updating the setting, the priority is set to 7 higher than the default priority of 8.

Table 8.2 Example of air supply temperature control program by JavaScript

bacstackSample.js

```
 1  const fs = require('fs');
 2  const readline = require('readline');
 3  const bacnet = require('bacstack');
 4
 5  //定数宣言
 6  const MY_IP='192.168.11.166'; //自身のIPアドレス
 7  const OBJ_AI=0; //Analog Inputの番号
 8  const OBJ_AO=1; //Analog Outputの番号
 9  const PROP_PV=85; //Present Valueの番号
10  const DV_NUM=104401; //Device ID (AHU4-1)
11  const SUPPLY_TEMP=20;
```

```
12
13  /**
14   * ExclusivePort.csv を読み込む
15   * @return {Object} エミュレータのIPアドレス，BACnet Device IDに対するポート番号の連想配列
16   */
17  function loadExPort()
18  {
19    var lines = fs.readFileSync(__dirname + '/ExclusivePort.csv', 'utf8').toString().split('¥r¥n');
20    var pnumber = {};
21    for(let i = 1; i < lines.length-1; i++)
22    {
23      if(lines[i])
24      {
25        const item = lines[i].split(',').map((value) => { return value.replace(/^"+|"+$| /g,'') })
26        pnumber[item[0]]=item[1];
27      }
28    }
29    return {ipAddress:lines[0], portNumber:pnumber}
30  };
31
32  //ExclusivePort.csv を読み込む
33  var dat = loadExPort();
34
35  //クライアント作成
36  var client = new bacnet({
37    interface: MY_IP,
38    port: dat.portNumber[DV_NUM]
39  });
40
41  //readPropertyMultiple で取得する情報
42  const requestArray = [
43    {objectId: {type: OBJ_AI, instance: 83}, properties: [{id: PROP_PV}]}, //給気温度
44    {objectId: {type: OBJ_AO, instance: 87}, properties: [{id: PROP_PV}]}  //二方弁開度
45  ];
46
47  //1 sec(1000 msec)ごとに BACnet 通信
48  setInterval(()=>{
49    //情報取得
50    client.readPropertyMultiple(dat.ipAddress, requestArray, (err, value) => {
51      var tspy = value.values[0].values[0].value[0].value; //給気温度
52      var lift = value.values[1].values[0].value[0].value; //二方弁開度
53      console.log('supply temperature = '+tspy + ',  valve lift = '+lift);
54
55      //開度更新
56      if(tspy < SUPPLY_TEMP) lift += 0.01;
57      else lift -= 0.01;
58
59      client.writeProperty(dat.ipAddress, {type: OBJ_AO, instance: 87}, PROP_PV,
60      [{type: bacnet.enum.ApplicationTags.BACNET_APPLICATION_TAG_REAL, value: lift}],
61      {priority: 7},
62        (err, value) => {
63        console.log('writeProperty success.');
64      });
65    });
66  },1*1000);
```

8.5   BACnet communication by Python (BACpypes)

Due to the existence of TensorFlow, a machine learning library developed by Google, many researchers in the machine learning field have been using Python in recent years. This section explains how to communicate with the emulator using BACpypes (vers. 0.15.0) which is a BACnet communication library of Python (vers. 3.7.2). Control the air supply temperature of AHU in the same way as the JavaScript example in the previous section.

Python can install various packages to extend its function, and pip is a utility program to manage this.

Install BACpypes by entering the following command.

> pip install bacpypes

If you write a program with a text editor and call it from python, BACnet communication will be performed. For example, if the program file is "bacpypesSample.py", it can be executed with the following command.

> python bacpypesSample.py

An example program for controlling the air supply temperature with BACpypes is shown in Table 8.3.

Lines 3 to 15 are import of various functions. Define a class for BACnet communication on lines 17 to 112, and define a main method on lines 115 to 134.

First, BACnet Device for BACnet communication is generated in 120 to 131 lines. Line 118 is the IP address used for communication. You can use any port number other than 47808. Create an instance of RecurringCommunicator class in 132 lines using this BACnet Device.

RecurringCommunicator inherits BIPSimpleApplication and RecurringTask. The former is a class that provides basic processing of BACnet communication, and the latter is a class that provides repetitive processing of a fixed time interval. The constructors defined on lines 20 to 30 initialize these parent classes. The line 28 is reading of "ExclusivePort.csv", and the main body is defined on line 101 to 112. A dictionary in which the IP address and port number can be referenced from the BACnet Device number is assigned to the instance variable "ippadds".

Lines 33 to 98 are repeatedly executed. Generates information for executing ReadPropertyMultiple in 35 to 50 lines.In this example, PresentValue of Analog Output (supply air temperature) of Instance No. 83 and PresentValue of AnalogInput (2-way valve opening rate) of Instance No. 87 are set. The BACnet Device of the communication partner is specified in line 53. Use ippadds (Dictionary) to obtain IP address and port number from BACnet Device ID. Lines 60 to 98 are executed when there is a response from the communication partner.

If a response is received, get the values for the supply air temperature and the two-way valve opening rate (lines 63 to 66). Based on the setpoint temperature, update the opening rate of the two-way valve on lines 69 to 83, and send the updated value on lines 85 to 95 using WritePropertyRequest. It should be noted that the Write Priority is set to 7 (line 93).

Table 8.3 Example of air supply temperature control program by python

bacpypesSample.py

```
1  ### coding: UTF-8
2
3  import socket
4  from bacpypes.app import BIPSimpleApplication
5  from bacpypes.apdu import ReadPropertyRequest, ReadPropertyACK, WritePropertyRequest
6  from bacpypes.apdu import ReadPropertyMultipleRequest, PropertyReference, ReadAccessSpecification
```

```python
from bacpypes.consolelogging import ConfigArgumentParser
from bacpypes.constructeddata import Array, Any
from bacpypes.core import run
from bacpypes.iocb import IOCB
from bacpypes.local.device import LocalDeviceObject
from bacpypes.object import get_object_class, get_datatype
from bacpypes.pdu import Address
from bacpypes.primitivedata import ObjectIdentifier, Double
from bacpypes.task import RecurringTask

class RecurringCommunicator(BIPSimpleApplication, RecurringTask):

    # コンストラクタ
    def __init__(self, *args):
        COMM_INTERVAL=1000  # 通信時間間隔[msec]
        self.SUPPLY_TEMP=20 # 温度設定値

        # 親クラスのコンストラクタ
        BIPSimpleApplication.__init__(self, *args)
        RecurringTask.__init__(self, COMM_INTERVAL)

        self.ippadds=self.loadExPort()  #BACnet Device のポート番号読み込み

        self.install_task()  #繰り返し処理

    # 繰り返し処理
    def process_task(self):

        # ReadPropertyMultiple Request を生成
        read_access_spec_list=[]
        read_access_spec = ReadAccessSpecification(
            objectIdentifier='analogInput:83',
            listOfPropertyReferences=[PropertyReference(propertyIdentifier='presentValue')],
            )
        read_access_spec_list.append(read_access_spec)
        read_access_spec = ReadAccessSpecification(
            objectIdentifier='analogOutput:87',
            listOfPropertyReferences=[PropertyReference(propertyIdentifier='presentValue')],
            )
        read_access_spec_list.append(read_access_spec)

        request = ReadPropertyMultipleRequest(
            listOfReadAccessSpecs=read_access_spec_list,
            )

        # Request から IO Control Block を生成
        request.pduDestination = Address(self.ippadds[104401])
        iocb = IOCB(request)

        # Response 受信時のコールバック関数を設定
        iocb.add_callback(self.comp_read_request)
        self.request_io(iocb)

    # Response 受信時の処理
    def comp_read_request(self, iocb):
        if iocb.ioResponse:
            # 吹出温度とバルブ開度を取得
            rslts = iocb.ioResponse.listOfReadAccessResults
            tspy = rslts[0].listOfResults[0].readResult.propertyValue.cast_out(Double)
            lift = rslts[1].listOfResults[0].readResult.propertyValue.cast_out(Double)
            print('supply temperature = '+ str(tspy) + ',  valve lift = '+str(lift))

            # 温度設定値にもとづいてバルブ開度設定値を更新
            if tspy < self.SUPPLY_TEMP:
                lift += 0.01
            else:
                lift -= 0.01

            # バルブ開度設定値を送信
            request = WritePropertyRequest(
                objectIdentifier=('analogOutput:87'),
```

```
88                  propertyIdentifier='presentValue'
89                  )
90              request.pduDestination = Address(self.ippadds[104401])
91              request.propertyValue = Any()
92              request.propertyValue.cast_in(Double(lift))
93              request.priority=7
94              iocb = IOCB(request)
95              self.request_io(iocb)
96
97          if iocb.ioError:
98              print('ERR: ' + str(iocb.ioError))
99
100
101      # "ExclusivePort.csv"の読み込み。return: dict(BAC Add.:IPaddress + Port No.)
102      def loadExPort(self):
103          dict={}
104          with open("ExclusivePort.csv",mode="r",encoding="utf_8") as fileobj:
105              ipadd = next(fileobj).strip()
106              while True:
107                  try:
108                      pair = [int(x.strip()) for x in next(fileobj).split(',')]
109                      dict[pair[0]]=ipadd + ':' + str(pair[1])
110                  except StopIteration:
111                      break
112          return dict
113
114
115  def main():
116
117      # 0xBAC0(47808)で通信
118      ipadd = socket.gethostbyname(socket.gethostname())+':47808'
119
120      # 通信用 BACnet Device を作成
121      myDevice = LocalDeviceObject(
122          objectName="MyDevice",
123          address=ipadd,
124          objectIdentifier=599,
125          maxApduLengthAccepted=1024,
126          segmentationSupported="segmentedBoth",
127          maxSegmentsAccepted=1024,
128          vendorIdentifier=15,
129          foreignPort=0,
130          foreignTTL=30,
131          )
132      my_application = RecurringCommunicator(myDevice, ipadd)
133
134      run()
135
136
137  if __name__ == "__main__":
138      main()
```

8.6   Cloudization of optimization program

If you develop your own optimization program as described in Sections 8.3 to 8.5, you can control much more detailed than using a scheduler. However, to realize this, it is necessary to maintain BACnet communication stably for 24 hours. Therefore, there is a risk that the performance of the optimization program itself may be strained by whether it can maintain a stable computing or communication environment. If the optimization program can be clouded as shown in Figure 8.6, you can externalize computer and network quality assurance. Please confirm the difference from Figure 2.3. In this section, we will explain how to build an environment for optimization from an external server like this.

In recent years, an inexpensive virtual private server (VPS) service for individuals has appeared, and it

can be used at a cost of several hundred yen per month, as long as it is an emulator communication program of this championship. In this example, we use ConoHa, a VPS service from GMO Cloud Corporation. The server performance is "Memory: 512 MB, CPU: 1 Core, SSD: 20 GB, OS: CentOS 7.6, Cost: 630 yen / month".
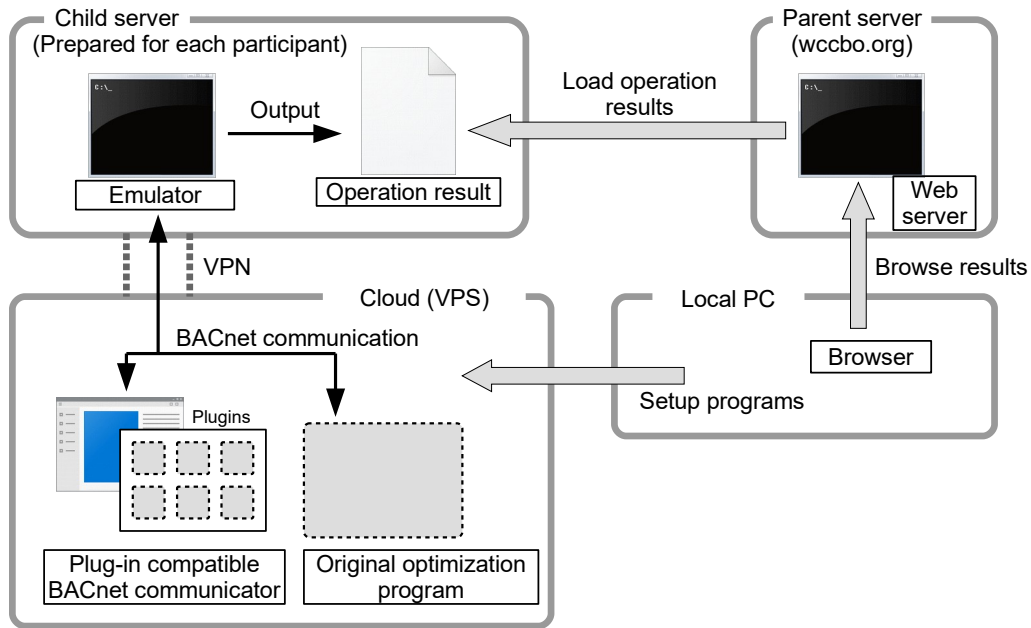
Figure 8.6 Cloudization of optimization program

The following explains how to set up a VPN connection with the VPS. Here, the IP address of the server on which the emulator is executed is "133.130.125.199", the name of the connecting user is "emulator_user", the password is "emulator_pass", and the Pre Shared Key (PSK) is "emulator". In practice, these values are different for each championship participant and are distributed in paper on the day of the event.

As already explained in Section 4.7, Windows can establish a VPN connection using default softwares. Although in CentOS, you need to install some software and build an environment. The Championships use L2TP / IPsec VPN. This is a combination of the Layer 2 Tunneling Protocol (L2TP), which communicates between computers, and the Security Architecture for Internet Protocol (IPsec), which performs encryption. Install software called xl2tp and libreswan to realize each function.

```
# yum install -y xl2tp libreswan
```

Because these software use ports 1701, 500 and 4500, we exclude these ports from the firewall.

```
# firewall-cmd --permanent --add-port=1701/udp
# firewall-cmd --permanent --add-port=500/udp
# firewall-cmd --permanent --add-port=4500/udp
# firewall-cmd --reload
```

There are two configuration files for L2TP. The contents are rewritten as follows. Please note that the underlined part will be different for each championship participant.

vi /etc/xl2tpd/xl2tpd.conf

	/etc/xl2tpd/xl2tpd.conf
[lac myl2tp] name = myl2tp lns=133.130.125.199 require chap = yes refuse pap = yes require authentication = yes ppp debug = yes pppoptfile = /etc/ppp/options.xl2tpd length bit = yes	

vi /etc/ppp/options.xl2tpd

	/etc/ppp/options.xl2tpd
name emulator_user netmask 255.255.255.0 password emulator_pass noauth mtu 1410 mru 1410 nodefaultroute proxyarp logfile /var/log/xl2tpd.log noipdefault	

There are also two configuration files for ipsec. The contents are rewritten as follows.

vi /etc/ipsec.d/l2tp-ipsec.conf

	/etc/ipsec.d/l2tp-ipsec.conf

conn myl2tp
    authby=secret
    pfs=no
    auto=start
    keyingtries=3
    rekey=no
    ikelifetime=8h
    keylife=1h
    type=transport
    #left=%defaultroute
    left=192.168.0.151
    leftprotoport=17/1701
    right=133.130.125.199
    rightprotoport=17/1701	

vi /etc/ipsec.d/default.secrets

	/etc/ipsec.d/default.secrets
%any 133.130.125.199 : PSK "emulator"	

After setting, restart the two software. Also, change the setting so that it will be enabled automatically at system startup.

systemctl restart ipsec xl2tpd

systemctl enable ipsec

systemctl enable xl2tpd

Finally, enter the following command to establish a VPN connection with the emulator server. If you check the network status with "ifconfig", you can see that ppp0 is added and the local IP address of 192.168.0.151

is assigned.

xl2tpd-control connect myl2tp

ifconfig

```
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST>  mtu 1410
        inet 192.168.0.151  netmask 255.255.255.255  destination 192.168.0.1
        ppp  txqueuelen 3  (Point-to-Point Protocol)
        RX packets 3  bytes 30 (30.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 3  bytes 30 (30.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

We described from sections 8.3 to 8.5 about examples of developing optimization programs in five languages: .NET Framework (C#, Basic, C++), Node.js (JavaScript), and bacpypes (Python). All of these have an execution environment in Linux (CentOS). Therefore, the developed optimization program can be run on VPS as it is after testing on a local PC.

8.7   Example of visualization of indoor information by Unity

BACnet communication expands the possibilities of developing various user interfaces. Figures 8.7 and 8.8 show an example in which the office on the 4th floor on the south was made 3 dimensional using the game engine Unity. Nine VAV blowing status (Supply air volume and temperature) and thermal environment information of each zone are visualized.

Figure 8.7 Visualization of VAV blowing information by Unity

Figure 8.8 Visualization of occupants' thermal sensation by Unity

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Appendix 1　Architectural design drawing

26200 6300 10000

14000

事務室1

電気室

熱源・衛生機械室
受水槽
受水槽
ST-PU-1 排水ポンプ
ST-Plgr-2
HECH-1
ST-Plgr-3
HECH-2
AHPM-Pch-3

蓄熱槽 460t

倉庫

35500

階段1

空調機械室

DPS1

給湯室

EPS1

EV

EV

EVホール

EV

EV

倉庫

EPS2

DPS2

階段2

倉庫

2500

5000

3350

更衣室1

自販機コーナー

SK

休憩室

更衣室2

PS

事務室2

MWC

WWC

10650

風除室

中央監視室
警備室

6500 6500 6500 10000 6500 6500

1800 6400 1800

42500

図面番号		作成	DATE	名 称:H25年省エネルギー基準に準拠した算定・判断の方法及び解説 モデル建物	図面番号
		E.Togashi	縮 尺 Scale= 1:200 (A3)	図面名: 1階 平面図	

「平成25年省エネルギー基準に準拠した算定・判断の方法及び解説」からの変更点
・柱を追加
・柱追加に合わせて扉位置を調整
・共用部からメンテ可能にEPS1の扉位置を変更

事務室1

SA OA EA RA

空調機械室

階段1

DPS1

給湯室

EPS1

EV

EV

EVホール

EV

EV

EPS2

DPS2

階段2

倉庫

14000

2500

5000

事務室2

自販機コーナー

SK

3350

PS

MWC

WWC

10650

35500

6500　6500　6500　10000　6500　6500

42500

記事				作 成	DATE	名 称:H25年省エネルギー基準に準拠した算定・判断の方法及び解説 モデル建物	図面番号
				E.Togashi	縮 尺 Scale= 1:200 (A3)	図面名: 2〜7階 平面図	

Appendix 2　　HVAC design drawing

機器表

左側機器リスト

機器番号	機器名称	機器仕様	付属電動機 電源	容量kW	起動方式	台数	据付位置	備考
GAR-1 Gas Absorption Refrigerator	直だき吸収冷温水機	型式 ガスだき、ヘビーロード対応（年間8,000h） 冷却能力 528 kW（150USRT） 冷房COP 1.36 以上（高位発熱基準） 冷水 15.0 ℃ → 7.0 ℃ 流量 946 L/min 圧力損失 90.1 kPa以下 冷却水 38.0 ℃ → 32.0 ℃ 流量 2,096 L/min 圧力損失 51.9 kPa以下 燃料消費量 388 kW（31.1 Nm3/h） 加熱能力 348 kW（1,253MJ/h） 暖房COP 0.90 以上（高位発熱基準） 温水 36.0 ℃ → 32.0 ℃ 流量 624 L/min 圧力損失 39.2 kPa以下 燃料消費量 387 kW（30.9 Nm3/h） 燃料 都市ガス13A 容量制御範囲 20 % ～ 100 % 付属機器 溶液ポンプ1 / 溶液ポンプ2 / 冷媒ポンプ / バーナーブロア 付属品 制御盤（遠方発停、遠方出口温度設定、運転故障表示端子付） 防振装置（防振スプリング）、機器ガバナ 感震器付ガス遮断弁、煙突（30m、煙道ダンパ付）、ほか標準付属品一式 仕様 屋外型（外装：ガルバリウム鋼板製）、耐重塩害、冷水・冷却水変流量制御、低NOxバーナー	3φ-200V	25.6kVA 溶液ポンプ1 1.1kW 溶液ポンプ2 0.3kW 冷媒ポンプ 0.3kW バーナーブロア 0.75kW	L-S	1	RF階	参考外形寸法・重量 2,300mmW×3,900mmL×2,400mmH 機器重量 7,500kg 運転重量 8,000kg
AHPM-1 Air Heat Source Heat Pump	空冷ヒートポンプ モジュールチラー（5ユニット連結）	型式 インバータ型・ポンプ内蔵型 冷却追掛運転時 冷却能力 425 kW（121USRT） 外気温度 35.0 ℃ 冷水出入口温度 15.0 ℃ → 7.0 ℃ COP 3.55 以上 入力 119.7 kW以下 冷水流量 761 L/min 機内揚程 70 kPa 機外揚程 115 kPa 冷却蓄熱運転時 冷却能力 404 kW（115USRT） 外気温度 35.0 ℃ 冷水出入口温度 13.0 ℃ → 5.0 ℃ COP 3.45 以上 入力 117.1 kW以下 冷水流量 724 L/min 加熱追掛運転時 加熱能力 382 kW（1,373MJ/h） 外気温度 0.0 ℃ 温水出入口温度 36.0 ℃ → 44.0 ℃ COP 3.36 以上 入力 113.5 kW以下 温水流量 684 L/min 機内揚程 56 kPa 機外揚程 130 kPa 加熱蓄熱運転時 加熱能力 379 kW（1,364MJ/h） 外気温度 0.0 ℃ 温水出入口温度 38.0 ℃ → 46.0 ℃ COP 3.20 以上 入力 118.5 kW以下 温水流量 679 L/min 耐圧 冷水 1.0 MPa 温水 1.0 MPa 容量制御範囲 10 % ～ 100 % 冷水変流量仕様 60 % ～ 100 % 冷却水変流量仕様 60 % ～ 100 % 付属品 インバータ盤、防振スプリングその他標準付属品一式 仕様 耐重塩害、凝縮器圧力・温度、蒸発器圧力・温度、高圧力、油圧、油温、電流値、LTD、圧縮機電流値を中央に表示する 冷水・冷却水変流量制御、水熱源、熱源水はブライン	3φ-200V	圧縮機 INV 7.5 kW ×3台 ファン 1.0 kW ×3台 ポンプ 0.75 kW	INV	1	RF階	参考外形寸法・重量 3,000mmW×5,200mmL×2,300mmH 機器重量 5,200kg 運転重量 5,300kg （5ユニット）
CT-1 Cooling Tower	冷却塔（直だき吸収冷温水機系統）	型式 開放式冷却塔-向流型、超低騒音型、内部配管、耐重塩害仕様、高層階仕様 冷却能力 877 冷却水 38.0 ℃ → 32.0 ℃ 流量 2,096 L/min 冷却塔揚程 50.0 kPa以下 外気湿球 28.0 ℃WB 耐震 2.0 G 付属品 階段、上部散水槽蓋、上部平面、ファン内部点検 連通接続口（250A）、飛散防止金具 吸込側消音器（-20dB）、風向固定ルーバー（羽根硬度固定60度、方向45度固定） 吐出側消音器（-26dB）材質：ガルバリウム鋼板（1.2t） 吸音材：ポリエステル不織布充填 防振装置 高性能スプリング防振架台（3Hz）	3φ-200V	5.5	INV	1	RF階	参考外形寸法・重量 2,300mmW×3,700mmL×3,400mmH 機器重量 1,200kg 運転重量 3,000kg
HECH-1	熱交換器（蓄熱）	型式 プレート（SUS316）、ガスケット：EPDM 冷却能力 404 kW（115USRT） 冷水（蓄熱槽側） 14.0 ℃ → 6.0 ℃ 流量 724 L/min 圧力損失 60.0 kPa以下 冷水（AHPM側） 5.0 ℃ → 13.0 ℃ 流量 724 L/min 圧力損失 60.0 kPa以下 加熱能力 379 kW（1,364MJ/h） 温水（蓄熱槽側） 37.0 ℃ → 45.0 ℃ 流量 679 L/min 圧力損失 60.0 kPa以下 温水（AHPM側） 46.0 ℃ → 38.0 ℃ 流量 679 L/min 圧力損失 60.0 kPa以下 必要伝熱面積 100 ㎡以上	-	-	-	1	1階 熱源機械室	参考外形寸法・重量 500mmW×2,000mmL×2,000mmH 機器重量 1,100kg
HECH-2	熱交換器（放熱）	型式 プレート（SUS316）、ガスケット：EPDM 冷却能力 340 kW（97USRT） 冷水（蓄熱槽側） 6.0 ℃ → 14.0 ℃ 流量 609 L/min 圧力損失 60.0 kPa以下 冷水（二次側） 15.0 ℃ → 7.0 ℃ 流量 609 L/min 圧力損失 60.0 kPa以下 加熱能力 340 kW（1,224MJ/h） 温水（蓄熱槽側） 45.0 ℃ → 37.0 ℃ 流量 609 L/min 圧力損失 60.0 kPa以下 温水（二次側） 36.0 ℃ → 44.0 ℃ 流量 609 L/min 圧力損失 60.0 kPa以下 必要伝熱面積 90 ㎡以上	-	-	-	1	1階 熱源機械室	参考外形寸法・重量 500mmW×2,000mmL×2,000mmH 機器重量 1,100kg
Tkex-1 Expansion Tank	膨張タンク（冷水系統）	型式 開放式 有効容量 500 L 外形寸法 1,000 φ×1,000 mmH 耐圧 2.0 G 付属品 架台（1000mmH, SUS製）、圧力計、安全弁、その他標準付属品	-	-	-	1	RF階	
Tkex-2 Expansion Tank	膨張タンク（温水系統）	型式 開放式 有効容量 500 L 外形寸法 1,000 φ×1,000 mmH 耐圧 2.0 G 付属品 架台（1000mmH, SUS製）、圧力計、安全弁、その他標準付属品	-	-	-	1	RF階	
ST-1	冷温水蓄熱槽	温度成層型 蓄熱槽効率90%以上 温度条件 冷水：6℃/14℃ 温水：45℃/37℃ 有効容量 460 ㎥ 水深 7 m 断熱防水、Tラップ（背かご付）、水面度接材 分配器 円盤スロット開口式 PVC製 寸法 1,800 φ × 300mmH 上下 各6段 流速 0.050 m/s 吸込、吐出用	-	-	-	-	RF階	断熱断熱防水：建築工事
		電極棒 10 P/列						
CF-1	冷却水薬注装置	型式 タンク一体型ユニット、屋外型 タンク容量 200L 制御方式 給水流量の比例注入方式（流量計付属） 薬液仕様 防スケール、防藻、殺藻、耐レジオネラ剤 材質 PVC製 吐出量 0.5～4.5L/h 500 kPa（ポンプ2台、自動交互運転） 付属品 レベルスイッチ、一括警報信号、ステンレスパン（水抜き付）、他標準付属品一式	1φ-100V	0.2	L-S	1	RF階	参考外形寸法・重量 900×800×1,000mm 運転重量：330kg
AV-1	蓄熱槽脱気装置	型式 タンク一体型ユニット 処理水量 3m3/h 溶存酸素量 10.0mg/L → 0.5mg/L 窒素ガス流量 0.45Nm3/h（純度99.9%） 窒素発生装置 付属品 制御盤、平架台、その他一式	3φ-200V	0.9 2.0	L-S	1	1階 熱源機械室	参考外形寸法・重量 2,100×1,900×3,800mm 機器重量 3,400kg 参考外形寸法（発生装置） 1,000×1,000×1,800mm

右側機器リスト（パッケージ空調機・ファン）

機器番号	機器名称	機器仕様	付属電動機 電源	容量kW	起動方式	台数	据付位置	備考
PAC-1	パッケージ型空調機	型式 空気熱源マルチパッケージ、冷暖同時 冷媒 R32A 冷房能力 28.0 kW 消費電力 8.46 kW COP 3.31 以上 加熱能力 31.5 kW 消費電力 9.06 kW COP 3.48 以上	3φ-200V	3.0 ×1 3.0 ×1 0.2 ×2	L-S	1	RF階	参考外形寸法・重量 1,300×800×1,800mm 運転重量：4030kg
PAC-2	パッケージ型空調機	型式 空気熱源マルチパッケージ、冷房専用 冷媒 R32A 冷房能力 22.4 kW 消費電力 5.72 kW COP 3.92 以上	3φ-200V	4.7 ×1 0.26 ×2	L-S	1	RF階	参考外形寸法・重量 1,300×800×1,800mm 運転重量：4030kg

PAC-1 室内機

機器番号	冷房	暖房	ファン	形式	系統
PAC-1-1	5.6 kW	6.3 kW	43 W	4方向	1F 中央監視室
PAC-1-2	5.6 kW	6.3 kW	43 W	4方向	1F 中央監視室
PAC-1-3	5.6 kW	6.3 kW	43 W	4方向	1F 休憩室
PAC-1-4	3.6 kW	4.0 kW	28 W	壁掛け	1F 男子更衣室
PAC-1-5	3.6 kW	4.0 kW	28 W	壁掛け	1F 女子更衣室

外気および室内条件はJIS8616 2015条件に従う

PAC-2 室内機

機器番号	冷房	暖房	ファン	形式	系統
PAC-2-1	11.2 kW	- kW	240 W	天吊	1F 電気室
PAC-2-2	11.2 kW	- kW	240 W	天吊	1F 電気室

排気ファン・給気ファン

機器番号	機器名称	機器仕様		風量	静圧	消費電力	電源	容量kW	起動方式	台数	据付位置	備考
FE-1-1	排気ファン	片吸込シロッコ、天吊		700 CMH	150 Pa	73 W	1φ-100V	0.2	L-S	1	1F 男子便所	
FE-1-2	排気ファン	片吸込シロッコ、天吊		700 CMH	150 Pa	73 W	1φ-100V	0.2	L-S	1	1F 女子便所	
FE-1-3	排気ファン	片吸込シロッコ、天吊		100 CMH	150 Pa	10 W	1φ-100V	0.2	L-S	1	1F 男子更衣室	
FE-1-4	排気ファン	片吸込シロッコ、天吊		100 CMH	150 Pa	10 W	1φ-100V	0.2	L-S	1	1F 女子更衣室	
FE-1-5	排気ファン	片吸込シロッコ、天吊		100 CMH	150 Pa	10 W	1φ-100V	0.2	L-S	1	1F 休憩室	
FE-1-6	排気ファン	片吸込シロッコ、天吊		200 CMH	150 Pa	21 W	1φ-100V	0.2	L-S	1	1F 中央監視室	
FE-1-7	排気ファン	片吸込シロッコ、天吊		600 CMH	150 Pa	63 W	1φ-100V	0.2	L-S	1	1F 電気室	
FE-1-8	排気ファン	片吸込シロッコ、天吊		1,200 CMH	150 Pa	125 W	1φ-100V	0.2	L-S	1	1F 熱源機械室	
FE-2-7-1	排気ファン	片吸込シロッコ、天吊		900 CMH	150 Pa	94 W	1φ-100V	0.2	L-S	6	2-7F 男子便所	
FE-2-7-2	排気ファン	片吸込シロッコ、天吊		900 CMH	150 Pa	94 W	1φ-100V	0.2	L-S	6	2-7F 女子便所	
FE-2-7-3	排気ファン	片吸込シロッコ、天吊		100 CMH	150 Pa	10 W	1φ-100V	0.2	L-S	6	1F 空調機械室	
FS-1-1	給気ファン	片吸込シロッコ、天吊		100 CMH	250 Pa	17 W	1φ-100V	0.2	L-S	1	1F 男子更衣室	プレフィルタ+中性能フィルタ
FS-1-2	給気ファン	片吸込シロッコ、天吊		100 CMH	250 Pa	17 W	1φ-100V	0.2	L-S	1	1F 女子更衣室	プレフィルタ+中性能フィルタ
FS-1-3	給気ファン	片吸込シロッコ、天吊		100 CMH	250 Pa	17 W	1φ-100V	0.2	L-S	1	1F 休憩室	プレフィルタ+中性能フィルタ
FS-1-4	給気ファン	片吸込シロッコ、天吊		200 CMH	250 Pa	35 W	1φ-100V	0.2	L-S	1	1F 中央監視室	プレフィルタ+中性能フィルタ
FS-1-5	給気ファン	片吸込シロッコ、天吊		600 CMH	250 Pa	83 W	1φ-100V	0.2	L-S	1	1F 電気室	プレフィルタ
FS-1-6	給気ファン	片吸込シロッコ、天吊		1,200 CMH	200 Pa	167 W	1φ-100V	0.2	L-S	1	1F 熱源機械室	プレフィルタ

ポンプ表

機器番号	機器名称	系統	型式	口径[mm]	流量[L/min]	揚程[kPa]	INV	起動 φ/V	電動機kW	その他	防振	制御盤	メカニカルシール	台数	設置場所	備考
GAR - Pch - 1	直だき吸収冷温水機 冷温水ポンプ	GAR-1	片吸込渦巻ポンプ	80×65	946	150	○	INV 3/200	7.5		SP	○		1	RF階	300mmW×800mmL×900mmH
GAR - Pcd - 1	直だき吸収冷温水機 冷却水ポンプ	GAR-1	片吸込渦巻ポンプ	125×100	2,096	150	○	INV 3/200	7.5		SP	○		1	RF階	500mmW×1,200mmL×900mmH
ST - P1ch - 1	冷温水蓄熱 蓄熱側一次ポンプ	ST	片吸込渦巻ポンプ	80×65	724	150	○	INV 3/200	3.7		SP	○		1	1階 熱源機械室	300mmW×800mmL×400mmH
ST - P2ch - 1	冷温水蓄熱 放熱二次ポンプ	ST	片吸込渦巻ポンプ	80×65	609	150	○	INV 3/200	2.2		SP	○		1	1階 熱源機械室	300mmW×800mmL×400mmH
CT - PU - 1	冷却塔補給水ポンプユニット	-	給水ポンプユニット	40×40	63	500	○	INV 3/200	3.7 ×2		SP			1	RF階	400mmW×900mmL×500mmH, 1083kW/3台, Δt=8
HDc - P2c - 1～3	冷水二次ポンプ		片吸込渦巻ポンプ	80×65	647	200	○	INV 3/200	3.7		SP	○		3	RF階	400mmW×900mmL×500mmH, 701kW/3台, Δt=8
HDh - P2h - 1～3	温水二次ポンプ		片吸込渦巻ポンプ	80×65	419	200	○	INV 3/200	2.2		SP	○		3	RF階	300mmW×800mmL×400mmH, 701kW/3台, Δt=8

ヘッダー表

機器番号	機器名称	寸法 口径φ(mm)	長さL(mm)	材質 鋼管	架台 H(mm)	耐圧(MPa)	32A	40A	50A	65A	80A	100A	125A	150A	200A	250A	300A	350A	400A	450A	500A	650A	台数	据付位置
HDcs	冷水往1次ヘッダ	350	3,000	STPY 9.5t	1000	0.98	5					10											1	RF階
HDcr	冷水還ヘッダ	350	3,000	STPY 9.5t	1000	0.98	5					10											1	RF階
HDhs	温水往1次ヘッダ	350	3,000	STPY 9.5t	1000	0.98	5					10											1	RF階
HDhr	温水還ヘッダ	350	3,000	STPY 9.5t	1000	0.98	5					10											1	RF階
HDcs - 2	冷水往2次ヘッダ	350	3,000	STPY 9.5t	1000	0.98	5					10											1	RF階
HDhs - 2	温水往2次ヘッダ	350	3,000	STPY 9.5t	1000	0.98	5					10											1	RF階

〈ヘッダー共通仕様〉
(1) 圧力計・温度計共
(2) 冷水・温水ヘッダーは溶融亜鉛メッキとする。
(3) 蓄熱槽ヘッダは季節に応じて分割して使用可能なものとする

空調機（AHU・FCU）表

	系統	台数	能力 冷房kW	暖房kW	加湿kg/h	吹出条件 冷房CDB	冷房CWB	暖房CDB	暖房WDB	コイル入口条件 冷房CDB	冷房CWB	暖房CDB	暖房WDB	コイル出口条件 冷房CDB	冷房CWB	暖房CDB	暖房WDB	コイル水量 冷水L/min	温水L/min	水圧損失 冷水kPa	温水kPa	全熱交換器	全熱交換器出入口条件（夏季） 外気CDB	排気CDB	給気CDB	全熱交換器出入口条件（冬季） 外気CDB	排気CDB	給気CDB	風量 CMH	機外静圧 Pa	機内静圧 Pa	電動機kW

（以下 AHU-1-1～AHU-7-4、FCU-1、FCU-2 の詳細数値は省略 — 微細な数値多数）

〈共通仕様〉特記無き限り以下記仕様による
型式 コンパクト型、四方式
送風機 多翼送風機（JIS高効率モーター仕様）／インバータ付／3相200Vとする
フィルタ プレフィルタ＋中性能フィルタを備える／プレフィルタJIS重量法40%とする／中性能フィルタ 比色法 80%以上／洗浄再生可能型とする
コイル 冷水入口条件 7℃～15℃／温水入口条件 44℃～36℃／通過風速2.5m/s以下とする
防振 スプリング防振とする

〈特記事項〉
1) 冷却コイルの列数の決定にあたっては10%の余裕を見込むこと、最小6列以上とすること
2) 温水コイルおよび加湿器の選定にあたっては10%の余裕を見込むこと、（保湿制御対応）
3) フレーム・ボルト・ナットはSUS製とする
4) インバータ本体および制御盤は自動制御工事に、無用バイパスする
5) インバータはACL、DCL付とする
6) 外装は溶融アルミニウム・亜鉛鋼板（板厚0.8mm以上）による耐腐食ウレタン樹脂とする
7) サンドイッチパネル構造とし、厚み30mm以上とする
8) マリンランプおよびスケージングの電源・配線・スイッチを附属する
9) 電源の分電盤は配電盤メーカー工事とする
10) 二方弁は自動制御工事による
11) 加湿用電磁弁・フィルタ一定圧は制御機構に自動制御工事とする
12) ドレンパンはSUS304製とし、空気接触部はすべてウレタン断熱塗付とする
13) 排水管接続は25mm以上とする
14) コイルの水抜きバルブを附属すること
15) 電動機は4極とする
16) ファンは電動機直結とし、ベルト掛けによる場合は適正なエスベルトを使用する
17) 床上30cm以上の点検口は、手掛足掛けとし、取付用フック付とする

付属品 ドレンパン（SUS304）、動力盤、自動制御盤、高性能スプリング防振架台（固有振動数-2.3Hz）、その他標準付属品一式

記事		作成	DATE	名称：H25年省エネルギー基準に準拠した算定・判定の方法及び解説 モデル建物	図面番号
		縮尺	N.S	図面名：	

空気熱源ヒートポンプ 運転モード

	AHPM-V1	AHPM-V2	AHPM-V3	AHPM-V4	AHPM-Pch-1	AHPM-Pch-2
加熱蓄熱	Close	Open	Close	Open	Off	On
加熱追掛	Close	Open	Open	Close	On	Off
冷却蓄熱	Open	Close	Open	Close	Off	On
冷却追掛	Open	Close	Open	Close	On	Off

直焚吸収冷温水機 運転モード

	GAR-V1	GAR-V2
加熱	Open	Close
冷却	Close	Open

蓄熱槽 運転モード

	ST-V1	ST-V2	ST-V3	ST-V4	ST-V5	ST-P1ch-2
加熱蓄熱	Open	Open	Open	Close	Close	Off
加熱放熱	Open	Open	Close	Open	Control	On
冷却蓄熱	Close	Open	Open	Close	Close	Off
冷却放熱	Open	Close	Close	Open	Control	On

〈二次ポンプ制御〉
・負荷流量にもとづき増減段を行う
・吐出圧が一定となるようにバイパス弁とインバータの比例制御を行う

〈蓄熱槽制御〉
・蓄熱時は定格能力でポンプを運転する
・放熱時は放熱用熱交換器出口温度(T-ST1)が設定値になるように放熱ポンプの回転数およびバイパス弁を制御する

〈冷却塔制御〉
・冷却水出口温度 T-CT1 によってファンの発停制御を行う
・冬季には稼働しないため、三方弁によるバイパス制御は行わない

RF 熱源機械置き場

1F 熱源機械室

Blow water
Makeup water
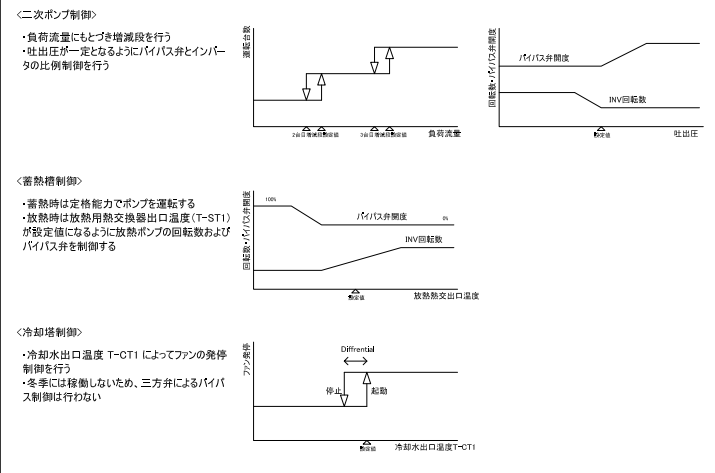
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記事		作成	DATE	名 称;H25年省エネルギー基準に準拠した算定・判断の方法及び解説 モデル建物	図面番号
		縮 尺 N. S		図面名: 熱源システム系統図	

1 Heat source operating stage control

START

T_D — N / Y

$n = 1$

$n = n+1$

$n < N_{st}-1$ — N / Y

$m = 0,\ q_{N,n} = 0$

$m = m+1$

$m < N_{hs}$ — N / Y

$q_{up,n+1} = q_{N,n+1} \times R_{up}$
$q_{lw,n+1} = q_{N,n+1} \times R_{lw}$

hs_m operatable ? — N / Y

$q_{N,n+1} \mathrel{+}= q_{hs,m}$

$n = 1$

$n = n+1$

$q < q_{up,n}$ — N / Y

$n_{st,min} = n$

$n = N_{st}$

$n = n-1$

$q_{lw,n} \leq q$ — N / Y

$n_{st,max} = n$

$n_{st} < n_{st,min}$ — N / Y

$n_{st} = n_{st} +1$

$n_{st,max} < n_{st}$ — N / Y

$n_{st} = n_{st} -1$

$n_{st} = \mathrm{Max}\,(\,\mathrm{Min}\,(N_{st},\ n_{st}),1)$

$m = 0$

$m < N_{hs}$ — N / Y

$op_{hs,m} = (st_{hs,m} < n_{st})$

$\Delta T_{sply} = T_{lmt} - T_{sply}$ (Heating)
$\Delta T_{sply} = T_{sply} - T_{lmt}$ (Cooling)

$0 < \Delta T_{sply}$ — N / Y

$n_{st} = n_{st} +1$

END

q	: Heat load	
$q_{up,n}$	: Upper limit of nth stage heat load.	
$q_{lw,n}$	: Lower limit of nth stage heat load.	
$q_{hs,m}$	: Heat capacity of mth heat source.	
N_{op}	: Number of operable heat source.	
N_{st}	: Number of stage.	
n_{st}	: Current stage.	
T_D	: Time to delay changing operating stage.	
$op_{hs,m}$	: Is m^{th} heat source operating.	
$st_{hs,m}$	: Stage to operate m^{th} heat source.	
R_{up}	: Limit to increase operating stage. (1.0)	
R_{lw}	: Limit to decrease operating stage. (0.8)	
T_{lmt}	: Temperature limit to increase stage.	

T_{sply}	: Supply header water temperature.

2 | Secondary pump system rotation rate and operating number control

START

$T_D < T_{Pass}$ — N / Y

$$v_{up,Npmp} = v_N \times (n_{pmp} + R_{up} - 1)$$
$$v_{lw,Npmp} = v_N \times (n_{pmp} + R_{lw} - 2)$$

$v < v_{lw,Npmp}$ — N / Y

$v_{up,Npmp} < v$ — N / Y

$P_{set} = a \times v + b$

$P < P_{set}$ — N / Y

$0 < Lft_{bp}$ — N / Y

$n_{pmp} = 1$ — N / Y

$n_{pmp} = n_{pmp} - 1$

$n_{pmp} = n_{pmp} + 1$

$R_{pmp} = 1.0$

$Lft_{bp} = Lft_{bp} - 0.1$

$R_{pmp} = P_{set} / P \times R_{pmp}$

$Lft_{bp} = Lft_{bp} - 0.1$

Start counting T_{Pass}

END

Graph labels: 1, 2, 3; $v_{lw,2}$, $v_{up,1}$, $v_{lw,3}$, $v_{up,2}$, v

P; $P_{set} = a \times v + b$; v
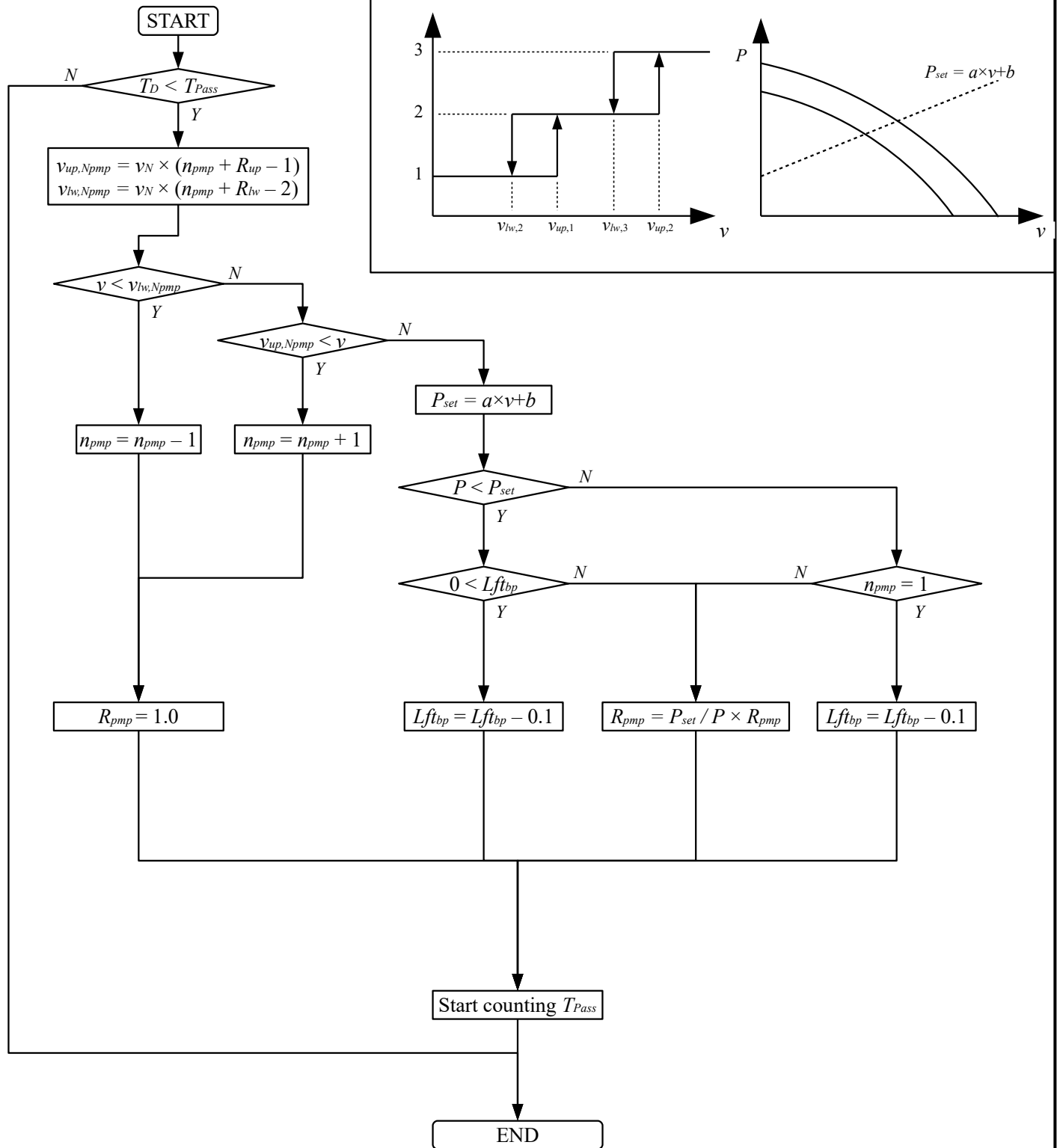
T_D	: Time to delay changing number of operating units.
n_{pmp}	: Number of operating pumps.
R_{pmp}	: Rotation ratio of pump. (0.5~1.0)
P	: Pressure
P_{set}	: Set point of pressure.
a	: Coefficient for constant terminal pressure control.
b	: Coefficient for constant terminal pressure control.
v	: Volumetric flow rate.
T_{Pass}	: Time passage from last control.
Lft_{bp}	: Lift of bypass valve (0.0~1.0)

3 | VAV system supply air temperature control

START

FLG_{dset} — N / Y

$T_{spns} < T_{spn}$ — N / Y

$n = 0$

$FLG_{min,n}$ — N / Y

FLG_{min} = true

$FLG_{max,n}$ — N / Y

FLG_{max} = true

$n = n+1$

$n = N_{vav}$ — N / Y

Cooling? — N / Y

FLG_{max}? — N / Y

$T_s = T_s + \Delta T_s$

FLG_{min}? — N / Y

$T_s = T_s - \Delta T_s$

FLG_{max}? — N / Y

$T_s = T_s - \Delta T_s$

FLG_{min}? — N / Y

$T_s = T_s + \Delta T_s$

Control water valve with PID from T_s

END
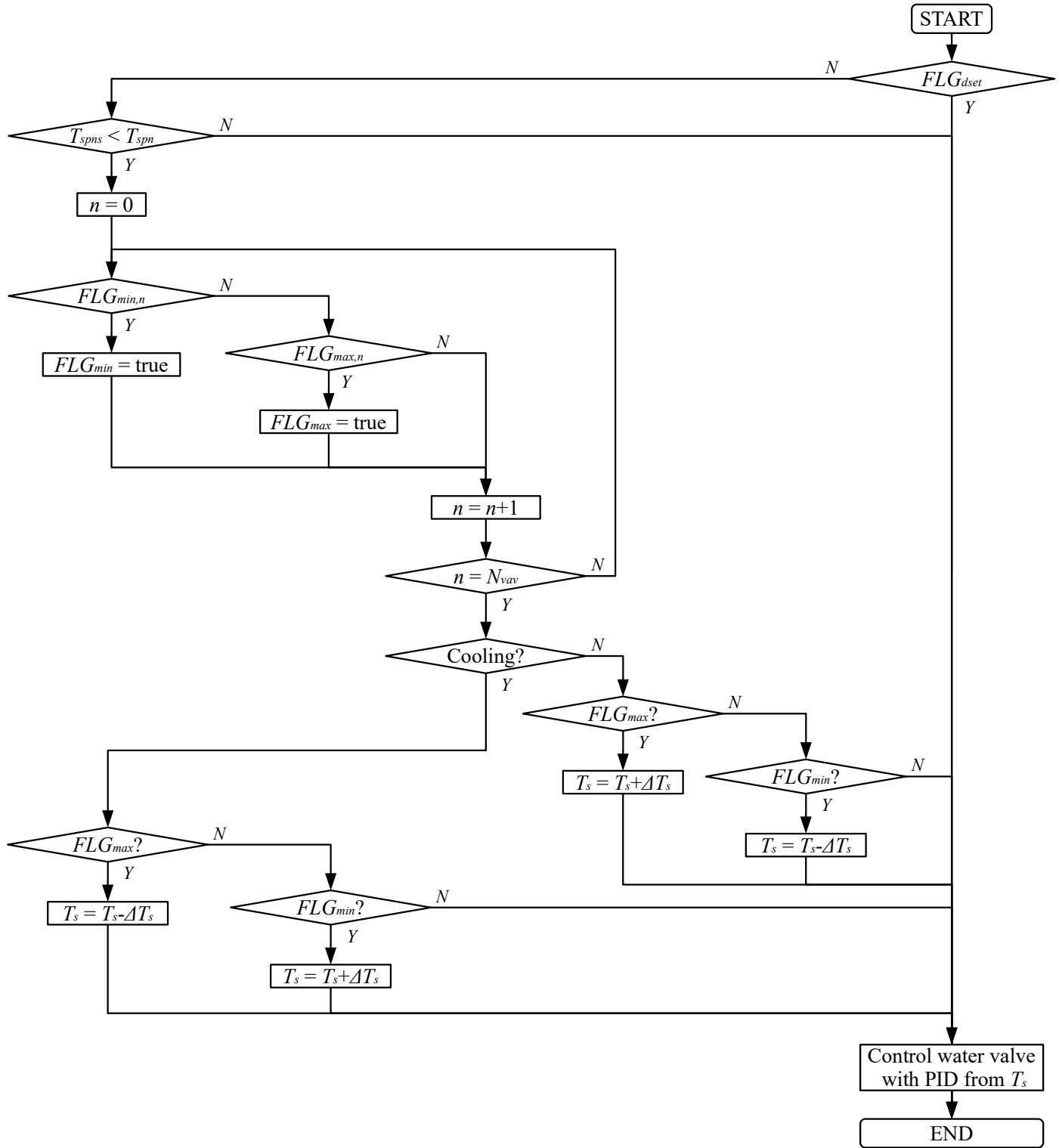
T_{spns}	: Temperature control interval. (5min)
T_{spn}	: Time passage from last temperature control.
FLG_{min}	: Air flow reaches to minimum.
FLG_{max}	: Air flow reaches to maximum.
N_{vav}	: Number of VAV units.
T_s	: Supply air set point temperature.
ΔT_s	: Set point temperature variation range. (0.5 ºC)
FLG_{dset}	: Set point temperature is provided directly.

* :

4 | VAV system air flow rate control

START

$T_{spns} < T_{spn}$ — N

Y

$V_{sum} = V_0$
$R_{op,max} = R_{op,0}$

$n = 1$

$V_{sum} = V_{sum} + V_n$

$R_{op,max} < R_{op,n}$ — N

Y

$R_{op,max} = R_{op,n}$

$n = n+1$

$n = N_{vav}$ — N

Y

$R_{op,max} = 1.0$ — N

Y

$R_{op,max} < R_{op,lmt}$ — N

Y

$\Delta R_{fan} = \Delta R_{fan} + \Delta R_{stp}$

$\Delta R_{fan} = \Delta R_{fan} - \Delta R_{stp}$

$R_{fan} = V_{sum}/V_{Nom} + \Delta R_{fan}$

END
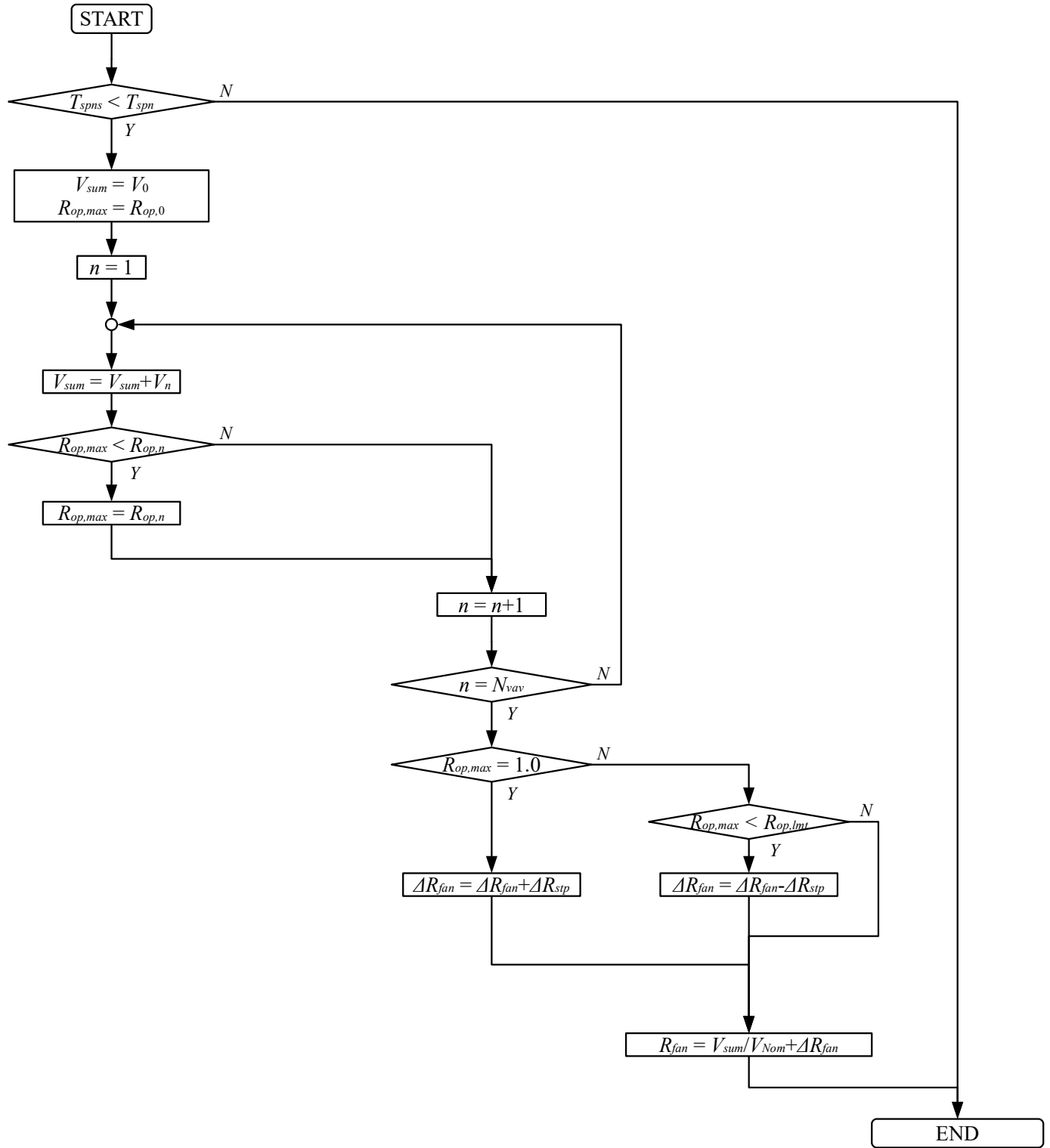
T_{spns}	: Air flow control interval. (1 min)	*	:
T_{spn}	: Time passage from last air flow control.		:
V_{sum}	: Total air flow set point.		:
V_n	: Air flow set point of nth VAV unit.		:
N_{vav}	: Number of VAV units.		:
$R_{op,n}$	: Opening rate of nth VAV unit.		:
$R_{op,lmt}$	: Opening rate limit of VAV units. (0.9)		:
$R_{op,max}$	: Maximum opening rate of VAV units.		:
ΔR_{fan}	: Shift of fan rotation ratio.		:
ΔR_{stp}	: Fan rotation ratio variation range. (0.01)		:
R_{fan}	: Fan rotation ratio.		:
V_{Nom}	: Nominal air flow rate of fan.		:
:			:

Characteristics of module heat pump chiller

Water flow rate = Nominal flow rate
Temperature difference = 5ºC × partial load rate

Cooling mode

Outdoor temperature = 20 ºC, 25 ºC, 30 ºC, 35 ºC

Chilled water temperature = 4 ºC

Chilled water temperature = 7 ºC

Chilled water temperature = 10 ºC

Heating mode

Outdoor temperature = 15 ºC, 10 ºC, 5 ºC, 0 ºC

Hot water temperature = 50 ºC

Hot water temperature = 45 ºC

Hot water temperature = 40 ºC

Characteristics of direct fired absorption chiller

Chilled or hot water flow rate = Nominal flow rate, Cooling water flow rate = Nominal flow rate
Temperature difference = 5ºC × partial load rate

Cooling mode

Cooling water temperature = 20 ºC
24 ºC
28 ºC
32 ºC

Chilled water temperature = 4 ºC

Primary COP [-]
Partial load rate [-]

Heating mode

Hot water temperature = 40, 45, 50 ºC

Primary COP [-]
Partial load rate [-]

20 ºC
24 ºC
28 ºC
32 ºC

Chilled water temperature = 7 ºC

Primary COP [-]
Partial load rate [-]

20 ºC
24 ºC
28 ºC
32 ºC

Chilled water temperature = 10 ºC

Primary COP [-]
Partial load rate [-]

Characteristics of pumps
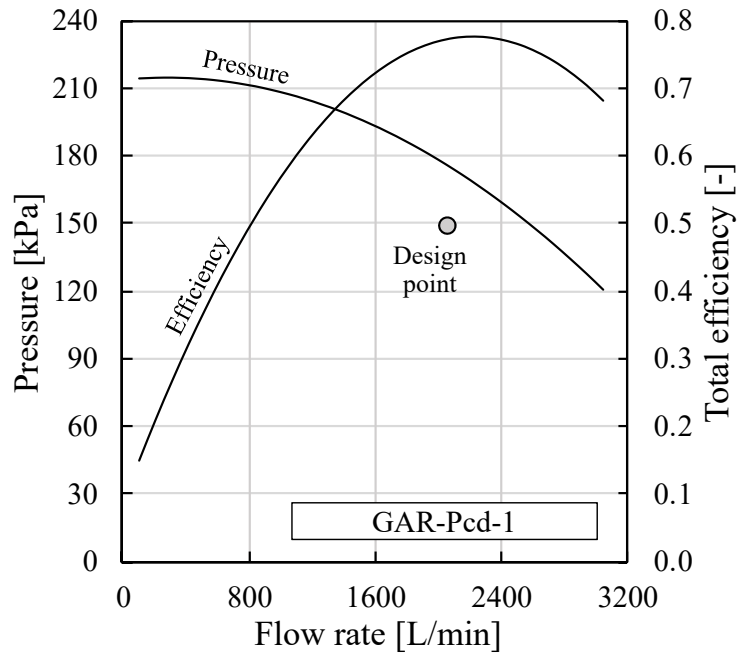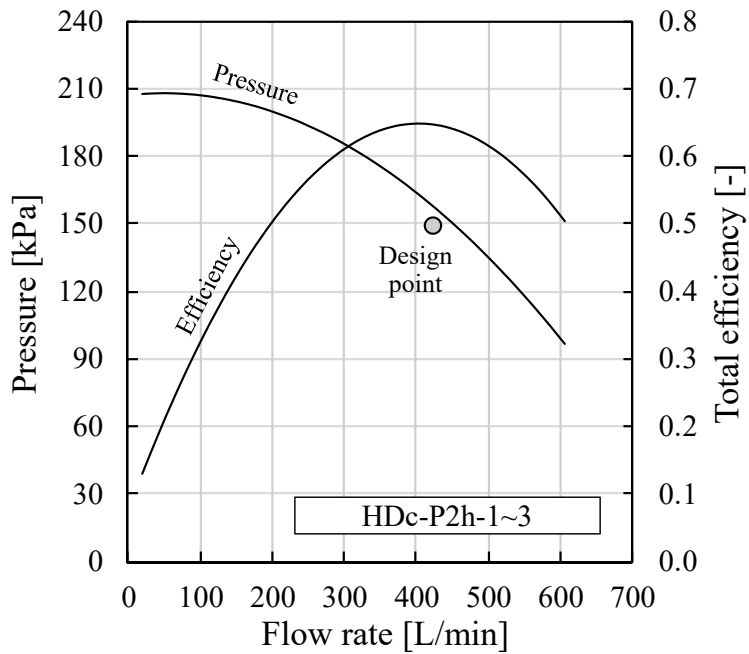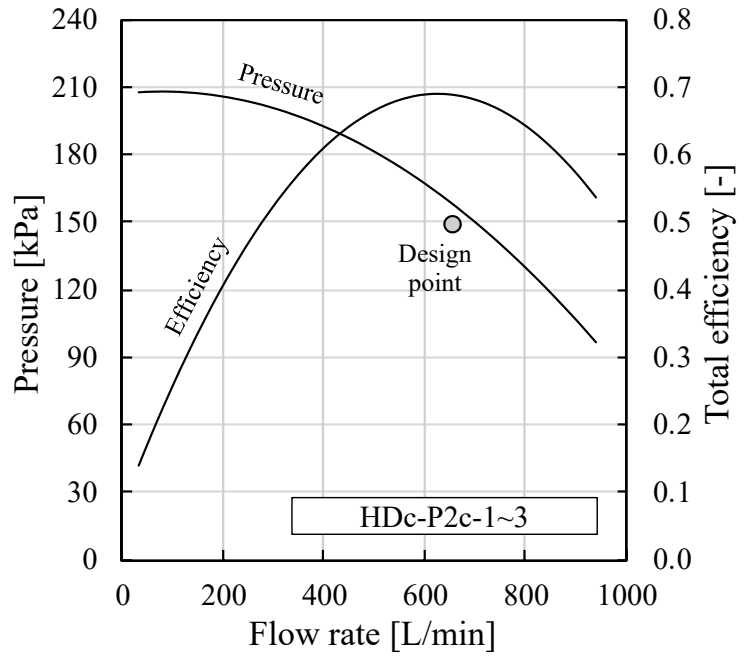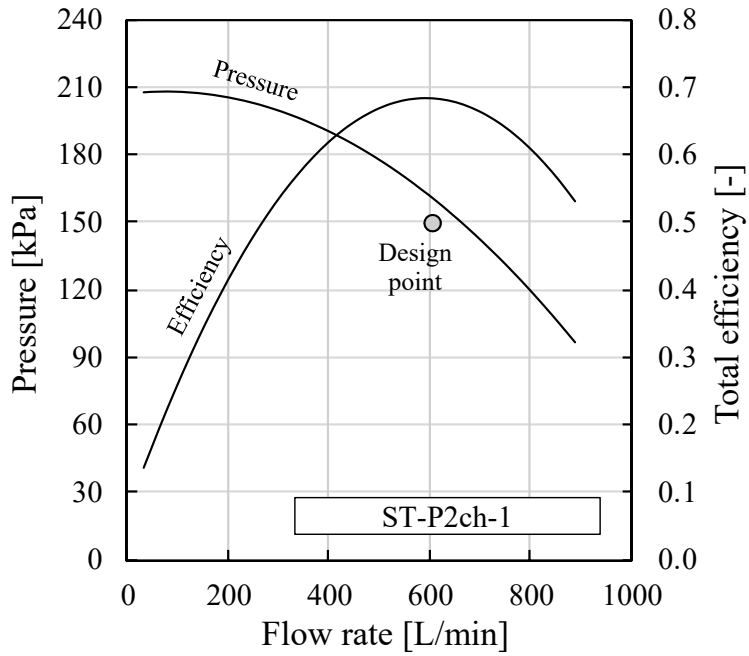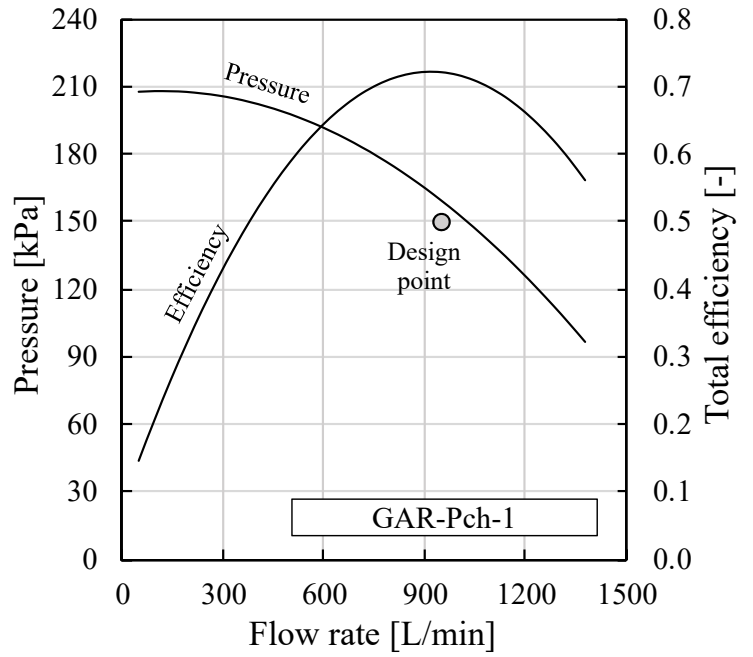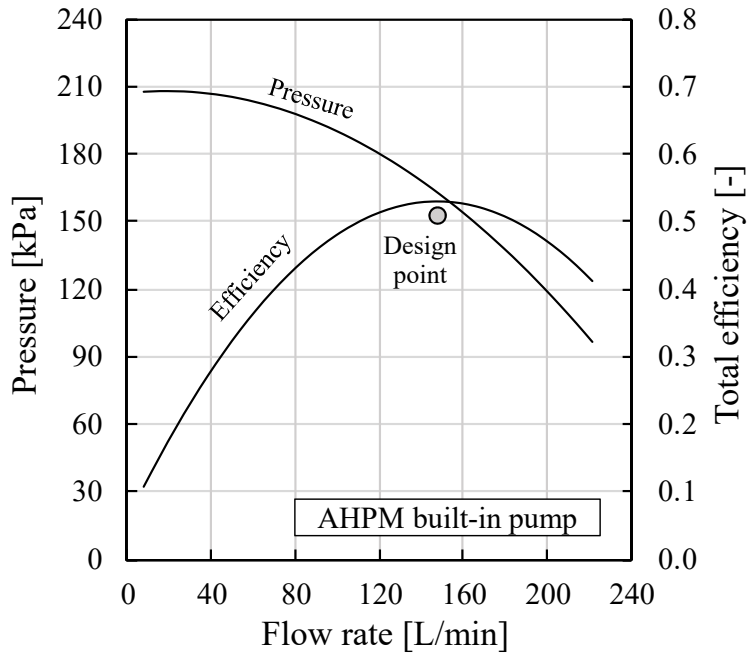
Characteristics of cooling and heating coils

Inlet air state = 26.5 ºCDB / 20.0 ºCWB

Inlet air state = 19.5 ºCDB / 13.5 ºCWB

Characteristics of cooling and heating coils

AHU-*n*-1

AHU-*n*-1

AHU-*n*-2

AHU-*n*-2

AHU-*n*-3

AHU-*n*-3

AHU-*n*-4

AHU-*n*-4
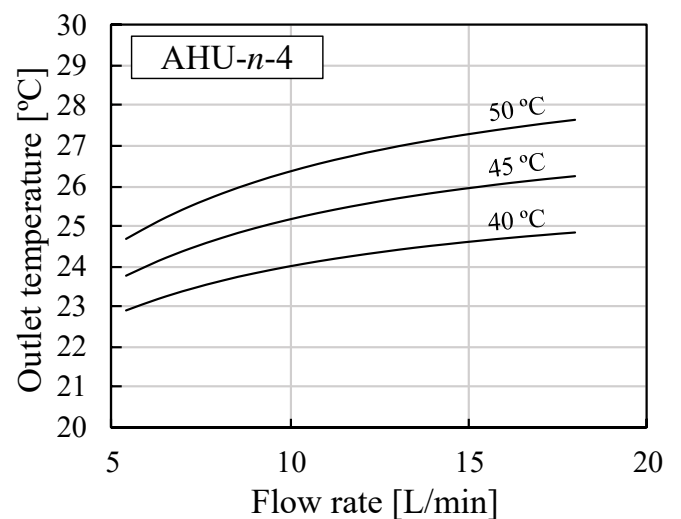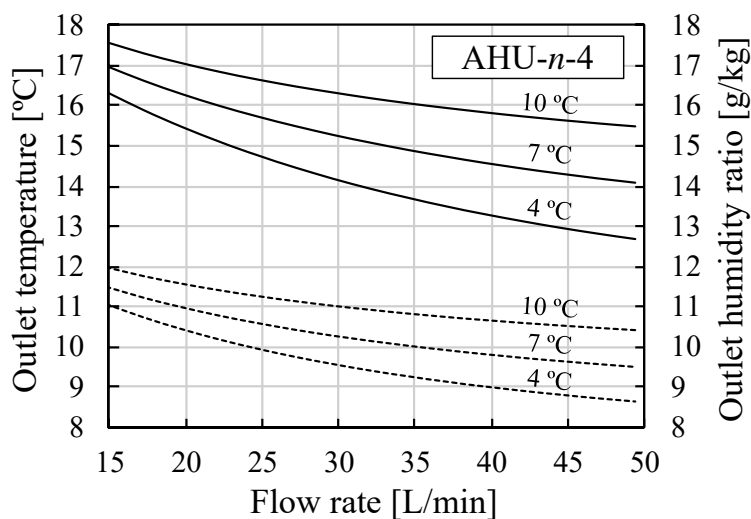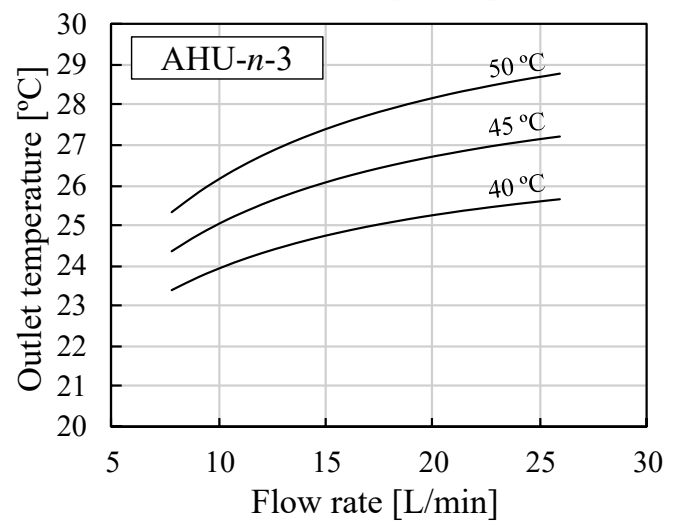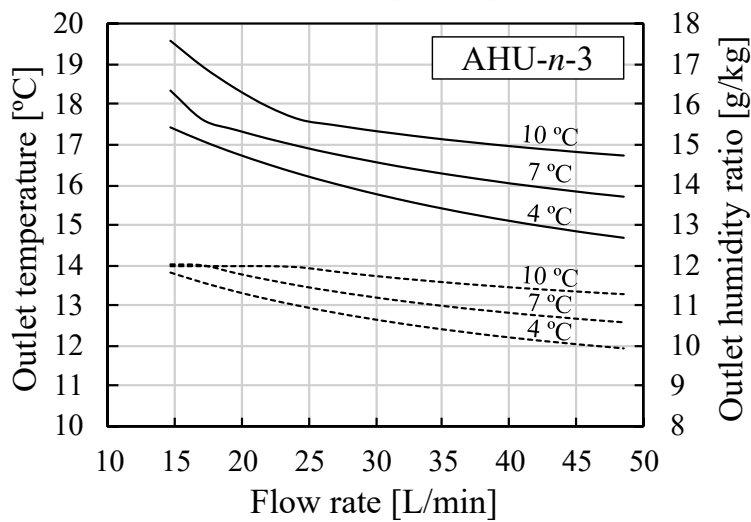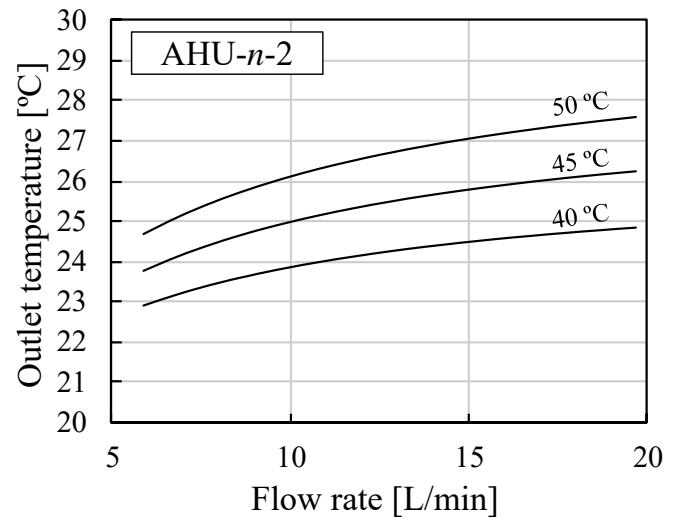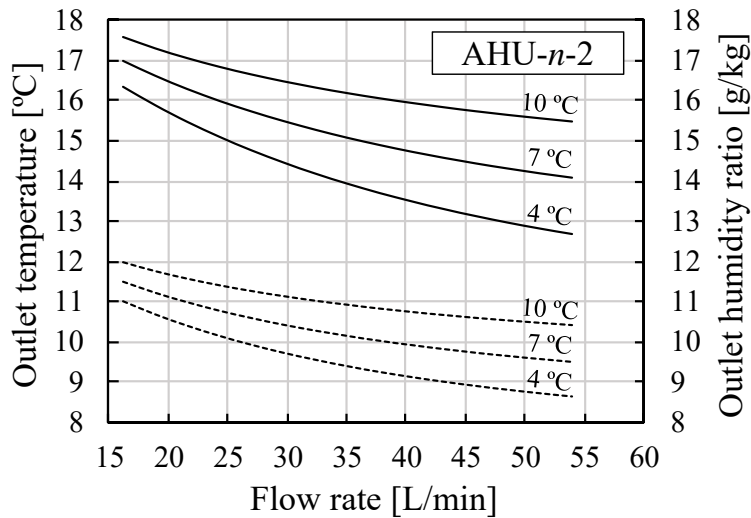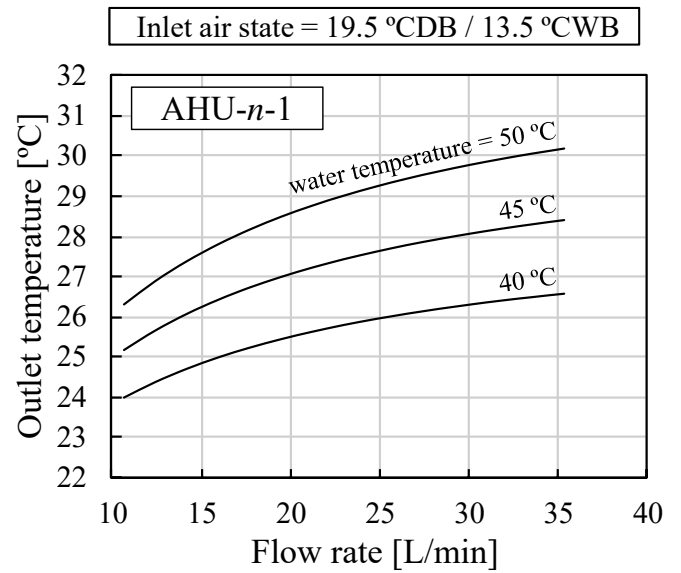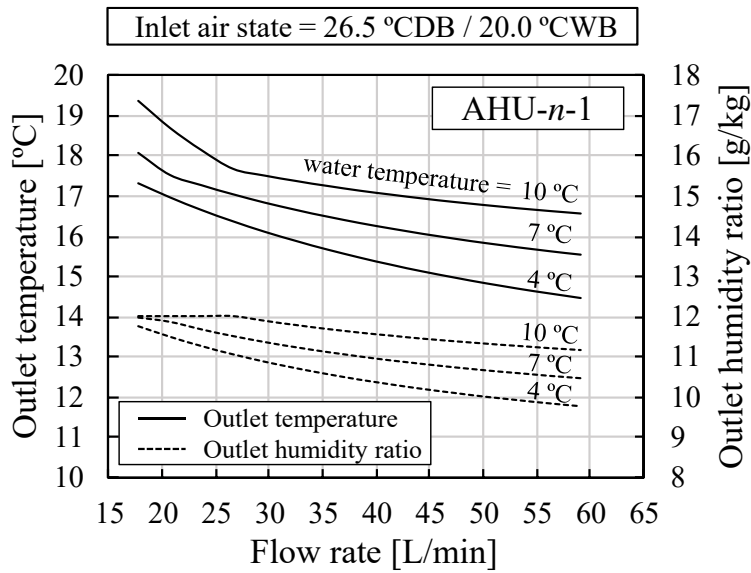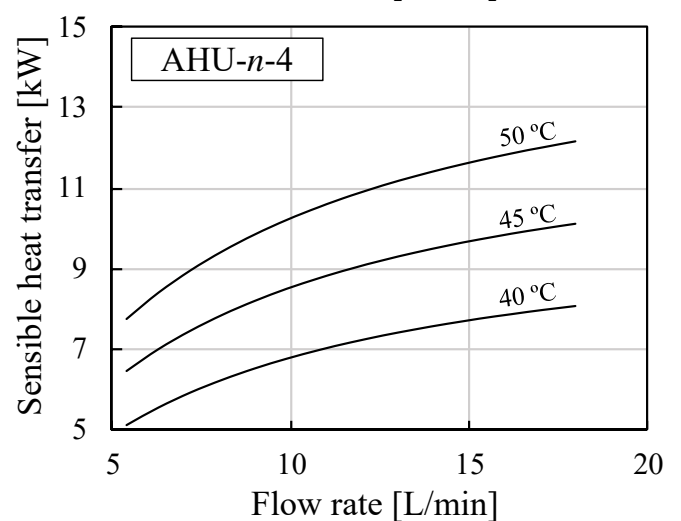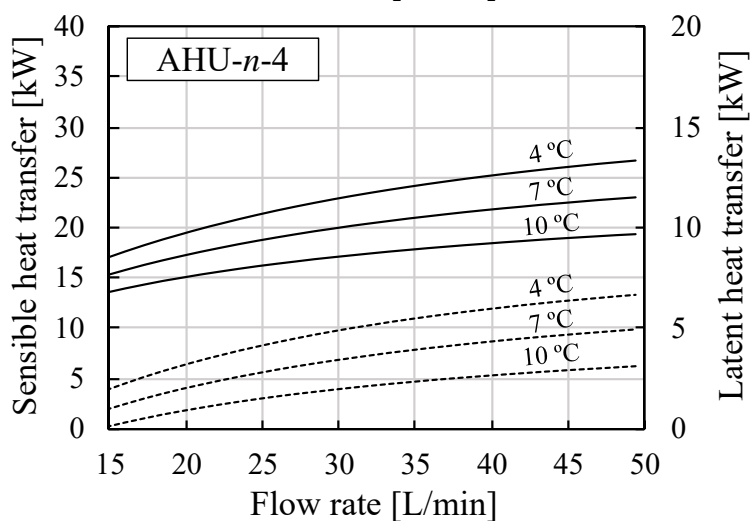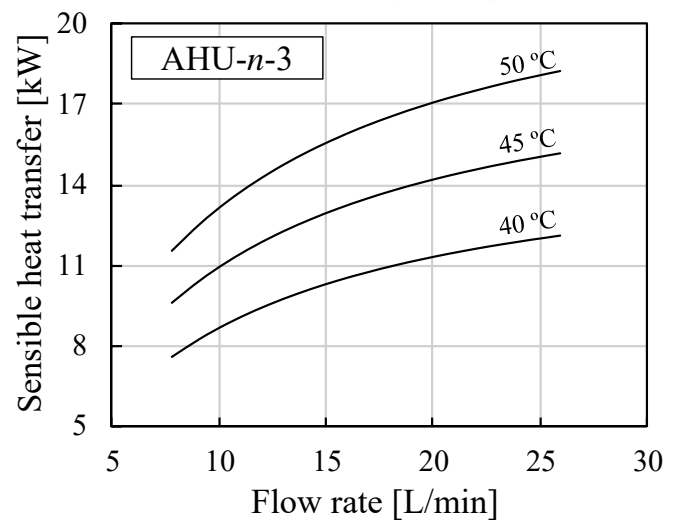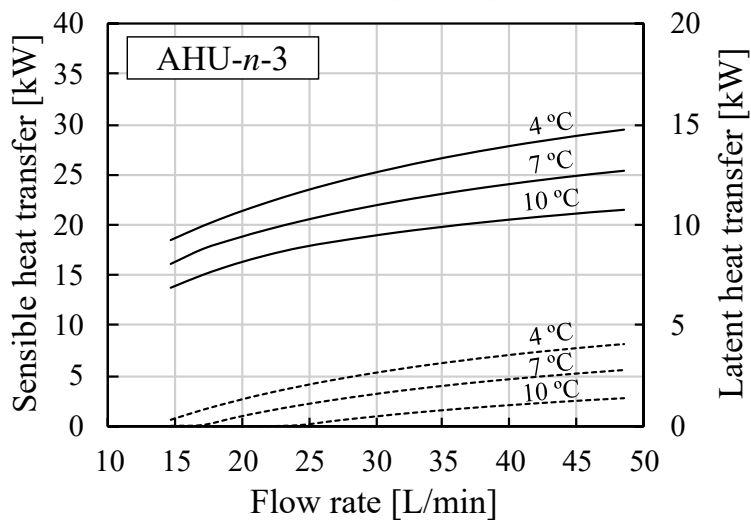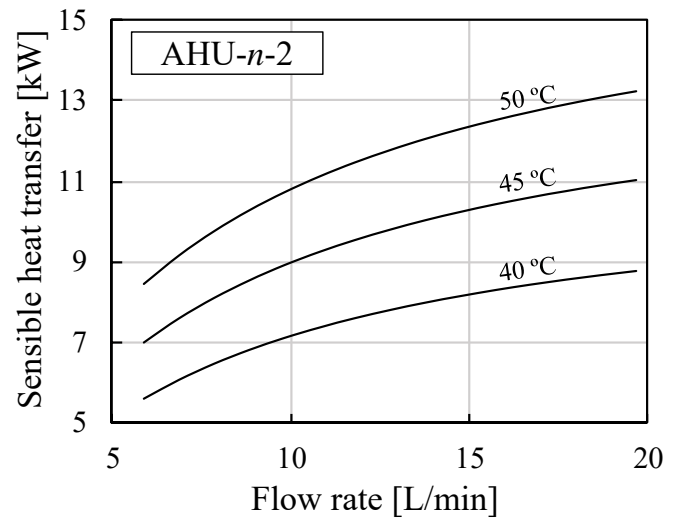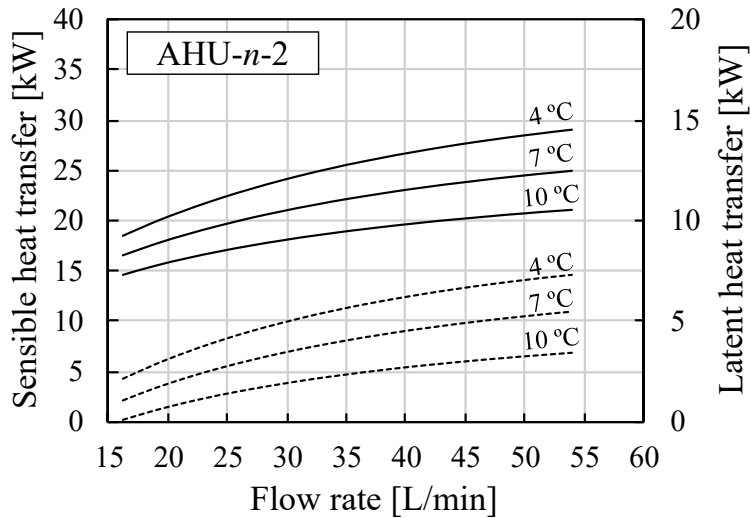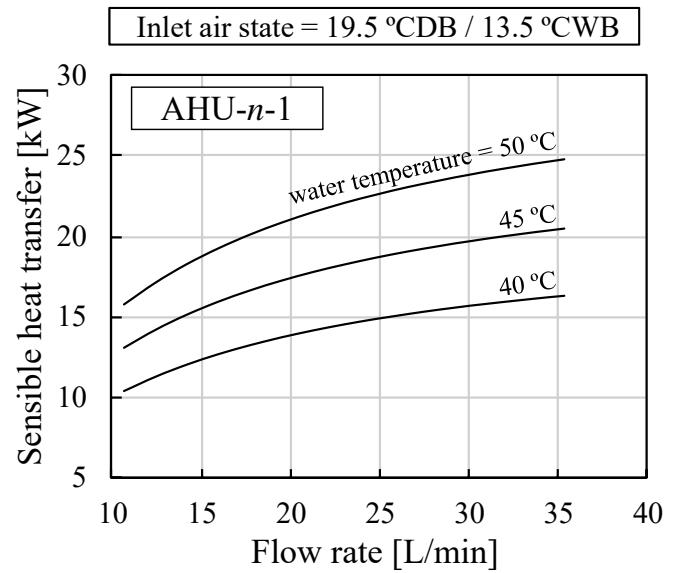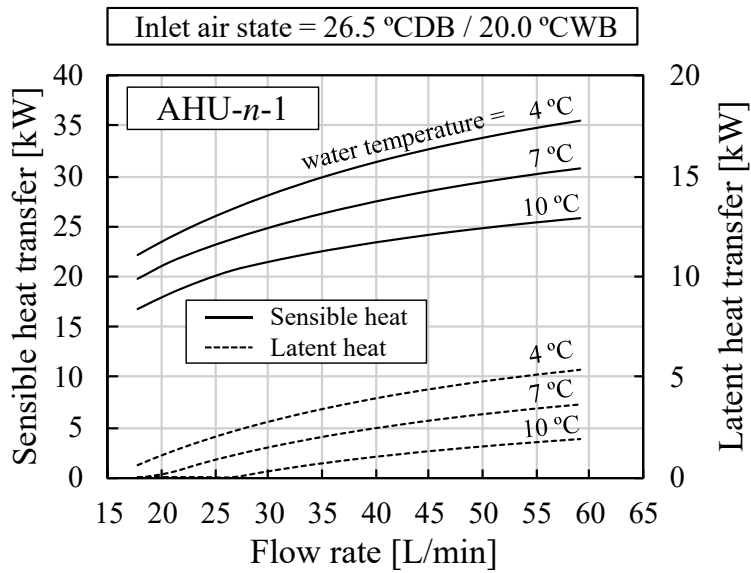
Characteristics of cooling tower

| Cooling water flow rate = const.
 Cooling water temperature difference =
 5°C × partial load rate | Cooling water flow rate =
 max flow rate × partial load rate
 Cooling water temperature difference =const. |

W.B. temperature = 28 °C

28 °C

outlet water temperature = 32 °C

W.B. temperature = 28 °C

outlet water temperature = 32 °C

W.B. temperature = 18 °C

20 °C

24 °C

28 °C

32 °C

W.B. temperature = 18 °C

24 °C

28 °C

32 °C

W.B. temperature = 8 °C

20 °C

24 °C

28 °C

32 °C

W.B. temperature = 8 °C

20 °C

24 °C
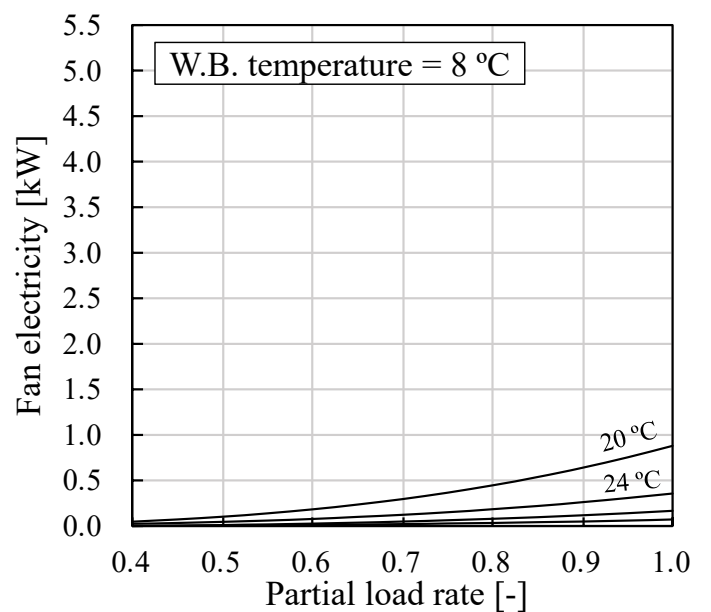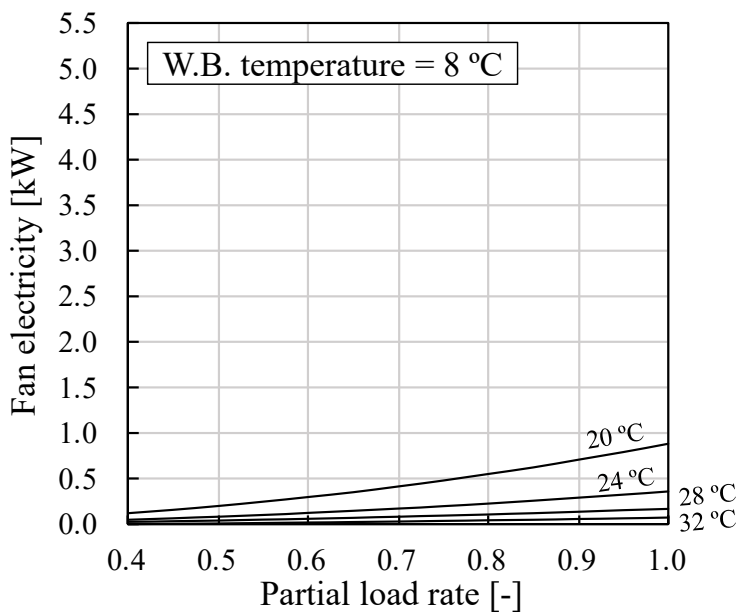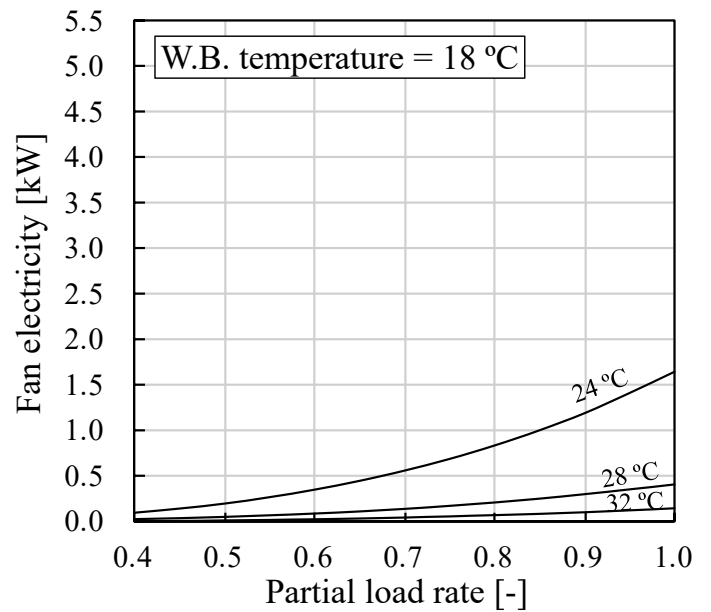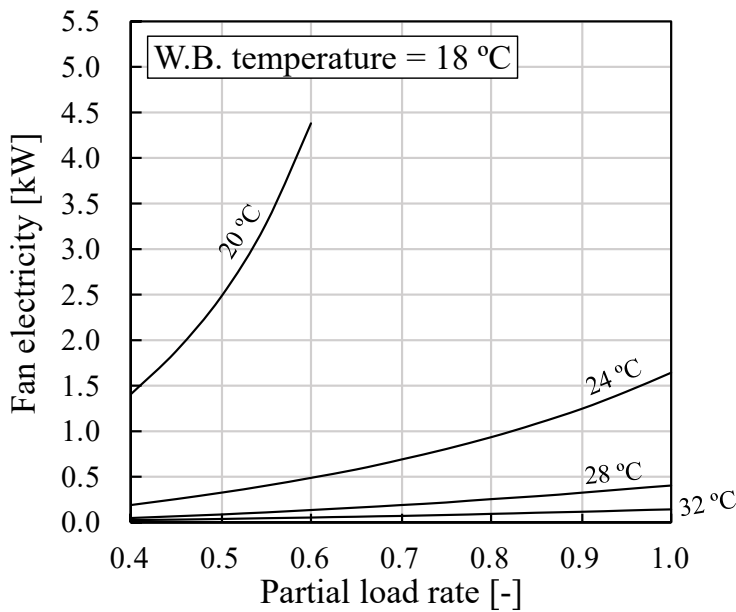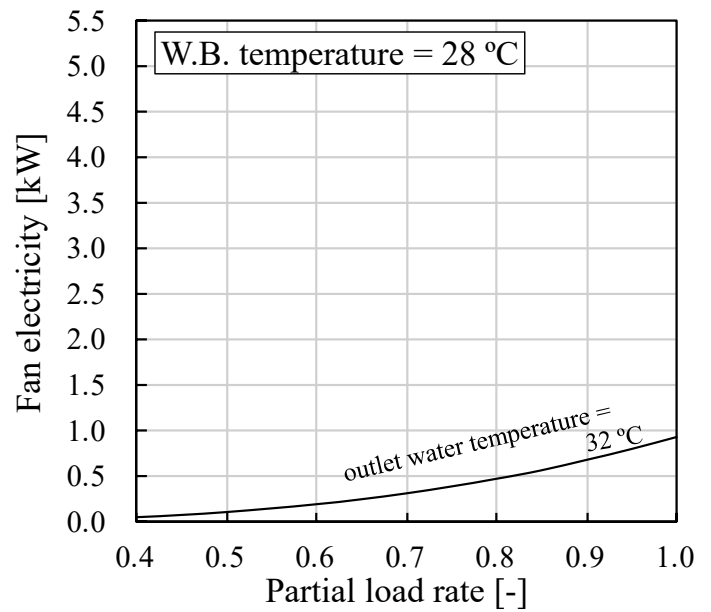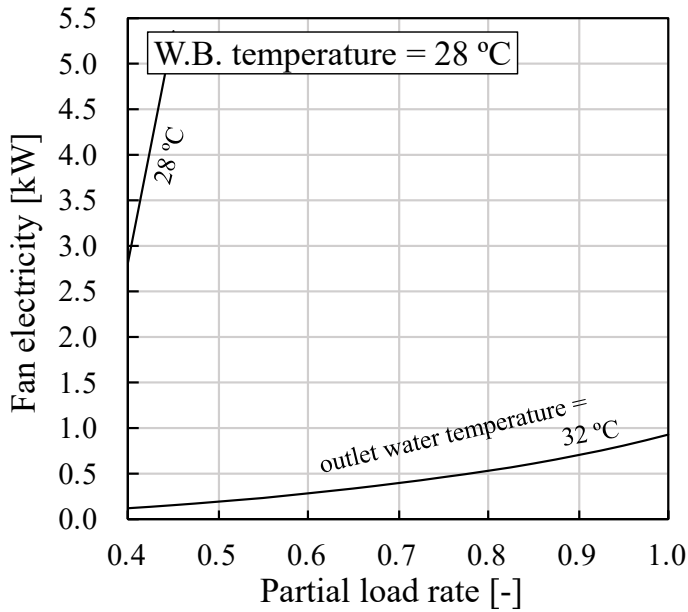
Appendix 3   Tenants and workers

Tenant name and zone number
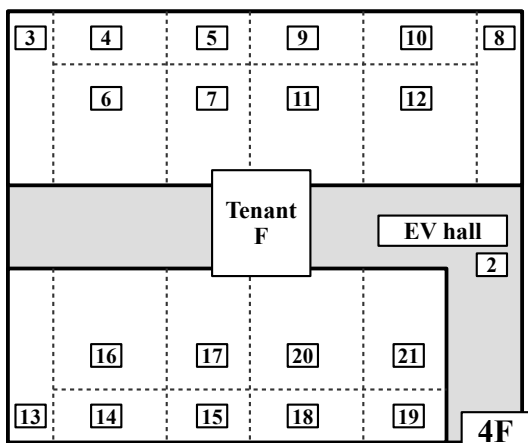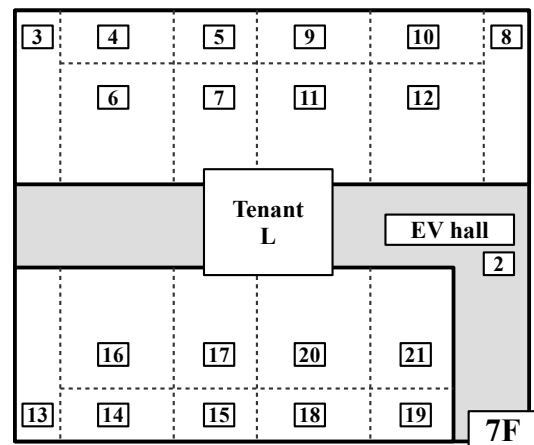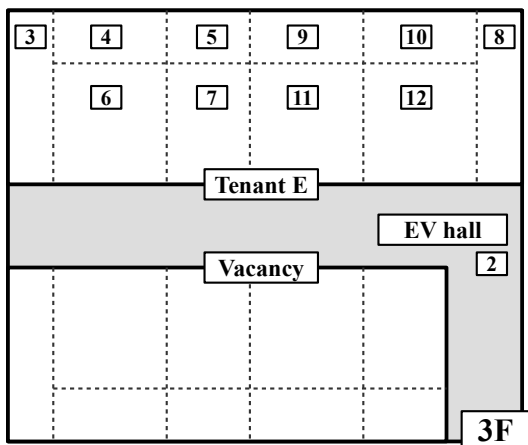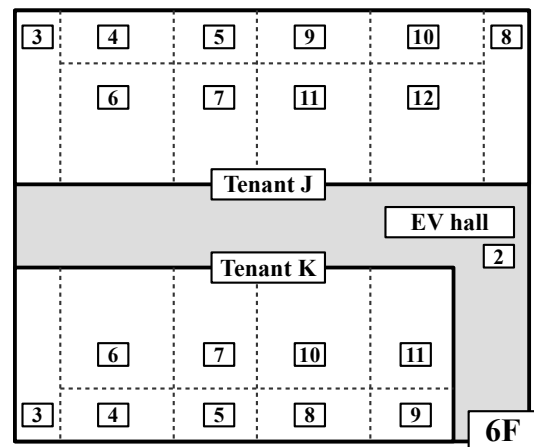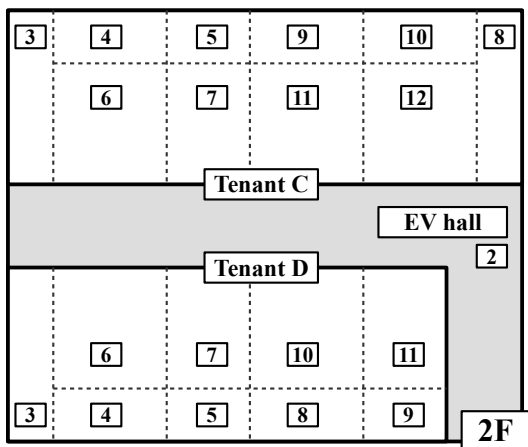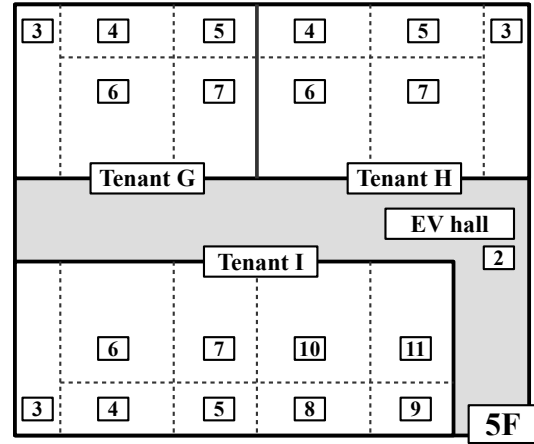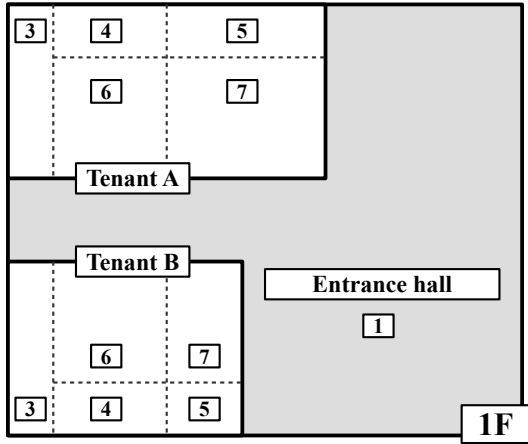
☐ ～ ㉑ : zone Index

Tenant List

ID	Industry category	Male	Female	Start	End	Floor
A	Real Estate	36	14	9:00	18:00	364.0
B	Finance or Insurance	22	4	9:00	18:00	273.0
C	Manufacturing	42	4	9:10	18:10	595.0
D	Information and Communications	26	7	9:00	18:00	504.0
E	Wholesale or Retailing	65	7	8:30	17:30	595.0
F	Construction	92	14	8:30	17:30	1099.0
G	Wholesale or Retailing	30	4	9:10	18:10	273.0
H	Finance or Insurance	36	8	10:00	19:00	322.0
ID	Real Estate	49	8	9:00	18:00	504.0
J	Manufacturing	50	8	9:00	18:00	595.0
K	Traffic or Postal Service	43	5	9:00	18:00	504.0
L	Information and Communications	91	12	8:30	17:30	1099.0

Tenant and VAV zone index

1F

Tenant

VAV zone (Perimeter)

VAV zone (Interior)

① ～ ② VAV zone index
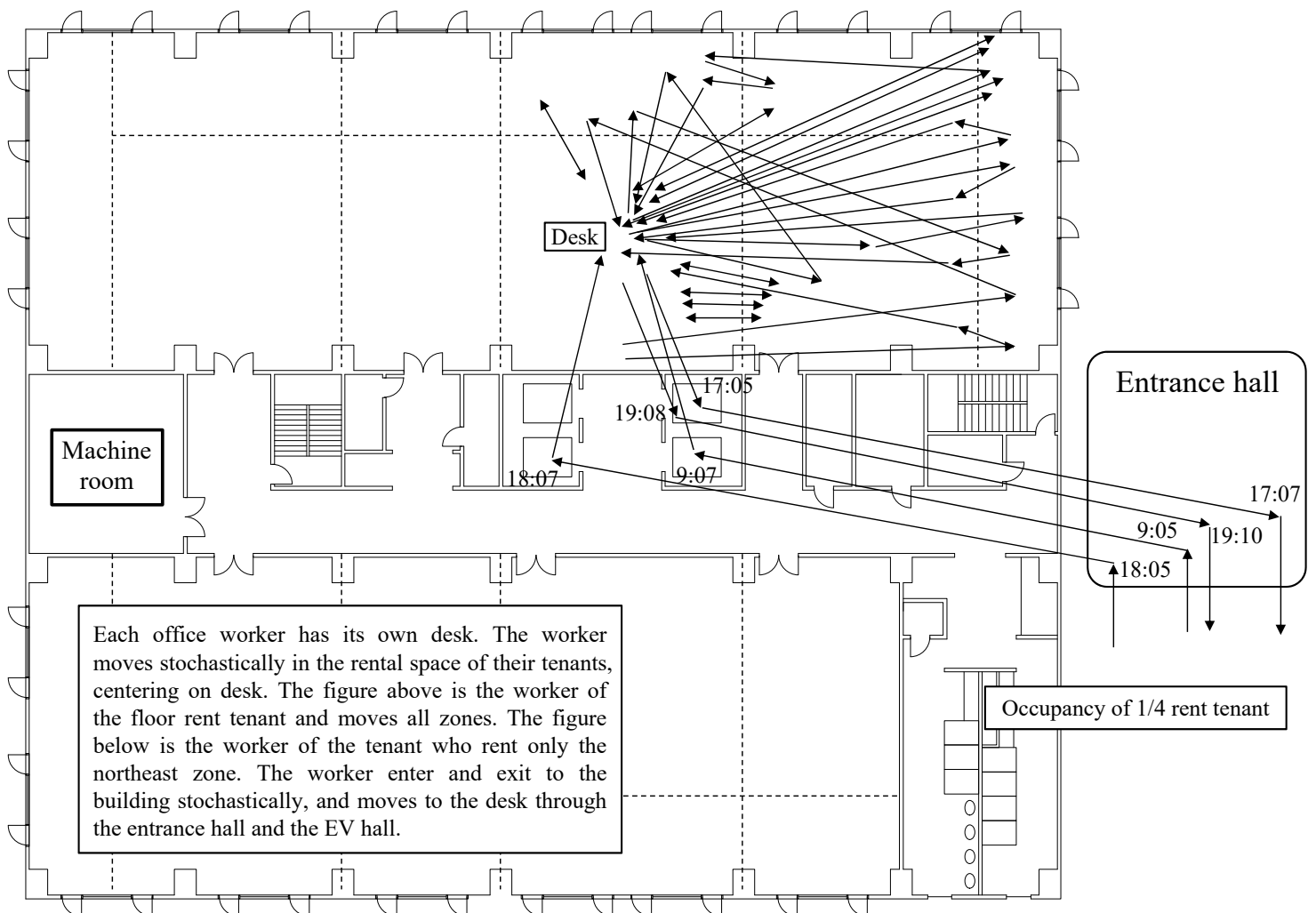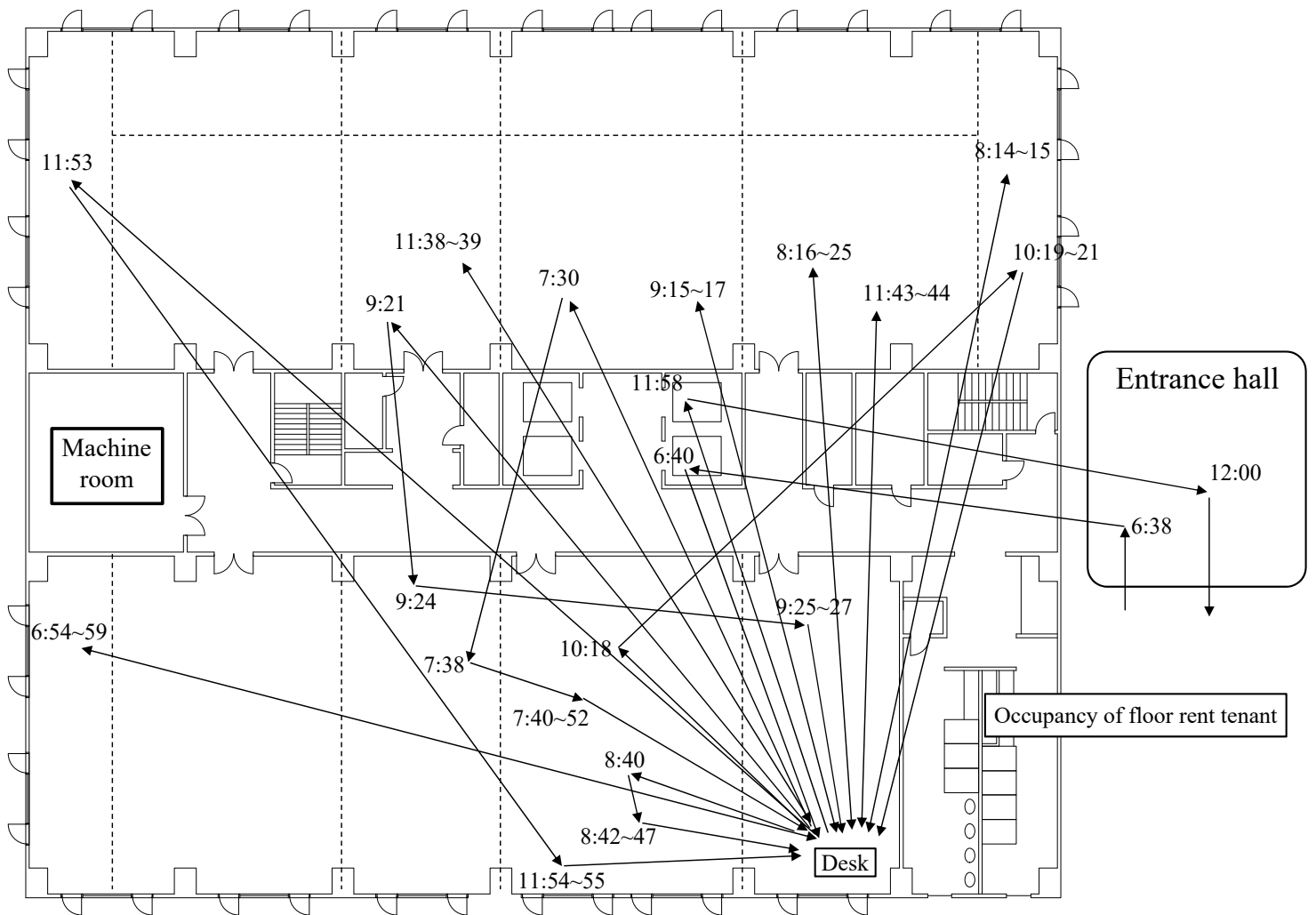
Each office worker has its own desk. The worker moves stochastically in the rental space of their tenants, centering on desk. The figure above is the worker of the floor rent tenant and moves all zones. The figure below is the worker of the tenant who rent only the northeast zone. The worker enter and exit to the building stochastically, and moves to the desk through the entrance hall and the EV hall.

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
1	10710x	1	Konno Kamio	A:RealEstate	1-NWP	Female	37	161.5	52.9
2	10710x	2	Itou Kashimoto	A:RealEstate	1-NWP	Female	61	153.6	49.9
3	10710x	3	Horiguchi Toshitaka	A:RealEstate	1-NWP	Female	27	154.0	42.5
4	10710x	4	Itagaki Tsuruoka	A:RealEstate	1-NWP	Male	49	175.1	71.5
5	10710x	5	Kurita Seiwa	A:RealEstate	1-NWP	Male	65	170.3	60.8
6	10710x	6	Maruyama Asada	A:RealEstate	1-NWP	Male	28	173.9	66.3
7	10710x	7	Yamaguchi Yohei	A:RealEstate	1-NWP	Male	54	172.3	54.2
8	10710x	8	Takahira Haraguchi	A:RealEstate	1-NWP	Male	45	182.7	68.5
9	10710x	9	Kajita Saga	A:RealEstate	1-NWP	Male	27	164.3	56.3
10	10710x	10	Kimura Keihiko	A:RealEstate	1-NWP	Male	45	163.4	70.7
11	10710x	11	Yoshikawa Teramoto	A:RealEstate	1-NP-1	Male	21	163.4	63.9
12	10710x	12	Hayama Oota	A:RealEstate	1-NP-1	Female	63	153.3	54.1
13	10710x	13	Takahashi Kimiro	A:RealEstate	1-NP-1	Male	65	172.9	77.3
14	10710x	14	Nakagawa Igarashi	A:RealEstate	1-NP-1	Male	36	174.3	73.2
15	10710x	15	Sekiya Ooe	A:RealEstate	1-NP-1	Female	49	156.1	56.1
16	10710x	16	Kosaka Kangdaige	A:RealEstate	1-NP-2	Male	25	177.1	80.6
17	10710x	17	Kaneko Kanesen	A:RealEstate	1-NP-2	Male	67	172.5	62.5
18	10710x	18	Oohara Hamada	A:RealEstate	1-NP-2	Female	43	162.8	51.8
19	10710x	19	Seizan Takimoto	A:RealEstate	1-NP-2	Female	27	160.6	50.9
20	10710x	20	Aoki Terasaka	A:RealEstate	1-NP-2	Female	66	152.0	63.0
21	10710x	21	Watanabe Kinoshita	A:RealEstate	1-NP-2	Female	45	161.0	67.2
22	10710x	22	Suzuki Ishige	A:RealEstate	1-NP-2	Female	54	154.7	41.1
23	10710x	23	Yamamoto Kensetsugu	A:RealEstate	1-NP-2	Female	38	160.5	57.1
24	10710x	24	Nanba Ike	A:RealEstate	1-NP-2	Female	41	166.8	54.3
25	10710x	25	Koyanagi Scripture	A:RealEstate	1-NP-2	Male	55	168.5	65.9
26	10710x	26	Suzuki Kazuo	A:RealEstate	1-NP-2	Male	25	174.4	60.4
27	10710x	27	Takagi Tomonori	A:RealEstate	1-NI-1	Female	49	160.2	55.0
28	10710x	28	Nishitani Kaoru	A:RealEstate	1-NI-1	Female	45	158.9	47.5
29	10710x	29	Tamura Alltogether	A:RealEstate	1-NI-1	Female	23	164.4	53.7
30	10710x	30	Fujimoto Shintoshrine	A:RealEstate	1-NI-1	Male	63	170.7	56.5
31	10710x	31	Rin Tomohiko	A:RealEstate	1-NI-1	Female	25	162.6	59.6
32	10710x	32	Matsunaga Shigemura	A:RealEstate	1-NI-1	Female	35	151.4	49.9
33	10710x	33	Hashimoto Matsukawa	A:RealEstate	1-NI-1	Male	27	168.7	75.0
34	10710x	34	Isaka Oosaki	A:RealEstate	1-NI-1	Female	45	152.5	56.2
35	10710x	35	Itou Keizo	A:RealEstate	1-NI-2	Female	51	162.6	53.4
36	10710x	36	Fujii Mitsuki	A:RealEstate	1-NI-2	Male	29	172.5	64.7
37	10710x	37	Ogawa Chihiro	A:RealEstate	1-NI-2	Male	25	166.5	63.4
38	10710x	38	Satou Shingo	A:RealEstate	1-NI-2	Female	38	159.2	44.4
39	10710x	39	Kinoshita Shinwa	A:RealEstate	1-NI-2	Female	35	165.8	43.4
40	10710x	40	Itou Feng	A:RealEstate	1-NI-2	Male	62	168.7	65.1
41	10710x	41	Kitaura Shigeyuki	A:RealEstate	1-NI-2	Male	62	162.2	71.5
42	10710x	42	Watanabe Kaname	A:RealEstate	1-NI-2	Male	61	164.0	63.2
43	10710x	43	Iwashita Takaaki	A:RealEstate	1-NI-2	Male	62	172.7	78.5
44	10710x	44	Takeuchi Beimura	A:RealEstate	1-NI-2	Female	55	154.4	58.9
45	10710x	45	Ogura Kaihyo	A:RealEstate	1-NI-2	Female	45	159.9	52.5
46	10710x	46	Saito Shouzou	A:RealEstate	1-NI-2	Male	55	162.6	67.8
47	10710x	47	Kan Teraguchi	B: FinanceOrInsurance	1-SWP	Female	48	157.5	56.4
48	10710x	48	Itou Kawai	B: FinanceOrInsurance	1-SWP	Female	25	161.7	56.1
49	10710x	49	Kuroda Ban	B: FinanceOrInsurance	1-SWP	Female	43	162.4	53.4
50	10710x	50	Itou Hatano	B: FinanceOrInsurance	1-SWP	Male	55	175.9	73.2
51	10710x	51	Sakurai Tao	B: FinanceOrInsurance	1-SWP	Female	39	166.4	45.4
52	10710x	52	Watanabe Kuniaki	B: FinanceOrInsurance	1-SWP	Male	58	155.6	76.8
53	10710x	53	Takakura Asai	B: FinanceOrInsurance	1-SWP	Male	28	180.1	76.6
54	10710x	54	Nagao Kantaro	B: FinanceOrInsurance	1-SP-1	Male	25	183.4	61.5
55	10710x	55	Kaneko Itano	B: FinanceOrInsurance	1-SP-1	Male	34	167.1	71.5
56	10710x	56	Matsumoto Mawatari	B: FinanceOrInsurance	1-SP-1	Female	23	151.1	43.5
57	10710x	57	Kawarazaki Tadahito	B: FinanceOrInsurance	1-SP-1	Female	31	157.4	56.6
58	10710x	58	Shibata Keuma	B: FinanceOrInsurance	1-SP-1	Female	42	157.8	54.6
59	10710x	59	Maruta Inohara	B: FinanceOrInsurance	1-SP-1	Male	31	172.0	65.3
60	10710x	60	Ide Oku	B: FinanceOrInsurance	1-SP-1	Male	52	170.0	58.6
61	10710x	61	Takahashi Ichigo	B: FinanceOrInsurance	1-SP-1	Female	52	156.7	47.0
62	10710x	62	Sumiyoshi Daisuke	B: FinanceOrInsurance	1-SP-2	Male	48	179.4	65.3
63	10710x	63	Kameyama Kaki	B: FinanceOrInsurance	1-SP-2	Female	55	162.7	58.7
64	10710x	64	Koike Iwamura	B: FinanceOrInsurance	1-SP-2	Female	45	165.4	52.6
65	10710x	65	Miura Un-ichi	B: FinanceOrInsurance	1-SI-1	Male	42	168.8	66.1
66	10710x	66	Yamazaki Shogun	B: FinanceOrInsurance	1-SI-1	Female	49	150.9	42.2
67	10710x	67	Matsuda Kusaba	B: FinanceOrInsurance	1-SI-1	Male	33	166.5	77.6
68	10710x	68	Fuke Ooiwa	B: FinanceOrInsurance	1-SI-1	Female	21	152.3	53.8
69	10710x	69	Imamura Sadao	B: FinanceOrInsurance	1-SI-1	Male	25	170.4	65.3
70	10710x	70	Ueno Kazama	B: FinanceOrInsurance	1-SI-1	Male	23	165.9	62.5
71	10710x	71	Kusuda Tamami	B: FinanceOrInsurance	1-SI-1	Male	57	175.6	76.8
72	10710x	72	Nakata Kenya	B: FinanceOrInsurance	1-SI-1	Male	45	170.0	58.5
73	10710x	73	Satou Chikara	B: FinanceOrInsurance	1-SI-1	Female	66	158.7	46.9
74	10710x	74	Hitomi Tadane	B: FinanceOrInsurance	1-SI-1	Female	53	149.6	56.7
75	10710x	75	Kasahara Mukawa	B: FinanceOrInsurance	1-SI-2	Female	43	165.5	48.8
76	10710x	76	Adachi Nishizaki	B: FinanceOrInsurance	1-SI-2	Male	61	160.4	63.2
77	10710x	77	Hachimaki Shinji	B: FinanceOrInsurance	1-SI-2	Male	59	170.4	71.9
78	10710x	78	Ikeda Naruse	B: FinanceOrInsurance	1-SI-2	Male	56	172.1	61.0
79	10710x	79	Toyama Takashi	B: FinanceOrInsurance	1-SI-2	Male	31	177.6	56.9
80	10710x	80	Fukuda Takataka	B: FinanceOrInsurance	1-SI-2	Male	26	179.6	68.3
81	10710x	81	Hirokawa Isozaki	B: FinanceOrInsurance	1-SI-2	Female	57	162.8	63.4
82	10710x	82	Yamamura Kitsune	B: FinanceOrInsurance	1-SI-2	Male	21	175.0	64.5
83	10710x	83	Inoue Mase	B: FinanceOrInsurance	1-SI-2	Male	27	179.5	54.2
84	10710x	84	Tashiro Tatuichiro	B: FinanceOrInsurance	1-SI-2	Male	35	178.6	64.8
85	10710x	85	Wada Ninichi	B: FinanceOrInsurance	1-SI-2	Male	58	173.5	64.1
86	10710x	86	Wakabayashi Nakazawa	B: FinanceOrInsurance	1-SI-2	Female	22	158.4	57.2
87	10710x	87	Ishii Takeo	B: FinanceOrInsurance	1-SI-2	Male	49	175.3	74.2
88	10710x	88	Iguchi Ide	B: FinanceOrInsurance	1-SI-2	Male	24	168.2	64.5
89	10720x	1	Satou Fujino	C: Manufacturing	2-NWP	Male	34	171.5	65.1
90	10720x	2	Yamamoto Kunikari	C: Manufacturing	2-NWP	Female	51	158.8	42.3
91	10720x	3	Sugimoto Seisei	C: Manufacturing	2-NWP	Male	24	175.9	72.6
92	10720x	4	Fujii Nasu	C: Manufacturing	2-NWP	Male	53	163.3	81.2
93	10720x	5	Shimizu Okutani	C: Manufacturing	2-NWP	Male	25	165.7	51.0
94	10720x	6	Uchida Sayama	C: Manufacturing	2-NWP	Male	64	169.3	71.9
95	10720x	7	Yamamoto Yoshihide	C: Manufacturing	2-NWP	Male	35	168.7	80.4
96	10720x	8	Kimura Kouichiro	C: Manufacturing	2-NWP	Male	63	163.7	70.2
97	10720x	9	Inoue Takeuchi	C: Manufacturing	2-NP-1	Male	52	173.5	66.4
98	10720x	10	Kurihara Hakuhiko	C: Manufacturing	2-NP-1	Male	42	169.1	88.5
99	10720x	11	Morinaga Norikuni	C: Manufacturing	2-NP-1	Female	48	160.6	54.1
100	10720x	12	Tanaka Akira	C: Manufacturing	2-NP-1	Female	51	155.3	59.9

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
101	10720x	13	Uno Kawazoe	C: Manufacturing	2-NP-1	Male	45	167.5	52.5
102	10720x	14	Yamanaka Yokouchi	C: Manufacturing	2-NP-1	Male	56	171.0	54.8
103	10720x	15	Kikuchi Tinto	C: Manufacturing	2-NP-2	Female	52	157.6	59.7
104	10720x	16	Tsuruta Wakabayashi	C: Manufacturing	2-NP-2	Male	31	182.2	76.3
105	10720x	17	Yamazaki Tomura-Kun	C: Manufacturing	2-NP-2	Female	43	162.5	47.4
106	10720x	18	Yoshida Tejima	C: Manufacturing	2-NP-3	Male	24	178.8	62.2
107	10720x	19	Fujimoto Ushioda	C: Manufacturing	2-NP-3	Male	44	170.2	82.6
108	10720x	20	Atsuta Omonehitome	C: Manufacturing	2-NP-3	Male	47	175.0	66.5
109	10720x	21	Terasaki Kazunori	C: Manufacturing	2-NP-3	Male	56	167.2	71.5
110	10720x	22	Tachibana Taniguchi	C: Manufacturing	2-NP-3	Male	25	171.0	78.7
111	10720x	23	Ooyama Shinta	C: Manufacturing	2-NP-3	Male	38	178.1	70.9
112	10720x	24	Suzuki Kouduki	C: Manufacturing	2-NP-3	Male	68	168.0	70.2
113	10720x	25	Sugiura Hamano	C: Manufacturing	2-NP-3	Female	33	162.0	52.1
114	10720x	26	Kondou Yoda	C: Manufacturing	2-NP-3	Male	55	177.1	78.4
115	10720x	27	Suzuki Norihiro	C: Manufacturing	2-NP-4	Male	26	167.3	67.5
116	10720x	28	Iida Koji	C: Manufacturing	2-NP-4	Male	27	171.3	58.1
117	10720x	29	Narikawa Tetsuyoshi	C: Manufacturing	2-NP-4	Male	46	164.8	69.7
118	10720x	30	Asada Tricolor	C: Manufacturing	2-NP-4	Male	39	176.0	72.3
119	10720x	31	Uno Tenzuro	C: Manufacturing	2-NP-4	Male	24	164.5	65.8
120	10720x	32	Doi Kannosuke	C: Manufacturing	2-NP-4	Female	53	158.2	45.2
121	10720x	33	Miyaji Kyou	C: Manufacturing	2-NEP	Female	44	161.6	43.1
122	10720x	34	Shigematsu Maejima	C: Manufacturing	2-NEP	Male	58	177.8	60.6
123	10720x	35	Kawakami Onigashira	C: Manufacturing	2-NEP	Female	66	164.2	57.2
124	10720x	36	Tsurumi Sugisaki	C: Manufacturing	2-NEP	Female	52	158.5	58.9
125	10720x	37	Fukazawa Kozo	C: Manufacturing	2-NEP	Male	32	160.2	67.0
126	10720x	38	Oooka Juzo	C: Manufacturing	2-NEP	Female	45	159.4	49.2
127	10720x	39	Ishii Yuya	C: Manufacturing	2-NEP	Male	32	183.3	46.3
128	10720x	40	Tanaka Satoru	C: Manufacturing	2-NEP	Male	29	181.9	68.1
129	10720x	41	Ooshita Kawashima	C: Manufacturing	2-NEP	Female	49	162.9	52.7
130	10720x	42	Matsumoto Shingira	C: Manufacturing	2-NI-1	Male	37	172.8	64.8
131	10720x	43	Nakamura Muramatsu	C: Manufacturing	2-NI-1	Male	44	174.3	74.8
132	10720x	44	Kosugi Tomoyasu	C: Manufacturing	2-NI-1	Male	21	176.2	53.3
133	10720x	45	Ogura Usui	C: Manufacturing	2-NI-1	Male	41	183.4	75.6
134	10720x	46	Seizan Hayasaka	C: Manufacturing	2-NI-1	Male	62	170.9	62.1
135	10720x	47	Suzuki Watanabe	C: Manufacturing	2-NI-1	Male	63	162.2	60.0
136	10720x	48	Ootake Satya	C: Manufacturing	2-NI-1	Male	58	168.2	77.9
137	10720x	49	Uemura Iwano	C: Manufacturing	2-NI-1	Male	58	165.5	70.7
138	10720x	50	Tamura Tomoyasu	C: Manufacturing	2-NI-1	Female	32	152.6	46.4
139	10720x	51	Shimizu Sezaki	C: Manufacturing	2-NI-1	Male	57	174.8	58.0
140	10720x	52	Kobayashi Yotaro	C: Manufacturing	2-NI-1	Male	25	177.3	62.2
141	10720x	53	Andou Sasanuma	C: Manufacturing	2-NI-1	Male	48	177.3	77.5
142	10720x	54	Itou Yuen	C: Manufacturing	2-NI-1	Male	35	174.0	71.1
143	10720x	55	Takada Toshimi	C: Manufacturing	2-NI-2	Male	25	176.3	51.6
144	10720x	56	Shimada Kuroyanagi	C: Manufacturing	2-NI-2	Female	45	162.1	55.7
145	10720x	57	Sakamoto Tomoaki	C: Manufacturing	2-NI-2	Male	55	166.0	75.9
146	10720x	58	Hoshino Mrs.Oshu	C: Manufacturing	2-NI-2	Male	42	172.9	59.1
147	10720x	59	Hishida Tetuya	C: Manufacturing	2-NI-3	Male	25	163.7	70.3
148	10720x	60	Shimada Satya	C: Manufacturing	2-NI-3	Female	45	151.7	45.4
149	10720x	61	Nakajima Fujishima	C: Manufacturing	2-NI-3	Male	55	169.4	73.6
150	10720x	62	Maeda Kawamoto	C: Manufacturing	2-NI-3	Male	39	164.3	81.1
151	10720x	63	Katsuragawa Yaguchi	C: Manufacturing	2-NI-3	Male	41	171.8	85.7
152	10720x	64	Satou Sengoku	C: Manufacturing	2-NI-3	Male	49	169.7	83.1
153	10720x	65	Takahashi Akihiro	C: Manufacturing	2-NI-3	Male	57	167.3	57.6
154	10720x	66	Takashima Shinta	C: Manufacturing	2-NI-3	Male	66	165.1	59.5
155	10720x	67	Watanabe Zhouzhou	C: Manufacturing	2-NI-3	Male	26	173.1	76.4
156	10720x	68	Sakai Akimoto	C: Manufacturing	2-NI-3	Female	54	155.2	54.5
157	10720x	69	Niijima Emori	C: Manufacturing	2-NI-3	Female	27	151.5	59.0
158	10720x	70	Shinjou Ekishi	C: Manufacturing	2-NI-3	Male	38	171.6	57.7
159	10720x	71	Maruyama Harigaya	C: Manufacturing	2-NI-3	Female	45	158.2	51.4
160	10720x	72	Kawamura Kuze	C: Manufacturing	2-NI-3	Male	69	168.7	68.6
161	10720x	73	Shimono Tosaka	C: Manufacturing	2-NI-3	Female	25	155.0	47.7
162	10720x	74	Takatsu Ichiki	C: Manufacturing	2-NI-3	Male	26	160.1	61.5
163	10720x	75	Tabuchi Honen	C: Manufacturing	2-NI-3	Male	25	171.3	65.8
164	10720x	76	Shouji Asahi	C: Manufacturing	2-NI-3	Male	44	185.9	68.5
165	10720x	77	Nakagawa Jun	C: Manufacturing	2-NI-4	Male	29	168.4	91.4
166	10720x	78	Yamaguchi Minoritai	C: Manufacturing	2-NI-4	Male	35	182.5	71.0
167	10720x	79	Suganuma Yoshiki	C: Manufacturing	2-NI-4	Female	26	170.7	50.5
168	10720x	80	Sugimoto Kenshin	C: Manufacturing	2-NI-4	Male	56	168.0	67.2
169	10720x	81	Kanazawa Shirasaka	C: Manufacturing	2-NI-4	Male	27	183.8	60.4
170	10720x	82	Tachikawa Shintaku	C: Manufacturing	2-NI-4	Female	25	156.3	53.5
171	10720x	83	Fukuhara Aoki	C: Manufacturing	2-NI-4	Female	47	153.1	46.2
172	10720x	84	Fukumoto Akanuma	C: Manufacturing	2-NI-4	Male	27	172.1	62.2
173	10720x	85	Hirao Shoshi	C: Manufacturing	2-NI-4	Male	68	164.9	61.3
174	10720x	86	Hattori Akatsuka	C: Manufacturing	2-NI-4	Male	32	172.3	51.0
175	10720x	87	Seki Takayoshi	C: Manufacturing	2-NI-4	Male	49	168.2	55.1
176	10720x	88	Takagi Yokoshima	C: Manufacturing	2-NI-4	Male	55	173.2	67.9
177	10720x	89	Yoshioka Takeo	C: Manufacturing	2-NI-4	Female	43	161.0	56.6
178	10720x	90	Katagiri Mao	C: Manufacturing	2-NI-4	Male	28	173.7	66.6
179	10720x	91	Ueno Takemi	C: Manufacturing	2-NI-4	Male	25	168.5	60.8
180	10720x	92	Udagawa Mituhiro	D: InformationAndCommu	2-SWP	Male	63	172.8	72.2
181	10720x	93	Sakurai Shigetaka	D: InformationAndCommu	2-SWP	Male	29	178.1	77.1
182	10720x	94	Koyama Kotaka	D: InformationAndCommu	2-SWP	Male	49	169.3	54.4
183	10720x	95	Hirabayashi Hisashiro	D: InformationAndCommu	2-SWP	Male	21	168.7	58.7
184	10720x	96	Kanzaki Koishi	D: InformationAndCommu	2-SWP	Male	41	177.2	76.5
185	10720x	97	Doi Sakai	D: InformationAndCommu	2-SP-1	Male	59	176.4	67.8
186	10720x	98	Yamaguchi Hiromasa	D: InformationAndCommu	2-SP-1	Male	32	168.9	73.2
187	10720x	99	Kitazawa Chungcheon	D: InformationAndCommu	2-SP-1	Female	42	162.0	52.2
188	10720x	100	Hamada Hayate	D: InformationAndCommu	2-SP-1	Female	32	162.3	56.7
189	10720x	101	Torii Funabashi	D: InformationAndCommu	2-SP-1	Male	42	178.6	64.0
190	10720x	102	Katou Kentaandyou	D: InformationAndCommu	2-SP-1	Male	46	168.7	81.1
191	10720x	103	Kitani Takashima	D: InformationAndCommu	2-SP-1	Male	62	170.5	58.2
192	10720x	104	Inoue Kobayashi	D: InformationAndCommu	2-SP-1	Male	53	168.9	62.2
193	10720x	105	Yano Akiyoshi	D: InformationAndCommu	2-SP-1	Male	45	168.4	68.2
194	10720x	106	Murai Ryuma	D: InformationAndCommu	2-SP-1	Male	23	178.0	68.7
195	10720x	107	Komine Kanazawa	D: InformationAndCommu	2-SP-2	Male	55	180.6	88.1
196	10720x	108	Ishimaru Tada	D: InformationAndCommu	2-SP-2	Male	49	167.7	75.3
197	10720x	109	Yoshimi Ooya	D: InformationAndCommu	2-SP-2	Male	58	168.7	44.9
198	10720x	110	Nishimura Izumi	D: InformationAndCommu	2-SP-3	Male	59	170.8	67.9
199	10720x	111	Mita Shinbun	D: InformationAndCommu	2-SP-3	Male	41	177.1	69.5
200	10720x	112	Matsumoto Shouji	D: InformationAndCommu	2-SP-4	Male	65	169.7	62.9

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
201	10720x	113	Kawashita Nagori	D: InformationAndCommu	2-SP-4	Female	59	158.5	66.8
202	10720x	114	Iino Mitsunaga	D: InformationAndCommu	2-SP-4	Female	46	153.7	60.9
203	10720x	115	Tada Takashi	D: InformationAndCommu	2-SI-1	Male	58	168.6	69.5
204	10720x	116	Takayama Yukio	D: InformationAndCommu	2-SI-1	Male	61	167.7	66.0
205	10720x	117	Sasaki Tsuruki	D: InformationAndCommu	2-SI-1	Female	24	164.5	44.8
206	10720x	118	Matsuda Kunikari	D: InformationAndCommu	2-SI-1	Male	36	177.4	65.9
207	10720x	119	Enomoto Masayuki	D: InformationAndCommu	2-SI-1	Male	35	172.9	68.6
208	10720x	120	Araki Yamane	D: InformationAndCommu	2-SI-1	Female	27	150.8	61.4
209	10720x	121	Ookawa Otsujin	D: InformationAndCommu	2-SI-1	Male	52	160.3	93.0
210	10720x	122	Uno Sukue	D: InformationAndCommu	2-SI-1	Female	49	156.4	59.7
211	10720x	123	Lee Myonhyang	D: InformationAndCommu	2-SI-1	Female	26	153.1	43.1
212	10720x	124	Suzuki Akiyuki	D: InformationAndCommu	2-SI-1	Female	56	167.9	57.8
213	10720x	125	Tsunekawa Hisatomi	D: InformationAndCommu	2-SI-1	Male	41	174.5	73.9
214	10720x	126	Sato Akira	D: InformationAndCommu	2-SI-1	Male	28	165.6	58.8
215	10720x	127	Ono Kimiyoshi	D: InformationAndCommu	2-SI-1	Male	24	168.2	60.7
216	10720x	128	Chiba Satou	D: InformationAndCommu	2-SI-1	Female	28	163.6	49.8
217	10720x	129	Shibuya Sakaguchi	D: InformationAndCommu	2-SI-1	Male	45	168.9	52.5
218	10720x	130	Nakamura Shinnosuke	D: InformationAndCommu	2-SI-2	Female	31	160.2	51.2
219	10720x	131	Matsunaga Tsunema	D: InformationAndCommu	2-SI-2	Male	38	171.0	67.9
220	10720x	132	Ido Yagisawa	D: InformationAndCommu	2-SI-2	Female	35	156.5	49.0
221	10720x	133	Ishikawa Kawadu	D: InformationAndCommu	2-SI-2	Male	29	180.2	73.9
222	10720x	134	Shimizu Satake	D: InformationAndCommu	2-SI-2	Male	35	165.9	55.3
223	10720x	135	Kudou Miyoshi	D: InformationAndCommu	2-SI-2	Male	35	169.2	62.5
224	10720x	136	Mori Hachimaki	D: InformationAndCommu	2-SI-2	Female	44	158.4	55.6
225	10720x	137	Takahashi Takamori	D: InformationAndCommu	2-SI-2	Male	49	161.0	73.8
226	10720x	138	Matsumura Tomoaki	D: InformationAndCommu	2-SI-2	Male	23	164.1	75.5
227	10720x	139	Mizuguchi Ideta	D: InformationAndCommu	2-SI-2	Female	55	145.9	49.5
228	10720x	140	Moriyama Takebe	D: InformationAndCommu	2-SI-2	Male	41	168.5	49.2
229	10720x	141	Tanaka Kotobuki	D: InformationAndCommu	2-SI-2	Male	52	163.6	68.1
230	10720x	142	Itou Ike	D: InformationAndCommu	2-SI-2	Female	32	162.8	67.6
231	10720x	143	Toyokawa Longxu	D: InformationAndCommu	2-SI-3	Female	45	159.8	46.2
232	10720x	144	Suzuki Akitoshiakira	D: InformationAndCommu	2-SI-3	Male	37	175.0	89.9
233	10720x	145	Wakui Shiina	D: InformationAndCommu	2-SI-3	Male	26	164.1	56.6
234	10720x	146	Kuribayashi Kentaro	D: InformationAndCommu	2-SI-3	Male	33	156.5	85.6
235	10720x	147	Kobayashi Yasutaro	D: InformationAndCommu	2-SI-3	Female	34	151.9	47.4
236	10720x	148	Higashigawa Shouji	D: InformationAndCommu	2-SI-3	Male	29	170.6	54.3
237	10720x	149	Nagatsuka Sugawara	D: InformationAndCommu	2-SI-3	Male	63	170.5	48.1
238	10720x	150	Araki Watanabe	D: InformationAndCommu	2-SI-3	Male	51	172.2	72.5
239	10720x	151	Ukai Masanari	D: InformationAndCommu	2-SI-3	Male	45	173.6	66.9
240	10720x	152	Okumura Kimjongil	D: InformationAndCommu	2-SI-3	Female	32	163.3	48.7
241	10720x	153	Namiki Hachiman	D: InformationAndCommu	2-SI-3	Male	68	171.6	67.5
242	10720x	154	Arima Narikawa	D: InformationAndCommu	2-SI-3	Female	32	159.6	54.2
243	10720x	155	Akita Keiichiro	D: InformationAndCommu	2-SI-3	Female	53	155.5	49.9
244	10720x	156	Kiuchi Kenichi	D: InformationAndCommu	2-SI-3	Female	29	155.3	44.6
245	10720x	157	Harada Moritou	D: InformationAndCommu	2-SI-3	Male	48	171.6	82.7
246	10720x	158	Shimura Koichi	D: InformationAndCommu	2-SI-3	Female	43	169.7	56.9
247	10720x	159	Suzuki Yanase	D: InformationAndCommu	2-SI-4	Male	43	162.8	73.9
248	10720x	160	Oonuki Susumuman	D: InformationAndCommu	2-SI-4	Male	55	168.9	84.9
249	10720x	161	Oohara Koji	D: InformationAndCommu	2-SI-4	Male	35	156.3	66.2
250	10720x	162	Onose Arita	D: InformationAndCommu	2-SI-4	Male	52	172.5	83.4
251	10720x	163	Kondou Horino	D: InformationAndCommu	2-SI-4	Female	22	154.4	47.8
252	10720x	164	Ookura Tsukioka	D: InformationAndCommu	2-SI-4	Male	31	169.1	70.4
253	10720x	165	Yamamoto Ueyama	D: InformationAndCommu	2-SI-4	Male	38	171.1	71.2
254	10720x	166	Odajima Kosaka	D: InformationAndCommu	2-SI-4	Male	31	176.5	73.0
255	10720x	167	Yamada Kuramoto	D: InformationAndCommu	2-SI-4	Male	52	166.9	60.1
256	10720x	168	Kouda Watanabe	D: InformationAndCommu	2-SI-4	Male	32	176.6	71.9
257	10720x	169	Iwasaki Shirono	D: InformationAndCommu	2-SI-4	Male	35	169.8	79.6
258	10720x	170	Kanda Kimiji	D: InformationAndCommu	2-SI-4	Male	44	171.8	64.1
259	10720x	171	Suzuki Umeio	D: InformationAndCommu	2-SI-4	Male	66	174.4	74.3
260	10720x	172	Amano Takashima	D: InformationAndCommu	2-SI-4	Male	31	175.9	70.6
261	10730x	1	Saito Heizo	E: WholesaleOrRetailing	3-NWP	Male	55	177.3	57.9
262	10730x	2	Sakakibara Keizo	E: WholesaleOrRetailing	3-NWP	Male	37	183.2	77.2
263	10730x	3	Sakata Tokitazu	E: WholesaleOrRetailing	3-NWP	Male	43	168.5	64.0
264	10730x	4	Watanabe Satoshi	E: WholesaleOrRetailing	3-NWP	Female	65	149.6	61.5
265	10730x	5	Masuda Ikuma	E: WholesaleOrRetailing	3-NWP	Male	47	176.5	60.2
266	10730x	6	Aoki Yogi	E: WholesaleOrRetailing	3-NWP	Male	47	171.1	78.3
267	10730x	7	Yoshinari Kenji	E: WholesaleOrRetailing	3-NWP	Female	25	166.0	50.8
268	10730x	8	Kobayashi Takihon	E: WholesaleOrRetailing	3-NWP	Male	65	167.1	73.7
269	10730x	9	Tonegawa Ueda	E: WholesaleOrRetailing	3-NWP	Male	45	168.9	68.9
270	10730x	10	Itou Anexpert	E: WholesaleOrRetailing	3-NP-1	Male	45	170.0	73.9
271	10730x	11	Tsutsui Takane	E: WholesaleOrRetailing	3-NP-1	Male	56	179.7	76.6
272	10730x	12	Miyake Ooshiro	E: WholesaleOrRetailing	3-NP-1	Female	49	152.3	41.9
273	10730x	13	Aoki Sasanuma	E: WholesaleOrRetailing	3-NP-1	Male	41	162.9	55.8
274	10730x	14	Hirota Nakakoshi	E: WholesaleOrRetailing	3-NP-1	Male	39	170.8	53.3
275	10730x	15	Takahashi Konaka	E: WholesaleOrRetailing	3-NP-2	Female	31	155.0	48.4
276	10730x	16	Mouri Shintaro	E: WholesaleOrRetailing	3-NP-2	Female	56	150.6	51.8
277	10730x	17	Haga Fukadu	E: WholesaleOrRetailing	3-NP-3	Female	23	158.3	57.6
278	10730x	18	Kobayashi Yamaura	E: WholesaleOrRetailing	3-NP-3	Male	49	176.1	58.0
279	10730x	19	Seki Rantaro	E: WholesaleOrRetailing	3-NP-3	Male	52	164.0	83.3
280	10730x	20	Yasuda Hatayama	E: WholesaleOrRetailing	3-NP-3	Female	52	157.0	57.4
281	10730x	21	Honda Yourwholelife	E: WholesaleOrRetailing	3-NP-3	Male	39	178.1	73.0
282	10730x	22	Sasaki Takami	E: WholesaleOrRetailing	3-NP-3	Male	51	172.1	74.4
283	10730x	23	Utsumi Oshikawa	E: WholesaleOrRetailing	3-NP-3	Female	43	149.9	44.7
284	10730x	24	Ogiso Sadaaki	E: WholesaleOrRetailing	3-NP-4	Male	35	185.3	66.0
285	10730x	25	Hirano Toshio	E: WholesaleOrRetailing	3-NP-4	Male	44	180.5	67.6
286	10730x	26	Nagamine Kakazu	E: WholesaleOrRetailing	3-NEP	Female	35	163.8	57.2
287	10730x	27	Sanya Ogawa	E: WholesaleOrRetailing	3-NEP	Male	31	168.8	73.3
288	10730x	28	Masuda Susumu	E: WholesaleOrRetailing	3-NEP	Male	47	174.2	63.5
289	10730x	29	Suzuki Sawai	E: WholesaleOrRetailing	3-NEP	Male	69	168.0	68.0
290	10730x	30	Tajima Hakuishi	E: WholesaleOrRetailing	3-NEP	Female	62	160.1	52.6
291	10730x	31	Funaki Toujou	E: WholesaleOrRetailing	3-NI-1	Male	69	163.7	61.1
292	10730x	32	Kawasaki Ken	E: WholesaleOrRetailing	3-NI-1	Male	35	173.2	52.7
293	10730x	33	Toda Shouzou	E: WholesaleOrRetailing	3-NI-1	Male	54	169.4	55.3
294	10730x	34	Sasaki Ookura	E: WholesaleOrRetailing	3-NI-1	Male	66	168.2	64.4
295	10730x	35	Imai Katsuragi	E: WholesaleOrRetailing	3-NI-1	Female	35	160.7	46.5
296	10730x	36	Oono Ishimoto	E: WholesaleOrRetailing	3-NI-1	Female	64	154.3	44.3
297	10730x	37	Fukuda Moshio	E: WholesaleOrRetailing	3-NI-1	Male	25	175.8	75.1
298	10730x	38	Kume Jobushi	E: WholesaleOrRetailing	3-NI-1	Male	42	176.1	71.0
299	10730x	39	Kuwabara Masumii	E: WholesaleOrRetailing	3-NI-1	Male	25	168.4	52.8
300	10730x	40	Kamata Bane	E: WholesaleOrRetailing	3-NI-1	Female	31	152.8	53.2

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
301	10730x	41	Arisawa Sata	E: WholesaleOrRetailing	3-NI-1	Female	48	154.0	54.3
302	10730x	42	Kanzaki Shiratori	E: WholesaleOrRetailing	3-NI-1	Female	58	159.5	52.2
303	10730x	43	Maruyama Tashiro	E: WholesaleOrRetailing	3-NI-2	Male	47	172.2	71.6
304	10730x	44	Sakata Yasukawa	E: WholesaleOrRetailing	3-NI-2	Male	28	173.0	59.6
305	10730x	45	Kadoi Satoshiro	E: WholesaleOrRetailing	3-NI-2	Female	48	159.3	55.2
306	10730x	46	Watanabe Tuyoshi	E: WholesaleOrRetailing	3-NI-2	Male	48	159.3	57.2
307	10730x	47	Horie Gorou	E: WholesaleOrRetailing	3-NI-2	Male	25	162.0	62.6
308	10730x	48	Aiga Hiroshi	E: WholesaleOrRetailing	3-NI-2	Male	49	171.0	86.6
309	10730x	49	Shinozaki Takahira	E: WholesaleOrRetailing	3-NI-2	Male	51	169.5	73.7
310	10730x	50	Hosokawa Takaki	E: WholesaleOrRetailing	3-NI-2	Female	35	164.2	43.8
311	10730x	51	Tokuta Kawase	E: WholesaleOrRetailing	3-NI-2	Male	23	179.0	59.1
312	10730x	52	Koide Hosaka	E: WholesaleOrRetailing	3-NI-2	Male	38	168.0	53.7
313	10730x	53	Yokoyama Sou	E: WholesaleOrRetailing	3-NI-2	Female	49	154.6	49.3
314	10730x	54	Ishii Shinta	E: WholesaleOrRetailing	3-NI-2	Female	25	163.6	46.9
315	10730x	55	Oomiya Yonezawa	E: WholesaleOrRetailing	3-NI-2	Female	43	171.0	50.9
316	10730x	56	Uemura Riko	E: WholesaleOrRetailing	3-NI-3	Female	34	160.8	44.2
317	10730x	57	Sakamoto Kotaro	E: WholesaleOrRetailing	3-NI-3	Male	26	170.0	57.5
318	10730x	58	Sakagami Kazuhiro	E: WholesaleOrRetailing	3-NI-3	Female	21	160.2	55.4
319	10730x	59	Hara Taketaka	E: WholesaleOrRetailing	3-NI-3	Female	55	162.0	64.1
320	10730x	60	Kobayashi Kangry?gi	E: WholesaleOrRetailing	3-NI-3	Female	63	152.2	49.3
321	10730x	61	Toda Naiya	E: WholesaleOrRetailing	3-NI-3	Female	56	158.6	38.1
322	10730x	62	Kawasaki Koshino	E: WholesaleOrRetailing	3-NI-3	Female	54	157.3	61.7
323	10730x	63	Kobayashi Kimiro	E: WholesaleOrRetailing	3-NI-3	Female	45	160.7	53.9
324	10730x	64	Nakamura Hiroshi	E: WholesaleOrRetailing	3-NI-3	Female	57	161.3	43.4
325	10730x	65	Nimiya Hideo	E: WholesaleOrRetailing	3-NI-3	Male	24	164.1	61.8
326	10730x	66	Miyagawa Yokoe	E: WholesaleOrRetailing	3-NI-3	Male	23	171.9	66.6
327	10730x	67	Fujita Mizunuma	E: WholesaleOrRetailing	3-NI-3	Female	42	162.8	60.4
328	10730x	68	Sutou Narimatsu	E: WholesaleOrRetailing	3-NI-4	Male	57	177.4	50.5
329	10730x	69	Nakao Senkai	E: WholesaleOrRetailing	3-NI-4	Male	46	181.9	78.9
330	10730x	70	Torii Takamichi	E: WholesaleOrRetailing	3-NI-4	Male	27	172.0	65.3
331	10730x	71	Uchida Nurie	E: WholesaleOrRetailing	3-NI-4	Male	32	167.9	71.9
332	10730x	72	Ishikawa Kimi	E: WholesaleOrRetailing	3-NI-4	Male	44	171.3	64.7
333	10730x	73	Yamashita Ochiai	E: WholesaleOrRetailing	3-NI-4	Female	27	157.0	50.4
334	10730x	74	Seki Hatayama	E: WholesaleOrRetailing	3-NI-4	Male	47	164.6	69.2
335	10730x	75	Ochi Takase	E: WholesaleOrRetailing	3-NI-4	Female	41	154.4	53.7
336	10730x	76	Mita Imagawa	E: WholesaleOrRetailing	3-NI-4	Female	55	164.2	49.8
337	10730x	77	Fujii Kazuhirokin	E: WholesaleOrRetailing	3-NI-4	Male	67	168.0	50.5
338	10730x	78	Nakasato Chikara	E: WholesaleOrRetailing	3-NI-4	Male	62	170.9	75.9
339	10730x	79	Kosuga Kaga	E: WholesaleOrRetailing	3-NI-4	Male	35	175.6	77.6
340	10730x	80	Nakano Arai	E: WholesaleOrRetailing	3-NI-4	Male	68	166.4	70.9
341	10740x	1	Kamei Notsu	F: Construction	4-NWP	Male	36	180.1	63.1
342	10740x	2	Okamoto Imaizumi	F: Construction	4-NWP	Male	39	167.9	80.6
343	10740x	3	Matsuyama Submarine	F: Construction	4-NWP	Male	48	175.8	66.0
344	10740x	4	Ootsu Saruta	F: Construction	4-NWP	Female	66	153.5	59.2
345	10740x	5	Tsukakoshi Shinnosuke	F: Construction	4-NWP	Female	45	160.9	45.0
346	10740x	6	Tsutsui Nakahara	F: Construction	4-NWP	Female	33	163.1	53.7
347	10740x	7	Nakasato Araida	F: Construction	4-NWP	Male	55	166.8	75.1
348	10740x	8	Sasaki Takanashi	F: Construction	4-NWP	Male	34	162.1	79.4
349	10740x	9	Yamamoto Kensui	F: Construction	4-NP-1	Female	44	166.1	43.4
350	10740x	10	Shigeta Tae-Ui	F: Construction	4-NP-1	Female	58	154.8	47.5
351	10740x	11	Shibuya Kon	F: Construction	4-NP-1	Male	56	172.6	72.7
352	10740x	12	Araki Kiyoshinii	F: Construction	4-NP-1	Female	57	164.3	50.8
353	10740x	13	Maeda Sakiyama	F: Construction	4-NP-2	Female	35	168.2	52.4
354	10740x	14	Rin Tatsuro	F: Construction	4-NP-2	Male	42	164.5	90.6
355	10740x	15	Ochiai Kun	F: Construction	4-NP-2	Male	57	170.5	55.0
356	10740x	16	Shirai Kurose	F: Construction	4-NP-2	Female	26	156.1	51.2
357	10740x	17	Takase Riyori	F: Construction	4-NP-3	Male	28	176.5	75.3
358	10740x	18	Yamamoto Hirokawa	F: Construction	4-NP-3	Female	59	143.3	48.6
359	10740x	19	Tanaka Shimoda	F: Construction	4-NP-3	Male	26	170.2	69.3
360	10740x	20	Katou Hamachi	F: Construction	4-NP-3	Male	46	164.0	82.3
361	10740x	21	Wakatsuki Masaaki	F: Construction	4-NP-4	Male	44	171.8	54.3
362	10740x	22	Iwanaga Manaka	F: Construction	4-NP-4	Female	37	163.5	49.6
363	10740x	23	Tanaka Oomae	F: Construction	4-NP-4	Male	22	169.6	73.0
364	10740x	24	Sugaya Tetsushi	F: Construction	4-NP-4	Male	63	164.1	75.0
365	10740x	25	Nakahara Yabe	F: Construction	4-NP-4	Male	68	164.0	70.6
366	10740x	26	Takei Satake	F: Construction	4-NEP	Female	25	157.5	55.2
367	10740x	27	Masuda Eishi	F: Construction	4-NEP	Female	55	159.9	52.0
368	10740x	28	Sasaki Kazuya	F: Construction	4-NEP	Male	49	175.1	67.5
369	10740x	29	Sasaki Ibuki	F: Construction	4-NEP	Female	67	151.1	43.4
370	10740x	30	Kobayashi Mizunuma	F: Construction	4-NEP	Female	51	164.5	55.8
371	10740x	31	Kobayashi Ryosei	F: Construction	4-NEP	Female	46	151.3	43.9
372	10740x	32	Takahashi Etsushi	F: Construction	4-NEP	Male	26	179.9	62.2
373	10740x	33	Nakao Hiroji	F: Construction	4-NI-1	Female	57	167.0	40.0
374	10740x	34	Fujii Yangjiang	F: Construction	4-NI-1	Male	35	166.1	51.9
375	10740x	35	Yamashita Atsutaka	F: Construction	4-NI-1	Female	55	157.2	64.1
376	10740x	36	Aoki Takenaka	F: Construction	4-NI-1	Male	51	170.1	82.8
377	10740x	37	Yanagisawa Morninggi	F: Construction	4-NI-1	Female	68	153.9	43.8
378	10740x	38	Kusakabe Ashiko	F: Construction	4-NI-1	Male	43	173.4	74.8
379	10740x	39	Takahashi Seikei	F: Construction	4-NI-1	Male	68	155.0	68.3
380	10740x	40	Shigihara Takatoshi	F: Construction	4-NI-1	Male	31	165.9	49.1
381	10740x	41	Miyamoto Muratou	F: Construction	4-NI-1	Female	57	159.5	43.7
382	10740x	42	Kawazoe Takeya	F: Construction	4-NI-2	Male	35	166.4	69.2
383	10740x	43	Shimanuki Uchihito	F: Construction	4-NI-2	Female	52	156.5	52.9
384	10740x	44	Akita Shoichiro	F: Construction	4-NI-2	Male	52	167.0	82.0
385	10740x	45	Kimura Nakazawa	F: Construction	4-NI-2	Female	51	152.8	64.7
386	10740x	46	Aoki Kitaoka	F: Construction	4-NI-2	Male	55	162.1	74.0
387	10740x	47	Chiba Fukutome	F: Construction	4-NI-3	Male	33	161.2	64.7
388	10740x	48	Morita Kitajima	F: Construction	4-NI-3	Female	52	154.9	50.3
389	10740x	49	Tanaka Yoshidome	F: Construction	4-NI-3	Male	56	167.4	66.6
390	10740x	50	Yamagata Isobe	F: Construction	4-NI-3	Female	42	162.3	59.7
391	10740x	51	Ogino Morozumi	F: Construction	4-NI-3	Male	32	152.9	37.3
392	10740x	52	Andou Teraoka	F: Construction	4-NI-3	Male	28	169.7	63.9
393	10740x	53	Sasaki Shimamoto	F: Construction	4-NI-3	Female	57	148.0	67.4
394	10740x	54	Horiuchi Sho	F: Construction	4-NI-3	Female	55	160.0	53.0
395	10740x	55	Uemura Takaya	F: Construction	4-NI-3	Male	25	172.0	70.7
396	10740x	56	Hisayasu Kyou	F: Construction	4-NI-3	Male	36	174.5	66.3
397	10740x	57	Akaba Kubo	F: Construction	4-NI-3	Male	55	157.1	74.1
398	10740x	58	Suzuki Gouda	F: Construction	4-NI-3	Male	34	168.8	71.0
399	10740x	59	Hatakeyama Tomohiro	F: Construction	4-NI-3	Female	69	150.2	41.3
400	10740x	60	Asai Kitaura	F: Construction	4-NI-3	Female	45	162.1	58.2

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
401	10740x	61	Shimomura Itoga	F: Construction	4-NI-4	Male	39	167.1	72.8
402	10740x	62	Yamashita Ai	F: Construction	4-NI-4	Male	46	163.8	58.6
403	10740x	63	Mori Senda	F: Construction	4-NI-4	Male	59	170.5	67.6
404	10740x	64	Iida Withdrawal	F: Construction	4-NI-4	Female	45	154.7	45.1
405	10740x	65	Yamamoto Iwase	F: Construction	4-NI-4	Female	45	151.7	52.0
406	10740x	66	Mori Kenrow	F: Construction	4-NI-4	Female	64	155.4	45.9
407	10740x	67	Yamada Katsunori	F: Construction	4-NI-4	Male	21	170.8	64.5
408	10740x	68	Shimizu Onigashira	F: Construction	4-NI-4	Male	41	169.9	75.1
409	10740x	69	Tominaga Shimoda	F: Construction	4-NI-4	Male	57	166.3	74.6
410	10740x	70	Kojima Kinichi	F: Construction	4-NI-4	Male	48	172.2	81.4
411	10740x	71	Nakata Iwabuchi	F: Construction	4-NI-4	Male	63	169.2	64.5
412	10740x	72	Yamashita Kyoukiga	F: Construction	4-NI-4	Female	41	156.5	52.9
413	10740x	73	Tsuruta Kunikari	F: Construction	4-NI-4	Female	68	155.1	46.9
414	10740x	74	Yahagi Katsuya	F: Construction	4-NI-4	Female	66	141.4	42.0
415	10740x	75	Tsuchita Takanori	F: Construction	4-NI-4	Male	65	165.5	51.8
416	10740x	76	Watanabe Koji	F: Construction	4-NI-4	Male	45	170.1	61.9
417	10740x	77	Watanabe Shitara	F: Construction	4-NI-4	Male	42	170.9	73.1
418	10740x	78	Hosokawa Kazumasa	F: Construction	4-NI-4	Female	54	153.5	52.4
419	10740x	79	Ochi Ishikawa	F: Construction	4-NI-4	Male	49	163.9	64.0
420	10740x	80	Iguchi Satoru	F: Construction	4-NI-4	Male	48	170.5	61.3
421	10740x	81	Miyazato Hajime	F: Construction	4-NI-4	Female	29	167.0	45.2
422	10740x	82	Tanaka Kwanghyeon	F: Construction	4-SWP	Female	61	157.8	53.1
423	10740x	83	Tamura Takashi	F: Construction	4-SWP	Male	27	180.0	64.7
424	10740x	84	Shibuya Kunio	F: Construction	4-SWP	Male	37	177.0	67.7
425	10740x	85	Nomura Akira	F: Construction	4-SWP	Female	67	159.6	52.5
426	10740x	86	Komori Imura	F: Construction	4-SWP	Female	66	156.6	45.1
427	10740x	87	Okada Junkim	F: Construction	4-SWP	Male	23	173.6	64.1
428	10740x	88	Tsuchiya Minetwopeop	F: Construction	4-SP-1	Male	69	165.8	73.4
429	10740x	89	Fujiwara Kazushige	F: Construction	4-SP-1	Male	51	169.1	61.2
430	10740x	90	Itou Akihiro	F: Construction	4-SP-1	Male	45	170.1	67.8
431	10740x	91	Nakamoto Minamide	F: Construction	4-SP-1	Female	57	157.8	56.4
432	10740x	92	Ooishi Chiya	F: Construction	4-SP-1	Male	58	171.8	67.1
433	10740x	93	Haga Maruyama	F: Construction	4-SP-1	Male	66	160.3	69.8
434	10740x	94	Takamatsu Norio	F: Construction	4-SP-2	Male	55	167.5	66.5
435	10740x	95	Naoi Tateishi	F: Construction	4-SP-2	Male	56	175.0	72.8
436	10740x	96	Nagano Geno	F: Construction	4-SP-2	Male	22	179.1	63.0
437	10740x	97	Niisato Sera	F: Construction	4-SP-2	Male	43	177.7	74.6
438	10740x	98	Ise Tooyama	F: Construction	4-SP-2	Male	29	175.8	57.6
439	10740x	99	Hiratsuka Shouno	F: Construction	4-SP-2	Male	48	179.0	51.7
440	10740x	100	Fujiwara Tatsunobu	F: Construction	4-SP-3	Female	61	154.6	53.1
441	10740x	101	Oogami Kenichi	F: Construction	4-SP-3	Male	33	174.2	51.3
442	10740x	102	Ozawa Miyamori	F: Construction	4-SP-3	Male	32	172.3	61.6
443	10740x	103	Matsuoka Megumitaka	F: Construction	4-SP-3	Male	39	178.7	71.6
444	10740x	104	Ikeda Kenshun	F: Construction	4-SP-3	Female	45	162.1	50.1
445	10740x	105	Tomita Miki	F: Construction	4-SP-3	Female	48	165.8	48.9
446	10740x	106	Oikawa Kyoya	F: Construction	4-SP-4	Male	59	169.3	55.4
447	10740x	107	Kimura Tomono	F: Construction	4-SP-4	Male	59	164.7	72.8
448	10740x	108	Sugawa Machida	F: Construction	4-SP-4	Male	35	183.1	72.3
449	10740x	109	Arakawa Nakauchi	F: Construction	4-SI-1	Male	68	173.7	62.3
450	10740x	110	Muraki Nagano	F: Construction	4-SI-1	Male	63	173.6	57.3
451	10740x	111	Utsumi Beimura	F: Construction	4-SI-1	Male	45	171.6	53.5
452	10740x	112	Juudani Ishimoto	F: Construction	4-SI-1	Female	53	159.7	55.7
453	10740x	113	Satou Atsuto	F: Construction	4-SI-1	Male	47	172.9	77.6
454	10740x	114	Ishibashi Shimabukuro	F: Construction	4-SI-1	Male	66	161.6	54.2
455	10740x	115	Misawa Intelligence	F: Construction	4-SI-1	Male	56	168.7	51.5
456	10740x	116	Sakurai Kinnosuke	F: Construction	4-SI-1	Male	25	175.2	85.6
457	10740x	117	Hasegawa Koichiro	F: Construction	4-SI-1	Male	66	169.5	61.1
458	10740x	118	Hamada Hirose	F: Construction	4-SI-1	Male	69	170.2	45.1
459	10740x	119	Akiyoshi Taima	F: Construction	4-SI-1	Male	58	170.7	63.7
460	10740x	120	Aoki Akira	F: Construction	4-SI-1	Male	58	168.1	58.3
461	10740x	121	Ikehata Masashige	F: Construction	4-SI-1	Female	66	152.5	47.5
462	10740x	122	Yamaguchi Kyonosuke	F: Construction	4-SI-1	Female	43	158.4	62.8
463	10740x	123	Yanagi Kusano	F: Construction	4-SI-1	Female	59	152.0	51.1
464	10740x	124	Noguchi Takamaru	F: Construction	4-SI-1	Male	35	168.7	78.8
465	10740x	125	Arai Houjou	F: Construction	4-SI-2	Female	57	150.0	57.2
466	10740x	126	Saitou Meguro	F: Construction	4-SI-2	Male	69	159.7	66.3
467	10740x	127	Matsuo Mukumoto	F: Construction	4-SI-2	Female	41	167.4	53.4
468	10740x	128	Nagayama Aonuma	F: Construction	4-SI-2	Male	31	170.9	64.3
469	10740x	129	Nagatsuka Mamoru	F: Construction	4-SI-2	Male	44	176.9	91.5
470	10740x	130	Okuno Komatsu	F: Construction	4-SI-2	Male	45	179.3	74.1
471	10740x	131	Abe Koichi	F: Construction	4-SI-2	Female	41	155.1	51.2
472	10740x	132	Ooyama Muramoto	F: Construction	4-SI-2	Female	39	162.3	44.8
473	10740x	133	Kawahara Nurie	F: Construction	4-SI-3	Male	52	163.5	68.2
474	10740x	134	Yamamoto Fukutani	F: Construction	4-SI-3	Female	34	160.1	48.9
475	10740x	135	Oota Inaoka	F: Construction	4-SI-3	Male	54	168.3	66.6
476	10740x	136	Iwaki Ikari	F: Construction	4-SI-3	Female	64	158.4	47.4
477	10740x	137	Matsuo Mukumoto	F: Construction	4-SI-3	Male	65	168.3	77.3
478	10740x	138	Nakao Onodera	F: Construction	4-SI-3	Male	44	178.8	65.5
479	10740x	139	Miyakoshi Hatori	F: Construction	4-SI-3	Male	63	170.9	64.0
480	10740x	140	Fukumori Hirohiro	F: Construction	4-SI-3	Male	22	182.8	76.1
481	10740x	141	Kuno Nishihata	F: Construction	4-SI-3	Female	44	161.3	62.4
482	10740x	142	Kojima Ueshima	F: Construction	4-SI-3	Female	42	154.3	49.3
483	10740x	143	Okabe Ikky?	F: Construction	4-SI-3	Male	67	174.7	78.3
484	10740x	144	Tsuruta Kokomitsu	F: Construction	4-SI-3	Female	62	155.9	62.7
485	10740x	145	Nakatsuka Kunii	F: Construction	4-SI-3	Female	23	151.0	55.0
486	10740x	146	Furukawa Satoshiro	F: Construction	4-SI-3	Female	44	151.4	46.3
487	10740x	147	Gotou Sawada	F: Construction	4-SI-3	Female	34	156.7	43.4
488	10740x	148	Kouno Hisayuki	F: Construction	4-SI-3	Male	51	171.4	64.7
489	10740x	149	Inaoka Emory	F: Construction	4-SI-4	Male	36	179.2	61.3
490	10740x	150	Kuroda Toshiyuki	F: Construction	4-SI-4	Female	32	159.6	38.2
491	10740x	151	Kuwabara Miwa	F: Construction	4-SI-4	Female	62	158.4	51.0
492	10740x	152	Kishima Kawanabe	F: Construction	4-SI-4	Male	66	166.1	59.8
493	10740x	153	Ninomiya Inomata	F: Construction	4-SI-4	Male	45	167.3	49.6
494	10740x	154	Yamada Hamada	F: Construction	4-SI-4	Male	27	176.9	82.5
495	10740x	155	Inagaki Ootaki	F: Construction	4-SI-4	Female	65	157.2	57.0
496	10740x	156	Tamura Oomori	F: Construction	4-SI-4	Male	62	161.6	64.7
497	10740x	157	Murase Nishio	F: Construction	4-SI-4	Female	41	165.0	37.3
498	10740x	158	Udagawa Tomihiro	F: Construction	4-SI-4	Male	36	175.9	72.8
499	10750x	1	Seo Akita	G: WholesaleOrRetailing	5-NWP	Female	46	159.3	51.8
500	10750x	2	Satou Kikukawa	G: WholesaleOrRetailing	5-NWP	Female	63	149.4	40.4

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
501	10750x	3	Sasaki Yoshi-Kun	G: WholesaleOrRetailing	5-NWP	Male	53	169.9	83.9
502	10750x	4	Nakanishi Kawajiri	G: WholesaleOrRetailing	5-NWP	Male	51	174.6	63.8
503	10750x	5	Fujikawa Erikyo	G: WholesaleOrRetailing	5-NWP	Female	32	158.4	44
504	10750x	6	Satou Onelake	G: WholesaleOrRetailing	5-NWP	Male	68	166	63.7
505	10750x	7	Miyazaki Uemura	G: WholesaleOrRetailing	5-NWP	Female	51	151.3	60.5
506	10750x	8	Maeda Toshio	G: WholesaleOrRetailing	5-NWP	Male	32	166	80.3
507	10750x	9	Imada Ship	G: WholesaleOrRetailing	5-NWP	Female	58	151.3	50.4
508	10750x	10	Ishihara Miyao	G: WholesaleOrRetailing	5-NWP	Male	32	169.6	72.7
509	10750x	11	Uchida Hideo	G: WholesaleOrRetailing	5-NWP	Male	28	174.3	70.7
510	10750x	12	Morimoto Seiwa	G: WholesaleOrRetailing	5-NP-1	Female	35	166.5	54.1
511	10750x	13	Kimura Kouichiro	G: WholesaleOrRetailing	5-NP-1	Male	25	170.5	61.6
512	10750x	14	Nagao Takayanagi	G: WholesaleOrRetailing	5-NP-1	Male	35	183.7	67.9
513	10750x	15	Ehata Kenji	G: WholesaleOrRetailing	5-NP-1	Male	66	172.3	67.9
514	10750x	16	Yoshioka Hirohiro	G: WholesaleOrRetailing	5-NP-1	Male	39	175.3	53.8
515	10750x	17	Satou Tomii	G: WholesaleOrRetailing	5-NP-1	Male	38	181.1	63.2
516	10750x	18	Takaoka Minghiro	G: WholesaleOrRetailing	5-NP-1	Female	65	158.1	47.3
517	10750x	19	Ishiwata Miyoshi	G: WholesaleOrRetailing	5-NP-2	Male	67	165.8	59.1
518	10750x	20	Ina Oota	G: WholesaleOrRetailing	5-NP-2	Female	59	158.7	49.9
519	10750x	21	Yamada Kenko	G: WholesaleOrRetailing	5-NP-2	Male	49	161.8	48.7
520	10750x	22	Nosaki Ueda	G: WholesaleOrRetailing	5-NP-2	Male	23	174.2	59.2
521	10750x	23	Takeda Aratata	G: WholesaleOrRetailing	5-NI-1	Female	21	168.5	61.7
522	10750x	24	Tanahashi Toko	G: WholesaleOrRetailing	5-NI-1	Female	45	163.8	49.7
523	10750x	25	Shimazaki Nishiumi	G: WholesaleOrRetailing	5-NI-1	Female	25	154.4	41
524	10750x	26	Kinoshita Takeshi	G: WholesaleOrRetailing	5-NI-1	Male	65	162.1	65.1
525	10750x	27	Tanaka Agatsuma	G: WholesaleOrRetailing	5-NI-1	Female	41	160.2	57
526	10750x	28	Motomura Iwamatsu	G: WholesaleOrRetailing	5-NI-1	Female	37	154	54.1
527	10750x	29	Yamashita Serizawa	G: WholesaleOrRetailing	5-NI-1	Male	25	166.3	65.8
528	10750x	30	Yanagida Shin	G: WholesaleOrRetailing	5-NI-1	Female	47	163	65.3
529	10750x	31	Satou Praise	G: WholesaleOrRetailing	5-NI-1	Female	22	153.3	49.4
530	10750x	32	Nakamura Shintaku	G: WholesaleOrRetailing	5-NI-1	Male	31	167	68.5
531	10750x	33	Suzuki Kumano	G: WholesaleOrRetailing	5-NI-1	Female	57	140	58.3
532	10750x	34	Miyata Masato	G: WholesaleOrRetailing	5-NI-1	Male	29	178.7	65.8
533	10750x	35	Togashi EIsuke	G: WholesaleOrRetailing	5-NI-2	Male	24	172.9	60.6
534	10750x	36	Katuta Kouji	G: WholesaleOrRetailing	5-NI-2	Male	45	169.8	64.7
535	10750x	37	Izumi Satoru	G: WholesaleOrRetailing	5-NI-2	Male	55	160.4	68.5
536	10750x	38	Sakuraba Okata	G: WholesaleOrRetailing	5-NI-2	Male	23	171.1	60.9
537	10750x	39	Sakurai Shougo	G: WholesaleOrRetailing	5-NI-2	Male	64	166.6	68.8
538	10750x	40	Tajiri Takahiro	G: WholesaleOrRetailing	5-NI-2	Female	54	157.5	48.7
539	10750x	41	Mihara Tadayori	H: FinanceOrInsurance	5-NP-3	Female	63	158.6	41.9
540	10750x	42	Ootsuka Oomae	H: FinanceOrInsurance	5-NP-3	Female	53	156.7	58.2
541	10750x	43	Hosoya Dejun	H: FinanceOrInsurance	5-NP-3	Female	33	170.2	46.4
542	10750x	44	Oogami Asanuma	H: FinanceOrInsurance	5-NP-3	Male	52	167.6	62.8
543	10750x	45	Ishikawa Masaharu	H: FinanceOrInsurance	5-NP-3	Male	52	171.9	61.5
544	10750x	46	Katayama Taishaku	H: FinanceOrInsurance	5-NP-4	Female	58	150.8	54.8
545	10750x	47	Ishihara Ootsubo	H: FinanceOrInsurance	5-NP-4	Male	56	176	82.4
546	10750x	48	Carrier Willis	H: FinanceOrInsurance	5-NP-4	Male	55	177.3	56.4
547	10750x	49	Fujii Kouji	H: FinanceOrInsurance	5-NP-4	Male	26	173.3	63.2
548	10750x	50	Ozaki Sakakibara	H: FinanceOrInsurance	5-NP-4	Male	41	174.1	67.1
549	10750x	51	Morisaki Katsuragi	H: FinanceOrInsurance	5-NP-4	Male	63	158.6	56.3
550	10750x	52	Arita Hosono	H: FinanceOrInsurance	5-NEP	Male	34	174.5	80.1
551	10750x	53	Inoue Kiyotake	H: FinanceOrInsurance	5-NEP	Male	44	180.2	71.5
552	10750x	54	Suzuki Furuta	H: FinanceOrInsurance	5-NEP	Male	42	170.8	54.6
553	10750x	55	Mutou Nukui	H: FinanceOrInsurance	5-NEP	Female	48	159.6	56.4
554	10750x	56	Matuo You	H: FinanceOrInsurance	5-NEP	Male	56	168.9	58.1
555	10750x	57	Yamazaki Meng	H: FinanceOrInsurance	5-NI-3	Female	46	149	44
556	10750x	58	Minami Tomonori	H: FinanceOrInsurance	5-NI-3	Female	46	158	51.9
557	10750x	59	Ogawa Araki	H: FinanceOrInsurance	5-NI-3	Male	53	166.2	76.7
558	10750x	60	Hamada Kinji	H: FinanceOrInsurance	5-NI-3	Female	32	157.1	44.3
559	10750x	61	Miyamoto Kin	H: FinanceOrInsurance	5-NI-3	Male	66	162.9	68.9
560	10750x	62	Yamada Nogami	H: FinanceOrInsurance	5-NI-3	Female	47	159.6	50.1
561	10750x	63	Wakui Katsura	H: FinanceOrInsurance	5-NI-3	Male	22	171.6	68
562	10750x	64	Minami Onelake	H: FinanceOrInsurance	5-NI-3	Female	32	163.1	50.7
563	10750x	65	Yasuhara Abe	H: FinanceOrInsurance	5-NI-4	Female	31	157.6	56.7
564	10750x	66	Tateiwa Kazuma	H: FinanceOrInsurance	5-NI-4	Male	64	161	61.7
565	10750x	67	Suzuki Kanesen	H: FinanceOrInsurance	5-NI-4	Female	45	161.8	48.3
566	10750x	68	Yasuoka Hoshina	H: FinanceOrInsurance	5-NI-4	Male	48	174.7	55.8
567	10750x	69	Shimizu Shogun	H: FinanceOrInsurance	5-NI-4	Female	41	155.2	37.7
568	10750x	70	Doi Ikkin	H: FinanceOrInsurance	5-NI-4	Female	45	153.8	42.9
569	10750x	71	Kataoka Kenji	H: FinanceOrInsurance	5-NI-4	Male	46	165.8	63.1
570	10750x	72	Okumura Watarai	H: FinanceOrInsurance	5-NI-4	Male	35	170.4	59.6
571	10750x	73	Ishihara Masao	H: FinanceOrInsurance	5-NI-4	Male	69	173.7	74.8
572	10750x	74	Saitou Takashi	H: FinanceOrInsurance	5-NI-4	Male	51	155.8	66.1
573	10750x	75	Mikami Matsuzaki	H: FinanceOrInsurance	5-NI-4	Female	51	154.8	49.4
574	10750x	76	Ogura Honori	H: FinanceOrInsurance	5-NI-4	Female	45	155.1	44.9
575	10750x	77	Kamitaira Hajime	H: FinanceOrInsurance	5-NI-4	Female	24	153.5	51.3
576	10750x	78	Miura Fujioka	H: FinanceOrInsurance	5-NI-4	Female	44	151.9	53.8
577	10750x	79	Nomura Takeyama	H: FinanceOrInsurance	5-NI-4	Female	45	167.2	63.6
578	10750x	80	Sakurai Wasabi	H: FinanceOrInsurance	5-NI-4	Male	69	170.6	59.9
579	10750x	81	Sakai Iita	H: FinanceOrInsurance	5-NI-4	Male	59	167.2	56.6
580	10750x	82	Muramatsu Toshiakitos	I: RealEstate	5-SWP	Male	51	168	71.2
581	10750x	83	Nishihata Kiyoharu	I: RealEstate	5-SWP	Male	34	169.8	68.2
582	10750x	84	Yoshizawa Koshino	I: RealEstate	5-SWP	Male	65	167.9	63.2
583	10750x	85	Matsubara Takeharu	I: RealEstate	5-SWP	Male	38	163.2	70.7
584	10750x	86	Yagi Miyakoshi	I: RealEstate	5-SWP	Female	51	153.7	55
585	10750x	87	Harada Sonoda	I: RealEstate	5-SWP	Male	61	174.3	72.4
586	10750x	88	Mukai Jun-San	I: RealEstate	5-SWP	Female	28	167.4	44
587	10750x	89	Abe Yanai	I: RealEstate	5-SWP	Female	23	159.5	43
588	10750x	90	Funabashi Sakai	I: RealEstate	5-SWP	Female	34	168.8	56.9
589	10750x	91	Sawada Totallight	I: RealEstate	5-SWP	Female	29	165.3	46.8
590	10750x	92	Koyama Aso	I: RealEstate	5-SP-1	Female	65	157.9	55.7
591	10750x	93	Hirai Shimamoto	I: RealEstate	5-SP-1	Female	28	161	52.1
592	10750x	94	Matsumoto Hachioji	I: RealEstate	5-SP-1	Male	21	169.7	72.7
593	10750x	95	Hanashima Oshio	I: RealEstate	5-SP-2	Female	49	152.4	48.8
594	10750x	96	Hamaguchi Todoroki	I: RealEstate	5-SP-2	Female	26	157.9	41.3
595	10750x	97	Kawabata Hiroshima	I: RealEstate	5-SP-2	Female	35	170.7	50.8
596	10750x	98	Tsuji Dakakuchi	I: RealEstate	5-SP-2	Female	64	151.5	43.5
597	10750x	99	Tanifuji Kyoya	I: RealEstate	5-SP-2	Male	36	168.9	79
598	10750x	100	Saitou Miyadaira	I: RealEstate	5-SP-2	Female	28	161.2	46.9
599	10750x	101	Shiozawa Kigochi	I: RealEstate	5-SP-3	Male	69	181.2	67.8
600	10750x	102	Hosoe Cheol	I: RealEstate	5-SP-3	Male	65	164.4	56.8

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
601	10750x	103	Shiraishi Hideyo	I: RealEstate	5-SP-3	Male	27	175	59
602	10750x	104	Sugimura Shinjiro	I: RealEstate	5-SP-3	Male	69	160.4	62.5
603	10750x	105	Matsumoto Nanba	I: RealEstate	5-SP-3	Female	29	158.8	52.7
604	10750x	106	Daikaku Taketomi	I: RealEstate	5-SP-4	Male	36	177.2	66.7
605	10750x	107	Matsui Hirakawa	I: RealEstate	5-SP-4	Male	57	186.1	54.4
606	10750x	108	Kuwabara Fukata	I: RealEstate	5-SP-4	Male	48	174.1	61.5
607	10750x	109	Ikezawa Akanuma	I: RealEstate	5-SP-4	Female	29	149.5	58.1
608	10750x	110	Kobayashi Mingaka	I: RealEstate	5-SI-1	Male	39	173.6	50.6
609	10750x	111	Kishimoto Wada	I: RealEstate	5-SI-1	Male	25	178.8	59.2
610	10750x	112	Yonekura Kawaguchi	I: RealEstate	5-SI-1	Male	66	171.8	66.5
611	10750x	113	Sakagami Oota	I: RealEstate	5-SI-1	Male	61	162.8	59.9
612	10750x	114	Matsushita Eiichiro	I: RealEstate	5-SI-1	Male	36	173.1	60.3
613	10750x	115	Matsumoto Iizumi	I: RealEstate	5-SI-1	Male	41	172.4	72.9
614	10750x	116	Oda Ishimoto	I: RealEstate	5-SI-1	Female	24	156.7	53.4
615	10750x	117	Ogawa Kawasaki	I: RealEstate	5-SI-1	Female	26	157.3	51.6
616	10750x	118	Kimura Miyazawa	I: RealEstate	5-SI-1	Male	41	168.9	80.1
617	10750x	119	Motomura Umekawa	I: RealEstate	5-SI-1	Male	25	161.8	69.5
618	10750x	120	Kishima T.Mitsuru	I: RealEstate	5-SI-1	Female	33	163.9	50.9
619	10750x	121	Tahara Takaya	I: RealEstate	5-SI-1	Female	28	159.7	50.2
620	10750x	122	Nagae Bitou	I: RealEstate	5-SI-1	Male	48	175.2	33.4
621	10750x	123	Ooshima Shussui	I: RealEstate	5-SI-1	Female	45	168.1	47.8
622	10750x	124	Tanabe Sakai	I: RealEstate	5-SI-1	Female	33	163.8	56.1
623	10750x	125	Katagiri Toshi	I: RealEstate	5-SI-1	Female	54	159.3	53.7
624	10750x	126	Kimura Yu	I: RealEstate	5-SI-1	Female	39	156.7	58.7
625	10750x	127	Inoue Uichi	I: RealEstate	5-SI-1	Male	23	172.2	67.4
626	10750x	128	Haruyama Mukawa	I: RealEstate	5-SI-1	Male	64	174.3	67.6
627	10750x	129	Fukuda Miyanishi	I: RealEstate	5-SI-1	Male	41	177.1	71
628	10750x	130	Shindou Kumai	I: RealEstate	5-SI-1	Male	65	167.4	70
629	10750x	131	Tsuda Kenji	I: RealEstate	5-SI-1	Male	46	165.7	69
630	10750x	132	Maeda Toshio	I: RealEstate	5-SI-2	Male	51	174.6	67.7
631	10750x	133	Sugihara Shimoyama	I: RealEstate	5-SI-2	Female	49	159.1	50.9
632	10750x	134	Ono Ise	I: RealEstate	5-SI-2	Male	23	182.2	60.6
633	10750x	135	Hira Nakatake	I: RealEstate	5-SI-2	Male	52	177.4	47.3
634	10750x	136	Handa Shiichiroro	I: RealEstate	5-SI-2	Male	56	181.1	55.2
635	10750x	137	Nagatani Takashima	I: RealEstate	5-SI-2	Male	27	165.3	74.5
636	10750x	138	Honda Takeshi	I: RealEstate	5-SI-2	Male	65	171.6	69.9
637	10750x	139	Tada Bachelor'Sdegree	I: RealEstate	5-SI-2	Female	67	158.8	62.9
638	10750x	140	Itou Afewofyou	I: RealEstate	5-SI-2	Male	69	159.7	40.2
639	10750x	141	Watanabe Umehara	I: RealEstate	5-SI-2	Male	31	161.1	58.7
640	10750x	142	Kanda Usui	I: RealEstate	5-SI-2	Female	47	163.5	49.8
641	10750x	143	Nonoyama Ubukata	I: RealEstate	5-SI-2	Female	62	150.9	53.5
642	10750x	144	Nagai Tatuo	I: RealEstate	5-SI-2	Male	55	169.4	64.5
643	10750x	145	Kishida Goku	I: RealEstate	5-SI-2	Male	55	173.9	77.5
644	10750x	146	Takechi Gentlemen	I: RealEstate	5-SI-3	Male	49	171.1	62.8
645	10750x	147	Tanaka Koshimizu	I: RealEstate	5-SI-3	Female	27	158.2	49.6
646	10750x	148	Tada Sugino	I: RealEstate	5-SI-3	Male	32	160.8	54.5
647	10750x	149	Katou Kunikari	I: RealEstate	5-SI-3	Female	49	158.3	54.5
648	10750x	150	Tsukamoto Yonggi	I: RealEstate	5-SI-3	Female	63	156.6	43.4
649	10750x	151	Inoue Takeshi	I: RealEstate	5-SI-3	Female	55	156.7	66.9
650	10750x	152	Tajima Muneakisoke	I: RealEstate	5-SI-3	Female	55	160.9	53.7

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
651	10750x	153	Fujita Masuda	I: RealEstate	5-SI-3	Female	37	162.7	51.9
652	10750x	154	Nakajima Ike	I: RealEstate	5-SI-3	Male	63	178	67.3
653	10750x	155	Imai Satori	I: RealEstate	5-SI-3	Female	35	155.9	47.1
654	10750x	156	Yoneyama Muneaki	I: RealEstate	5-SI-4	Female	53	153.4	57.6
655	10750x	157	Watanabe Kuroki	I: RealEstate	5-SI-4	Male	58	166.1	61.2
656	10750x	158	Miyamoto Seiji	I: RealEstate	5-SI-4	Female	49	150.9	55.2
657	10750x	159	Kano Tokubei	I: RealEstate	5-SI-4	Female	64	159.2	55.9
658	10750x	160	Ishizaki Erieriya	I: RealEstate	5-SI-4	Male	25	171.4	57.3
659	10760x	1	Tanida Kojou	J: Manufacturing	6-NWP	Male	41	172.6	64.1
660	10760x	2	Kitagawa Hirakawa	J: Manufacturing	6-NWP	Male	44	178.5	63
661	10760x	3	Takashima Yajima	J: Manufacturing	6-NWP	Male	32	171.9	71.3
662	10760x	4	Matsumoto Tokiwa	J: Manufacturing	6-NWP	Male	38	165.6	43.1
663	10760x	5	Harada Gengo	J: Manufacturing	6-NWP	Male	33	166.9	65.5
664	10760x	6	Sekito Kunisuke	J: Manufacturing	6-NWP	Male	45	170.1	80.8
665	10760x	7	Ueki Sakairi	J: Manufacturing	6-NWP	Female	34	160.3	44.3
666	10760x	8	Takahashi Mihiro	J: Manufacturing	6-NP-1	Male	24	160.5	38.5
667	10760x	9	Iwasaki Asanuma	J: Manufacturing	6-NP-1	Female	36	151.4	57.3
668	10760x	10	Ooishi Ezaki	J: Manufacturing	6-NP-1	Male	32	174.7	67.1
669	10760x	11	Nagamine Yoshizaki	J: Manufacturing	6-NP-1	Female	44	158.8	42.6
670	10760x	12	Yanagimachi Masanosu	J: Manufacturing	6-NP-1	Male	55	176	63
671	10760x	13	Kanai Expert	J: Manufacturing	6-NP-1	Male	55	177.8	72.2
672	10760x	14	Sano Kai	J: Manufacturing	6-NP-1	Male	49	166.9	55.5
673	10760x	15	Aida Ezaki	J: Manufacturing	6-NP-1	Male	49	165.9	86.8
674	10760x	16	Kai Kuniya	J: Manufacturing	6-NP-2	Male	25	177.8	60.5
675	10760x	17	Takemura Takashi	J: Manufacturing	6-NP-2	Male	55	167.6	65.4
676	10760x	18	Akimoto Nagaoka	J: Manufacturing	6-NP-2	Male	41	167.6	60.7
677	10760x	19	Yoshida Shogun	J: Manufacturing	6-NP-2	Male	68	166.3	75
678	10760x	20	Ohara Takayoshi	J: Manufacturing	6-NP-3	Male	39	167.8	72.9
679	10760x	21	Satou Nagano	J: Manufacturing	6-NP-3	Female	41	164.5	55.3
680	10760x	22	Takeda Kiichi	J: Manufacturing	6-NP-4	Male	31	169.6	68.3
681	10760x	23	Ooba Yukinori	J: Manufacturing	6-NP-4	Male	59	164	74.1
682	10760x	24	Asada Tonomura	J: Manufacturing	6-NP-4	Female	25	151.4	45.3
683	10760x	25	Isobe Nishioka	J: Manufacturing	6-NP-4	Male	44	165.8	77
684	10760x	26	Sasaki Shigemoto	J: Manufacturing	6-NP-4	Male	67	177.5	62.4
685	10760x	27	Satou Honored	J: Manufacturing	6-NP-4	Male	61	166.3	64.6
686	10760x	28	Yasui Kanno	J: Manufacturing	6-NEP	Male	67	156.3	61.3
687	10760x	29	Hirayama Takashi	J: Manufacturing	6-NEP	Male	45	163.8	78.2
688	10760x	30	Ishizaki Kimito	J: Manufacturing	6-NEP	Male	59	166.9	54.8
689	10760x	31	Itoi Shibusawa	J: Manufacturing	6-NEP	Male	33	173.7	58.6
690	10760x	32	Yamazaki Koumi	J: Manufacturing	6-NEP	Male	48	173.4	74.4
691	10760x	33	Ishibashi Nagatomo	J: Manufacturing	6-NEP	Female	45	151	63.2
692	10760x	34	Suzuki Imura	J: Manufacturing	6-NI-1	Male	42	167.7	72.6
693	10760x	35	Endou Kenjin	J: Manufacturing	6-NI-1	Male	52	175.2	67
694	10760x	36	Suzuki Imanishi	J: Manufacturing	6-NI-1	Male	37	175.1	66.6
695	10760x	37	Sawada Chikada	J: Manufacturing	6-NI-1	Male	48	171.4	76.3
696	10760x	38	Tonegawa Tomoya	J: Manufacturing	6-NI-1	Male	55	163.3	78.4
697	10760x	39	Takanashi Takuato	J: Manufacturing	6-NI-1	Male	65	174.4	62.9
698	10760x	40	Akiyama Satya	J: Manufacturing	6-NI-1	Male	51	167.3	63.9
699	10760x	41	Touson Negishi	J: Manufacturing	6-NI-1	Male	63	162	58.3
700	10760x	42	Hayasaka Naoko	J: Manufacturing	6-NI-1	Female	22	160	47.2

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
701	10760x	43	Nakajima Kensuke	J: Manufacturing	6-NI-1	Male	24	177.9	67.5
702	10760x	44	Miura Hachisuka	J: Manufacturing	6-NI-1	Male	33	173.3	72.3
703	10760x	45	Tanaka Zenji	J: Manufacturing	6-NI-1	Male	24	163.5	70
704	10760x	46	Seki Kohashi	J: Manufacturing	6-NI-1	Male	62	168.3	57.5
705	10760x	47	Watanabe Okiji	J: Manufacturing	6-NI-2	Male	41	172.4	84.1
706	10760x	48	Rin Tanioka	J: Manufacturing	6-NI-2	Male	48	174.5	68.9
707	10760x	49	Iwase Farewell	J: Manufacturing	6-NI-2	Male	45	167.7	62.7
708	10760x	50	Takei Yonetsu	J: Manufacturing	6-NI-2	Male	59	170.1	57.6
709	10760x	51	Shirakawa Ryuichi	J: Manufacturing	6-NI-2	Male	47	167.6	47
710	10760x	52	Kawakami Kasuke	J: Manufacturing	6-NI-2	Male	29	169.4	58
711	10760x	53	Takemoto Funatsu	J: Manufacturing	6-NI-2	Male	49	172.5	75.4
712	10760x	54	Shimada Teruichi	J: Manufacturing	6-NI-2	Male	23	181.1	66.9
713	10760x	55	Akamatsu Komatsuzaki	J: Manufacturing	6-NI-2	Female	48	165.4	58.9
714	10760x	56	Kase Himself	J: Manufacturing	6-NI-2	Male	56	175	71.2
715	10760x	57	Horie Shirato	J: Manufacturing	6-NI-2	Male	34	173.4	62.1
716	10760x	58	Takahashi Unicorn	J: Manufacturing	6-NI-2	Male	68	169	51.2
717	10760x	59	Kurahashi Shinsuke	J: Manufacturing	6-NI-2	Male	62	167.6	75.8
718	10760x	60	Ookubo Tokunaga	J: Manufacturing	6-NI-3	Male	69	165	55.4
719	10760x	61	Kobayashi Toshinobu	J: Manufacturing	6-NI-3	Male	38	167.9	52.7
720	10760x	62	Tajima Takanori	J: Manufacturing	6-NI-3	Female	36	157.8	42.7
721	10760x	63	Hasegawa Takeya	J: Manufacturing	6-NI-3	Male	58	166.9	50.5
722	10760x	64	Kunitake Kozeki	J: Manufacturing	6-NI-3	Male	26	180.5	66.3
723	10760x	65	Watanabe Koshiro	J: Manufacturing	6-NI-3	Female	66	149.7	54.3
724	10760x	66	Yasuda Terayama	J: Manufacturing	6-NI-3	Female	52	153.2	58.5
725	10760x	67	Igarashi Toshio	J: Manufacturing	6-NI-3	Male	46	161.2	55
726	10760x	68	Fukushima Ichijo	J: Manufacturing	6-NI-3	Female	45	159	55
727	10760x	69	Ooya Tou	J: Manufacturing	6-NI-3	Male	41	177.4	62.1
728	10760x	70	Hamaguchi Junya	J: Manufacturing	6-NI-3	Male	48	173	81
729	10760x	71	Hironaka Omonehitome	J: Manufacturing	6-NI-3	Male	31	170.9	46.9
730	10760x	72	Igarashi Tatsumi	J: Manufacturing	6-NI-3	Male	24	166.7	34.6
731	10760x	73	Matsumoto Ryosei	J: Manufacturing	6-NI-3	Male	61	165.7	68.4
732	10760x	74	Okano Shishi	J: Manufacturing	6-NI-3	Male	61	168.3	72.3
733	10760x	75	Kudou Yonekura	J: Manufacturing	6-NI-3	Male	25	161.2	69.2
734	10760x	76	Kanazawa Nozue	J: Manufacturing	6-NI-3	Male	25	178.1	74.6
735	10760x	77	Ishikawa Shinzo	J: Manufacturing	6-NI-3	Male	25	173.4	72.8
736	10760x	78	Nagata Akihiro	J: Manufacturing	6-NI-3	Male	23	162.8	82.6
737	10760x	79	Ueno Haruyama	J: Manufacturing	6-NI-4	Male	28	183.7	69.6
738	10760x	80	Maruyama Onoda	J: Manufacturing	6-NI-4	Female	54	152.5	56.3
739	10760x	81	Taki Sasakura	J: Manufacturing	6-NI-4	Male	68	169.2	71.7
740	10760x	82	Nagura Seibu	J: Manufacturing	6-NI-4	Male	59	168.9	63.5
741	10760x	83	Seisen Toshiakitoshi	J: Manufacturing	6-NI-4	Male	55	168.5	54.3
742	10760x	84	Shimada Tabuchi	J: Manufacturing	6-NI-4	Male	62	171	71.3
743	10760x	85	Meiseki Founder	J: Manufacturing	6-NI-4	Male	36	167.7	80.9
744	10760x	86	Muto Juro	J: Manufacturing	6-NI-4	Male	23	171.6	68.2
745	10760x	87	Watanabe Taishin	J: Manufacturing	6-NI-4	Male	39	172.2	63.1
746	10760x	88	Nakatsuka Koshiro	J: Manufacturing	6-NI-4	Male	24	175.6	75.3
747	10760x	89	Tokashi Kuniya	J: Manufacturing	6-NI-4	Male	39	173.3	68.4
748	10760x	90	Nagai Kenyasuhiro	J: Manufacturing	6-NI-4	Male	59	176.3	72.4
749	10760x	91	Sano Nobuyuki	J: Manufacturing	6-NI-4	Male	55	169	75.8
750	10760x	92	Ootsuka Shigetaka	J: Manufacturing	6-NI-4	Male	57	176.9	72.5
751	10760x	93	Okazaki Atsuke	J: Manufacturing	6-NI-4	Male	65	162.9	69
752	10760x	94	Shimizu Keisuke	K: TrafficOrPostalService	6-SWP	Male	59	159.1	75.8
753	10760x	95	Matsuura Britishenglish	K: TrafficOrPostalService	6-SWP	Female	31	161.6	53.4
754	10760x	96	Suzuki Katsuzan	K: TrafficOrPostalService	6-SWP	Male	41	170.4	59.7
755	10760x	97	Urano Akira	K: TrafficOrPostalService	6-SWP	Male	38	169.7	72.4
756	10760x	98	Ikeda Kimiya	K: TrafficOrPostalService	6-SWP	Male	53	162.2	86.3
757	10760x	99	Kosaka Kazunori	K: TrafficOrPostalService	6-SWP	Male	38	173.5	73.5
758	10760x	100	Oosaka Ebina	K: TrafficOrPostalService	6-SWP	Male	32	175.3	72.3
759	10760x	101	Sakamoto Kenshun	K: TrafficOrPostalService	6-SWP	Male	44	167.2	58.7
760	10760x	102	Hirota Yasuichiro	K: TrafficOrPostalService	6-SWP	Male	42	158.8	53.1
761	10760x	103	Tomioka Sugino	K: TrafficOrPostalService	6-SP-1	Male	45	165.8	76.8
762	10760x	104	Shiraishi Kunai	K: TrafficOrPostalService	6-SP-1	Female	25	154.7	61.3
763	10760x	105	Nakano Tomonobu	K: TrafficOrPostalService	6-SP-1	Female	57	154	55.2
764	10760x	106	Satou Sata	K: TrafficOrPostalService	6-SP-2	Female	44	158.2	38.1
765	10760x	107	Yuasa Kayaka	K: TrafficOrPostalService	6-SP-2	Female	43	162.1	43.9
766	10760x	108	Hasegawa Iwashita	K: TrafficOrPostalService	6-SP-2	Female	48	160.1	53.4
767	10760x	109	Gotou Nagaya	K: TrafficOrPostalService	6-SP-2	Male	47	168.4	53.7
768	10760x	110	Nagano Tsuda	K: TrafficOrPostalService	6-SP-3	Male	31	177.5	72.2
769	10760x	111	Tokudome Hibikyouner	K: TrafficOrPostalService	6-SP-3	Male	64	169.1	57.7
770	10760x	112	Kitamura Makita	K: TrafficOrPostalService	6-SP-3	Female	65	160.4	50.7
771	10760x	113	Sakai Amino	K: TrafficOrPostalService	6-SP-3	Male	45	178.8	82.4
772	10760x	114	Kanno Wakakira	K: TrafficOrPostalService	6-SP-3	Female	35	165.8	55.3
773	10760x	115	Gotou Kariya	K: TrafficOrPostalService	6-SP-4	Female	46	165.5	55.5
774	10760x	116	Irie Migita	K: TrafficOrPostalService	6-SP-4	Male	58	170.6	65.3
775	10760x	117	Higuchi Kenshinkim	K: TrafficOrPostalService	6-SP-4	Male	55	171.5	81
776	10760x	118	Matsuda Kyoya	K: TrafficOrPostalService	6-SP-4	Male	56	169.9	66.5
777	10760x	119	Sekiya Naoko	K: TrafficOrPostalService	6-SI-1	Male	62	171.2	57.8
778	10760x	120	Takano Takumori	K: TrafficOrPostalService	6-SI-1	Female	47	160.9	37.6
779	10760x	121	Masuda Takeimasu	K: TrafficOrPostalService	6-SI-1	Female	53	160.5	43.8
780	10760x	122	Shimizu Holes	K: TrafficOrPostalService	6-SI-1	Male	69	168.1	53.8
781	10760x	123	Irie Nagumo	K: TrafficOrPostalService	6-SI-1	Male	31	170.5	72.5
782	10760x	124	Ogura Takaaki	K: TrafficOrPostalService	6-SI-1	Male	35	172	57.8
783	10760x	125	Hata Matsunaga	K: TrafficOrPostalService	6-SI-1	Male	34	177.6	85.3
784	10760x	126	Terada Goshima	K: TrafficOrPostalService	6-SI-2	Male	35	168.7	78.9
785	10760x	127	Kawahara Year-Old	K: TrafficOrPostalService	6-SI-2	Female	29	163.3	54.5
786	10760x	128	Satou Takeuchi	K: TrafficOrPostalService	6-SI-2	Female	42	158.5	50.6
787	10760x	129	Kobayashi Ooki	K: TrafficOrPostalService	6-SI-2	Female	44	150.2	40.2
788	10760x	130	Nishiyama Tatsuro	K: TrafficOrPostalService	6-SI-2	Male	65	169	60.2
789	10760x	131	Tada Rikato	K: TrafficOrPostalService	6-SI-2	Male	54	180.1	65.7
790	10760x	132	Tateishi Toshima	K: TrafficOrPostalService	6-SI-2	Male	65	182.5	66.2
791	10760x	133	Inoue Sugisawa	K: TrafficOrPostalService	6-SI-2	Male	35	171.5	73.9
792	10760x	134	Terao Tsuchiya	K: TrafficOrPostalService	6-SI-2	Female	47	149.5	59.3
793	10760x	135	Tabuchi Inutaro	K: TrafficOrPostalService	6-SI-2	Male	45	177.2	73.2
794	10760x	136	Takahashi Tokuhiro	K: TrafficOrPostalService	6-SI-2	Female	45	149.1	45.5
795	10760x	137	Oonuki Koga	K: TrafficOrPostalService	6-SI-2	Female	57	157.1	53
796	10760x	138	Takagi Takahiro	K: TrafficOrPostalService	6-SI-3	Female	65	160.2	55.4
797	10760x	139	Uemura Emoto	K: TrafficOrPostalService	6-SI-3	Female	51	162	51.5
798	10760x	140	Ochi Akira	K: TrafficOrPostalService	6-SI-3	Male	58	177.3	58.6
799	10760x	141	Saito Kouichiro	K: TrafficOrPostalService	6-SI-3	Male	47	160.4	74.4
800	10760x	142	Sakurai Shiozawa	K: TrafficOrPostalService	6-SI-3	Female	61	154	54.9

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
801	10760x	143	Tsutsumi Matsuzaki	K: TrafficOrPostalService	6-SI-3	Female	37	155	60.6
802	10760x	144	Nakamura Kawashima	K: TrafficOrPostalService	6-SI-3	Female	61	150.6	71.8
803	10760x	145	Yano Keiko	K: TrafficOrPostalService	6-SI-3	Male	38	177.6	72
804	10760x	146	Fujii Dobashi	K: TrafficOrPostalService	6-SI-3	Male	44	164.4	78.9
805	10760x	147	Yamamoto Shintaro	K: TrafficOrPostalService	6-SI-3	Male	45	168.7	77.3
806	10760x	148	Nakano Wakatsuki	K: TrafficOrPostalService	6-SI-3	Male	45	156.6	71.6
807	10760x	149	Motoyama Kuroiwa	K: TrafficOrPostalService	6-SI-3	Female	24	162.5	44.3
808	10760x	150	Miki Toshimitsu	K: TrafficOrPostalService	6-SI-3	Female	59	158.1	51.6
809	10760x	151	Muramatsu Narumi	K: TrafficOrPostalService	6-SI-3	Male	38	173.6	63.2
810	10760x	152	Andou Tatsuro	K: TrafficOrPostalService	6-SI-3	Male	43	172.1	58.6
811	10760x	153	Koyama Yokouchi	K: TrafficOrPostalService	6-SI-3	Female	48	165.3	62.8
812	10760x	154	Suzuki Megumi	K: TrafficOrPostalService	6-SI-3	Male	49	160.5	66.7
813	10760x	155	Saitou Atsutaka	K: TrafficOrPostalService	6-SI-3	Male	44	167.3	67.7
814	10760x	156	Yamauchi Ookane	K: TrafficOrPostalService	6-SI-3	Male	47	170.1	64.9
815	10760x	157	Yoshizawa Tsunashima	K: TrafficOrPostalService	6-SI-3	Male	66	165.1	63.6
816	10760x	158	Yanagisawa Keizo	K: TrafficOrPostalService	6-SI-4	Male	45	168.9	65.2
817	10760x	159	Ogawa Ohyama	K: TrafficOrPostalService	6-SI-4	Female	37	153.2	51.5
818	10760x	160	Kobayashi Urata	K: TrafficOrPostalService	6-SI-4	Male	45	168.5	73.9
819	10760x	161	Matsui Atsuko	K: TrafficOrPostalService	6-SI-4	Male	63	167.9	80.8
820	10760x	162	Itou Yoshimasa	K: TrafficOrPostalService	6-SI-4	Male	51	179.8	63.7
821	10760x	163	Oono Shimizu	K: TrafficOrPostalService	6-SI-4	Female	25	162.1	47.5
822	10760x	164	Hongou Abe	K: TrafficOrPostalService	6-SI-4	Male	41	174.4	58.6
823	10770x	1	Yoshimura Tanemura	L: InformationAndCommu	7-NWP	Male	68	171.8	67.6
824	10770x	2	Higuchi Koichi	L: InformationAndCommu	7-NWP	Male	39	175.7	62.8
825	10770x	3	Uemura Takutoshi	L: InformationAndCommu	7-NWP	Male	48	174.1	73.7
826	10770x	4	Hori Stringgirl	L: InformationAndCommu	7-NWP	Male	36	168.8	68.3
827	10770x	5	Hiratsuka Ishioka	L: InformationAndCommu	7-NWP	Male	33	175.5	71.5
828	10770x	6	Kumasawa Shunsuke	L: InformationAndCommu	7-NWP	Male	45	170.2	68.9
829	10770x	7	Ooshita Kamoshida	L: InformationAndCommu	7-NWP	Male	34	179.4	55.1
830	10770x	8	Uchida Ji	L: InformationAndCommu	7-NWP	Female	48	160.1	53.6
831	10770x	9	Shimizu Nishioka	L: InformationAndCommu	7-NWP	Male	28	179.3	59.4
832	10770x	10	Doi Inohara	L: InformationAndCommu	7-NWP	Male	56	169.8	77.1
833	10770x	11	Igarashi Mitsukokuren	L: InformationAndCommu	7-NWP	Female	45	162.3	45.9
834	10770x	12	Rin Sasamori	L: InformationAndCommu	7-NP-1	Male	69	168	57.7
835	10770x	13	Miyamura Natori	L: InformationAndCommu	7-NP-1	Female	49	159.7	56.3
836	10770x	14	Ono Kouduki	L: InformationAndCommu	7-NP-1	Female	54	154.5	58.9
837	10770x	15	Oonishi Ka	L: InformationAndCommu	7-NP-1	Male	26	167.5	63.9
838	10770x	16	Yoshihara Kusanori	L: InformationAndCommu	7-NP-1	Male	45	176.2	73
839	10770x	17	Yoshie Araki	L: InformationAndCommu	7-NP-1	Female	68	149.6	45.1
840	10770x	18	Iwasaki Kurosawa	L: InformationAndCommu	7-NP-2	Male	24	162.7	74.7
841	10770x	19	Satou Horizon	L: InformationAndCommu	7-NP-2	Female	24	165	42
842	10770x	20	Hirashima Nakanishi	L: InformationAndCommu	7-NP-3	Female	38	168	53.3
843	10770x	21	Fukushi Oyama	L: InformationAndCommu	7-NP-3	Male	21	168.3	67.6
844	10770x	22	Yamagata K-Koto	L: InformationAndCommu	7-NP-3	Female	36	153.9	50.5
845	10770x	23	Masui Tomoya	L: InformationAndCommu	7-NP-3	Male	23	174.7	76
846	10770x	24	Shimizu Oonuma	L: InformationAndCommu	7-NP-3	Male	42	172	57.4
847	10770x	25	Saitou Shibata	L: InformationAndCommu	7-NP-3	Male	53	165.6	72.4
848	10770x	26	Kawamura Katsuri	L: InformationAndCommu	7-NP-3	Male	59	171.8	55.9
849	10770x	27	Koya Mannedman	L: InformationAndCommu	7-NP-3	Female	41	169	59.6
850	10770x	28	Ooya Ka	L: InformationAndCommu	7-NP-4	Male	38	174.5	72.3
851	10770x	29	Kawase Tadayuki	L: InformationAndCommu	7-NP-4	Male	57	167	56.1
852	10770x	30	Ookura Tsurutani	L: InformationAndCommu	7-NP-4	Male	36	175.8	77.9
853	10770x	31	Tanaka Kido	L: InformationAndCommu	7-NP-4	Male	46	170.6	44.5
854	10770x	32	Hasegawa Youngage	L: InformationAndCommu	7-NP-4	Male	37	165.4	68.9
855	10770x	33	Iida Kamei	L: InformationAndCommu	7-NEP	Male	32	168	65.8
856	10770x	34	Masaki Horibe	L: InformationAndCommu	7-NEP	Male	25	173.8	79.6
857	10770x	35	Ootsuka Tonegawa	L: InformationAndCommu	7-NEP	Male	34	174.9	67.6
858	10770x	36	Miyake Kishigami	L: InformationAndCommu	7-NEP	Male	48	183.3	72.3
859	10770x	37	Imaizumi Sei-San	L: InformationAndCommu	7-NI-1	Female	26	156	45.7
860	10770x	38	Takahashi Yoshikiyosh	L: InformationAndCommu	7-NI-1	Male	56	172.9	65.1
861	10770x	39	Iwasa Masashige	L: InformationAndCommu	7-NI-1	Female	31	157	53.5
862	10770x	40	Ishibashi Sofue	L: InformationAndCommu	7-NI-1	Male	49	172.2	65.8
863	10770x	41	Takano Oguchi	L: InformationAndCommu	7-NI-1	Male	54	179.1	71.2
864	10770x	42	Nakamura Atsuki	L: InformationAndCommu	7-NI-1	Female	25	159.5	51.3
865	10770x	43	Ueno Matsuhashi	L: InformationAndCommu	7-NI-1	Male	36	175.4	69.8
866	10770x	44	Yoshida Kurita	L: InformationAndCommu	7-NI-1	Female	36	156.9	55.2
867	10770x	45	Ueda Koji	L: InformationAndCommu	7-NI-1	Male	62	169.3	76.2
868	10770x	46	Shimizu Kaji	L: InformationAndCommu	7-NI-1	Female	47	161.5	52
869	10770x	47	Sugai Kiyoshi	L: InformationAndCommu	7-NI-1	Male	45	177.3	80.9
870	10770x	48	Nagai Seiki	L: InformationAndCommu	7-NI-1	Male	47	168.2	73.6
871	10770x	49	Nagaoka Kimo	L: InformationAndCommu	7-NI-1	Male	59	172.9	64.3
872	10770x	50	Fujiyoshi Kenken	L: InformationAndCommu	7-NI-1	Female	26	157.9	58.3
873	10770x	51	Nakata Naotojin	L: InformationAndCommu	7-NI-2	Male	45	166.4	69.7
874	10770x	52	Yamada Rinsen	L: InformationAndCommu	7-NI-2	Female	21	158.2	48
875	10770x	53	Kinoshita Taito	L: InformationAndCommu	7-NI-2	Male	23	175	55.3
876	10770x	54	Maekawa Megereon	L: InformationAndCommu	7-NI-2	Female	41	155.2	56.2
877	10770x	55	Kaneko Seiichi	L: InformationAndCommu	7-NI-2	Male	46	166.8	76.9
878	10770x	56	Kurosawa Kozo	L: InformationAndCommu	7-NI-2	Female	23	157.3	53.8
879	10770x	57	Murakami Tetsuhiro	L: InformationAndCommu	7-NI-2	Male	65	165.3	62.4
880	10770x	58	Takayama Sosho	L: InformationAndCommu	7-NI-2	Male	29	179.2	71.1
881	10770x	59	Watase Tokuyama	L: InformationAndCommu	7-NI-2	Female	37	160.8	51.6
882	10770x	60	Fuse Tetsushi	L: InformationAndCommu	7-NI-2	Male	32	165	57.4
883	10770x	61	Fujimoto Atsushi	L: InformationAndCommu	7-NI-3	Female	27	157	44.2
884	10770x	62	Nishikawa Adachi	L: InformationAndCommu	7-NI-3	Female	37	151.4	51.3
885	10770x	63	Matsuno Playingmusic	L: InformationAndCommu	7-NI-3	Male	21	174	71.3
886	10770x	64	Takayama Minamide	L: InformationAndCommu	7-NI-3	Male	32	170.6	60.6
887	10770x	65	Sasaki Iijima	L: InformationAndCommu	7-NI-3	Male	32	168.5	71.8
888	10770x	66	Ishido Tsuyohiro	L: InformationAndCommu	7-NI-3	Male	34	171.8	67.5
889	10770x	67	Munekata Ichigo	L: InformationAndCommu	7-NI-4	Male	58	169.6	65.7
890	10770x	68	Katsumi Fightingspirit	L: InformationAndCommu	7-NI-4	Male	54	173.8	72.1
891	10770x	69	Toyama Takeyuki	L: InformationAndCommu	7-NI-4	Male	55	171	63.6
892	10770x	70	Nagano Hirokawa	L: InformationAndCommu	7-NI-4	Male	37	177.3	55.8
893	10770x	71	Ikeda Shosuke	L: InformationAndCommu	7-NI-4	Male	56	171.6	68.7
894	10770x	72	Katou Ooi	L: InformationAndCommu	7-NI-4	Female	23	153	54.8
895	10770x	73	Sakamoto Utsume	L: InformationAndCommu	7-NI-4	Male	46	172	67.4
896	10770x	74	Kumagai Toshiaki	L: InformationAndCommu	7-NI-4	Male	53	171.4	56.5
897	10770x	75	Tsukamoto Genki	L: InformationAndCommu	7-NI-4	Male	41	175	55.8
898	10770x	76	Matsui Kadoi	L: InformationAndCommu	7-NI-4	Female	35	153.6	44.2
899	10770x	77	Hirai Osamu	L: InformationAndCommu	7-NI-4	Male	31	164	72.6
900	10770x	78	Kitagawa Seijiro	L: InformationAndCommu	7-NI-4	Female	38	161.6	40.2

No.	Device ID	Instance No.	Name	Tenant	Zone	Sex	Age	Hight	Weight
901	10770x	79	Suzuki Kenji	L: InformationAndCommu	7-NI-4	Male	41	180.3	73.4
902	10770x	80	Yajima Shogun	L: InformationAndCommu	7-SWP	Male	23	170.1	65.2
903	10770x	81	Rin Takashi	L: InformationAndCommu	7-SWP	Male	35	168.7	65.7
904	10770x	82	Takada Takanori	L: InformationAndCommu	7-SWP	Male	25	170.6	65.4
905	10770x	83	Kobayashi Hiroyuki	L: InformationAndCommu	7-SWP	Male	57	170.3	72.6
906	10770x	84	Iiduka Miyagi	L: InformationAndCommu	7-SWP	Male	55	164.2	53.7
907	10770x	85	Katou Shingo	L: InformationAndCommu	7-SWP	Female	45	163.2	46.9
908	10770x	86	Koide Fujiwara	L: InformationAndCommu	7-SWP	Male	45	165.7	67.2
909	10770x	87	Shibata Takamitsu	L: InformationAndCommu	7-SP-1	Male	39	177.2	62.7
910	10770x	88	Miyahara Muramatsu	L: InformationAndCommu	7-SP-1	Female	31	156	49.1
911	10770x	89	Shibuya Kotaro	L: InformationAndCommu	7-SP-1	Male	44	171.8	68.8
912	10770x	90	Ishizaki Shouta	L: InformationAndCommu	7-SP-1	Male	38	167.9	71.6
913	10770x	91	Nakano Esashi	L: InformationAndCommu	7-SP-2	Male	48	172.7	69.6
914	10770x	92	Tamai Masuo	L: InformationAndCommu	7-SP-2	Male	33	166.4	72.9
915	10770x	93	Nagai Adachi	L: InformationAndCommu	7-SP-2	Male	59	165.6	58
916	10770x	94	Kawata Masukawa	L: InformationAndCommu	7-SP-3	Male	36	182.5	66
917	10770x	95	Ishida Kurosaka	L: InformationAndCommu	7-SP-3	Female	21	148.9	53.3
918	10770x	96	Iida Koiwa	L: InformationAndCommu	7-SP-3	Male	34	169.9	68.9
919	10770x	97	Endou Tsutsui	L: InformationAndCommu	7-SP-3	Male	25	177.4	67.3
920	10770x	98	Shinohara Space	L: InformationAndCommu	7-SP-3	Female	51	149.8	60.9
921	10770x	99	Hamazaki Teduka	L: InformationAndCommu	7-SP-4	Male	35	179.1	78.4
922	10770x	100	Seki Nagayama	L: InformationAndCommu	7-SP-4	Male	22	172.7	60.9
923	10770x	101	Satou Sadyuki	L: InformationAndCommu	7-SI-1	Male	35	156.9	75.1
924	10770x	102	Kurokawa Shinshin	L: InformationAndCommu	7-SI-1	Male	46	172.1	69.6
925	10770x	103	Suzuki Yongsin	L: InformationAndCommu	7-SI-1	Female	32	164.5	59.5
926	10770x	104	Matsuura Naotada	L: InformationAndCommu	7-SI-1	Female	55	165.9	51.7
927	10770x	105	Kawano Miyaji	L: InformationAndCommu	7-SI-1	Male	39	169.5	52.7
928	10770x	106	Kitamura Tadahito	L: InformationAndCommu	7-SI-1	Male	52	167.7	60.4
929	10770x	107	Uchida Ichigo	L: InformationAndCommu	7-SI-1	Male	46	171.2	84
930	10770x	108	Ooyama Katsunori	L: InformationAndCommu	7-SI-1	Male	32	178.3	77.3
931	10770x	109	Sasaki Government	L: InformationAndCommu	7-SI-1	Male	44	164	64.3
932	10770x	110	Hasegawa Senda	L: InformationAndCommu	7-SI-1	Female	34	155.4	47.6
933	10770x	111	Shiraishi Hirosawa	L: InformationAndCommu	7-SI-1	Male	44	155.8	64.4
934	10770x	112	Saitou Akutagawa	L: InformationAndCommu	7-SI-2	Male	24	172.8	60.9
935	10770x	113	Toda Kimitachi	L: InformationAndCommu	7-SI-2	Male	55	177.7	64.5
936	10770x	114	Hachimaki Takarada	L: InformationAndCommu	7-SI-2	Male	43	160	71.6
937	10770x	115	Kondou Kusano	L: InformationAndCommu	7-SI-2	Male	52	174.6	71
938	10770x	116	Oosugi Yuta	L: InformationAndCommu	7-SI-2	Male	28	164.6	75.8
939	10770x	117	Tani Minglight	L: InformationAndCommu	7-SI-2	Male	27	176.4	75.1
940	10770x	118	Arima Sanrin	L: InformationAndCommu	7-SI-2	Male	67	175.7	78.9
941	10770x	119	Yamaguchi Akira	L: InformationAndCommu	7-SI-2	Male	38	168.7	77.9
942	10770x	120	Hajime Imamura	L: InformationAndCommu	7-SI-2	Female	59	152.4	56.6
943	10770x	121	Masuda Birth	L: InformationAndCommu	7-SI-2	Male	43	180.8	82.6
944	10770x	122	Maruoka Akiraakira	L: InformationAndCommu	7-SI-2	Male	38	169	72.1
945	10770x	123	Nishii Suemitsu	L: InformationAndCommu	7-SI-3	Male	31	168.4	61
946	10770x	124	Minowa Dan	L: InformationAndCommu	7-SI-3	Male	48	179.9	81.4
947	10770x	125	Itou Shiraki	L: InformationAndCommu	7-SI-3	Female	32	159	52
948	10770x	126	Ooba Shioya	L: InformationAndCommu	7-SI-3	Male	46	173.3	69.8
949	10770x	127	Nakajima Yujyuki	L: InformationAndCommu	7-SI-3	Female	36	159.6	42
950	10770x	128	Suzuki Atsushi	L: InformationAndCommu	7-SI-3	Male	38	178.9	53.1
951	10770x	129	Okuno Andou	L: InformationAndCommu	7-SI-3	Female	37	160.7	50.2
952	10770x	130	Itou Takao	L: InformationAndCommu	7-SI-3	Male	45	157.9	65.5
953	10770x	131	Gotou Hatori	L: InformationAndCommu	7-SI-3	Female	48	161.7	50.8
954	10770x	132	Minakawa Party	L: InformationAndCommu	7-SI-3	Male	59	172.2	61.1
955	10770x	133	Ishiduka Tatsumi	L: InformationAndCommu	7-SI-3	Male	42	176.4	66.4
956	10770x	134	Kanno Ichichi-Kun	L: InformationAndCommu	7-SI-3	Male	57	171.8	76.1
957	10770x	135	Yoshikawa Teruyoshi	L: InformationAndCommu	7-SI-3	Male	49	161.4	92.9
958	10770x	136	Nagai Nanbu	L: InformationAndCommu	7-SI-4	Male	25	176.8	67.7
959	10770x	137	Watanabe Nishioka	L: InformationAndCommu	7-SI-4	Male	48	169.3	64.6
960	10770x	138	Maeda Kasai	L: InformationAndCommu	7-SI-4	Male	27	174.5	64.6
961	10770x	139	Mizoguchi Masatoshi	L: InformationAndCommu	7-SI-4	Female	47	153.7	61.7
962	10770x	140	Osawa Ichiro	L: InformationAndCommu	7-SI-4	Male	43	184.7	66.1
963	10770x	141	Ichiryuu Kaya	L: InformationAndCommu	7-SI-4	Male	46	161.9	58.5
964	10770x	142	Hara Kuroki	L: InformationAndCommu	7-SI-4	Male	59	166.4	80.6
965	10770x	143	Iiduka Kunio	L: InformationAndCommu	7-SI-4	Male	45	169.7	54.3
966	10770x	144	Itou Kusanori	L: InformationAndCommu	7-SI-4	Male	49	171.9	79.2
967	10770x	145	Sugiyama Kuniharu	L: InformationAndCommu	7-SI-4	Male	39	169.8	74.7
968	10770x	146	Hatakeyama Koga	L: InformationAndCommu	7-SI-4	Male	43	166.3	67.7
969	10770x	147	Fukuda Lieutenant	L: InformationAndCommu	7-SI-4	Female	37	167.4	50.6

Appendix 4   List of measuring points

CSV	No.	Description	Unit
1	1	Time	
1	2	Outdoor air Drybulb Temperature	C
1	3	Outdoor air Relative Humidity	%
1	4	E2R2	
1	5	ERR	
1	6	DRR	
1	7	Primary Energy Use	GJ
1	8	Electricity of heat source system	kW
1	9	Electricity of heat source system	kWh
1	10	Electricity of air conditioning system	kW
1	11	Electricity of air conditioning system	kWh
1	12	Electricity of Tenant Plug	kW
1	13	Electricity of Tenant Plug	kWh
1	14	Electricity of Tenant Lighting	kW
1	15	Electricity of Tenant Lighting	kWh
1	16	Chilled Water Supply Header Temperature	C
1	17	Chilled Water Return Header Temperature	C
1	18	Chilled Water Return Water Temperature	C
1	19	Chilled Water Supply Flow Rate	L/min
1	20	Chilled Water Supply Heat Flow	kW
1	21	Chilled Water Supply Heat Flow	MJ
1	22	Chilled Water Supply-Supply Header Bypass Flow Rate	L/min
1	23	Chilled Water Supply-Return Header Bypass Flow Rate	L/min
1	24	Hot Water Supply Header Temperature	C
1	25	Hot Water Return Header Temperature	C
1	26	Hot Water Return Water Temperature	C
1	27	Hot Water Supply Flow Rate	L/min
1	28	Hot Water Supply Heat Flow	kW
1	29	Hot Water Supply Heat Flow	MJ
1	30	Hot Water Supply-Supply Header Bypass Flow Rate	L/min
1	31	Hot Water Supply-Return Header Bypass Flow Rate	L/min
1	32	Cooling Tower Outlet Temperature	C
1	33	Cooling Tower Fan Electricity	kW
1	34	Cooling Tower Fan Electricity	kWh
1	35	Cooling Tower Water Consumption	L/min
1	36	Cooling Tower Water Consumption	L
1	37	Absorption Chiller and Cooling water pump Electricity	kW
1	38	Absorption Chiller and Cooling water pump Electricity	kWh
1	39	Absorption Chiller Chilled or Hot Water Pump Electricity	kW
1	40	Absorption Chiller Chilled or Hot Water Pump Electricity	kWh
1	41	Absorption Chiller Chilled or Hot Water Outlet Temperature	C
1	42	Absorption Chiller Chilled or Hot Water Flow Rate	L/min
1	43	Absorption Chiller Chilled or Hot Water Heat Flow	kW
1	44	Absorption Chiller Chilled or Hot Water Heat Flow	MJ
1	45	Absorption Chiller Gas Consumption	m3/h
1	46	Absorption Chiller Gas Consumption	m3
1	47	Air Source Heatpump Electricity	kW
1	48	Air Source Heatpump Electricity	kWh
1	49	Air Source Heatpump Chilled or Hot Water Pump Electricity	kW
1	50	Air Source Heatpump Chilled or Hot Water Pump Electricity	kWh
1	51	Air Source Heatpump Chilled or Hot Water Inlet Temperature	C
1	52	Air Source Heatpump Chilled or Hot Water Outlet Temperature	C
1	53	Air Source Heatpump Chilled or Hot Water Flow Rate	L/min
1	54	Air Source Heatpump Chilled or Hot Water Heat Flow	kW
1	55	Air Source Heatpump Chilled or Hot Water Heat Flow	MJ
1	56	Water Heat Storage	deltaMJ
1	57	Water Heat Storage Fully Charged	-
1	58	Water Heat Storage Storage Mode	-
1	59	Water Heat Storage Primary Pump Electiricy	kW
1	60	Water Heat Storage Primary Pump Electiricy	kWh
1	61	Water Heat Storage Secondary Pump Electricity	kW
1	62	Water Heat Storage Secondary Pump Electricity	kWh
1	63	Water Heat Storage Charge HEX Inlet Temperature	C
1	64	Water Heat Storage Charge HEX Outlet Temperature	C
1	65	Water Heat Storage Charge HEX Water Flow Rate	L/min
1	66	Water Heat Storage Charge HEX Heat Flow	kW
1	67	Water Heat Storage Charge HEX Heat Flow	MJ
1	68	Water Heat Storage Supply HEX Inlet Temperature	C
1	69	Water Heat Storage Supply HEX Outlet Temperature	C
1	70	Water Heat Storage Supply HEX Water Flow Rate	L/min
1	71	Water Heat Storage Supply HEX Heat Flow	kW
1	72	Water Heat Storage Supply HEX Heat Flow	MJ
1	73	Water Heat Storage Supply Water Temperature	C
1	74	Water Heat Storage Supply Water Flow Rate	L/min
1	75	Water Heat Storage Supply Water Heat Flow	kW
1	76	Water Heat Storage Supply Water Heat Flow	MJ
1	77	Water Heat Storage Tank Water Temperature 1	C
1	78	Water Heat Storage Tank Water Temperature 2	C
1	79	Water Heat Storage Tank Water Temperature 3	C
1	80	Water Heat Storage Tank Water Temperature 4	C
1	81	Water Heat Storage Tank Water Temperature 5	C
1	82	Water Heat Storage Tank Water Temperature 6	C
1	83	Water Heat Storage Tank Water Temperature 7	C
1	84	Water Heat Storage Tank Water Temperature 8	C
1	85	Water Heat Storage Tank Water Temperature 9	C
1	86	Chilled Water Secondary Pump Operating Number	-
1	87	Chilled Water Secondary Pump Electricity	kW
1	88	Chilled Water Secondary Pump Electricity	kWh
1	89	Chilled Water Secondary Pump Rotation Ratio	-
1	90	Chilled Water Secondary Pump Pressure Difference	kPa
1	91	Hot Water Secondary Pump Operating Number	-
1	92	Hot Water Secondary Pump Electricity	kW
1	93	Hot Water Secondary Pump Electricity	kWh
1	94	Hot Water Secondary Pump Rotation Ratio	-
1	95	Hot Water Secondary Pump Pressure Difference	kPa
2	1	Time	

CSV	No.	Description	Unit
2	2	Outdoor air Drybulb Temperature	C
2	3	Outdoor air Relative Humidity	%
2	4	ROOM1-1 CO2 Level	ppm
2	5	ROOM1-2 CO2 Level	ppm
2	6	ROOM2-1 CO2 Level	ppm
2	7	ROOM2-2 CO2 Level	ppm
2	8	ROOM3-1 CO2 Level	ppm
2	9	ROOM3-2 CO2 Level	ppm
2	10	ROOM4-1 CO2 Level	ppm
2	11	ROOM4-2 CO2 Level	ppm
2	12	ROOM5-1 CO2 Level	ppm
2	13	ROOM5-2 CO2 Level	ppm
2	14	ROOM6-1 CO2 Level	ppm
2	15	ROOM6-2 CO2 Level	ppm
2	16	ROOM7-1 CO2 Level	ppm
2	17	ROOM7-2 CO2 Level	ppm
2	18	AHU1-1 Zone1 Temperature	C
2	19	AHU1-1 Zone2 Temperature	C
2	20	AHU1-1 Zone3 Temperature	C
2	21	AHU1-2 Zone1 Temperature	C
2	22	AHU1-2 Zone2 Temperature	C
2	23	AHU1-3 Zone1 Temperature	C
2	24	AHU1-3 Zone2 Temperature	C
2	25	AHU1-3 Zone3 Temperature	C
2	26	AHU1-4 Zone1 Temperature	C
2	27	AHU1-4 Zone2 Temperature	C
2	28	AHU1-5 Zone1 Temperature	C
2	29	AHU2-1 Zone1 Temperature	C
2	30	AHU2-1 Zone2 Temperature	C
2	31	AHU2-1 Zone3 Temperature	C
2	32	AHU2-1 Zone4 Temperature	C
2	33	AHU2-1 Zone5 Temperature	C
2	34	AHU2-1 Zone6 Temperature	C
2	35	AHU2-2 Zone1 Temperature	C
2	36	AHU2-2 Zone2 Temperature	C
2	37	AHU2-2 Zone3 Temperature	C
2	38	AHU2-2 Zone4 Temperature	C
2	39	AHU2-3 Zone1 Temperature	C
2	40	AHU2-3 Zone2 Temperature	C
2	41	AHU2-3 Zone3 Temperature	C
2	42	AHU2-3 Zone4 Temperature	C
2	43	AHU2-3 Zone5 Temperature	C
2	44	AHU2-4 Zone1 Temperature	C
2	45	AHU2-4 Zone2 Temperature	C
2	46	AHU2-4 Zone3 Temperature	C
2	47	AHU2-4 Zone4 Temperature	C
2	48	AHU3-1 Zone1 Temperature	C
2	49	AHU3-1 Zone2 Temperature	C
2	50	AHU3-1 Zone3 Temperature	C
2	51	AHU3-1 Zone4 Temperature	C
2	52	AHU3-1 Zone5 Temperature	C
2	53	AHU3-1 Zone6 Temperature	C
2	54	AHU3-2 Zone1 Temperature	C
2	55	AHU3-2 Zone2 Temperature	C
2	56	AHU3-2 Zone3 Temperature	C
2	57	AHU3-2 Zone4 Temperature	C
2	58	AHU3-3 Zone1 Temperature	C
2	59	AHU3-3 Zone2 Temperature	C
2	60	AHU3-3 Zone3 Temperature	C
2	61	AHU3-3 Zone4 Temperature	C
2	62	AHU3-3 Zone5 Temperature	C
2	63	AHU3-4 Zone1 Temperature	C
2	64	AHU3-4 Zone2 Temperature	C
2	65	AHU3-4 Zone3 Temperature	C
2	66	AHU3-4 Zone4 Temperature	C
2	67	AHU4-1 Zone1 Temperature	C
2	68	AHU4-1 Zone2 Temperature	C
2	69	AHU4-1 Zone3 Temperature	C
2	70	AHU4-1 Zone4 Temperature	C
2	71	AHU4-1 Zone5 Temperature	C
2	72	AHU4-1 Zone6 Temperature	C
2	73	AHU4-2 Zone1 Temperature	C
2	74	AHU4-2 Zone2 Temperature	C
2	75	AHU4-2 Zone3 Temperature	C
2	76	AHU4-2 Zone4 Temperature	C
2	77	AHU4-3 Zone1 Temperature	C
2	78	AHU4-3 Zone2 Temperature	C
2	79	AHU4-3 Zone3 Temperature	C
2	80	AHU4-3 Zone4 Temperature	C
2	81	AHU4-3 Zone5 Temperature	C
2	82	AHU4-4 Zone1 Temperature	C
2	83	AHU4-4 Zone2 Temperature	C
2	84	AHU4-4 Zone3 Temperature	C
2	85	AHU4-4 Zone4 Temperature	C
2	86	AHU5-1 Zone1 Temperature	C
2	87	AHU5-1 Zone2 Temperature	C
2	88	AHU5-1 Zone3 Temperature	C
2	89	AHU5-1 Zone4 Temperature	C
2	90	AHU5-1 Zone5 Temperature	C
2	91	AHU5-1 Zone6 Temperature	C
2	92	AHU5-2 Zone1 Temperature	C
2	93	AHU5-2 Zone2 Temperature	C
2	94	AHU5-2 Zone3 Temperature	C
2	95	AHU5-2 Zone4 Temperature	C
2	96	AHU5-3 Zone1 Temperature	C
2	97	AHU5-3 Zone2 Temperature	C

CSV	No.	Description	Unit	CSV	No.	Description	Unit
2	98	AHU5-3 Zone3 Temperature	C	2	146	AHU1-2 Zone1 Relative Humidity	%
2	99	AHU5-3 Zone4 Temperature	C	2	147	AHU1-2 Zone2 Relative Humidity	%
2	100	AHU5-3 Zone5 Temperature	C	2	148	AHU1-3 Zone1 Relative Humidity	%
2	101	AHU5-4 Zone1 Temperature	C	2	149	AHU1-3 Zone2 Relative Humidity	%
2	102	AHU5-4 Zone2 Temperature	C	2	150	AHU1-3 Zone3 Relative Humidity	%
2	103	AHU5-4 Zone3 Temperature	C	2	151	AHU1-4 Zone1 Relative Humidity	%
2	104	AHU5-4 Zone4 Temperature	C	2	152	AHU1-4 Zone2 Relative Humidity	%
2	105	AHU6-1 Zone1 Temperature	C	2	153	AHU1-5 Zone1 Relative Humidity	%
2	106	AHU6-1 Zone2 Temperature	C	2	154	AHU2-1 Zone1 Relative Humidity	%
2	107	AHU6-1 Zone3 Temperature	C	2	155	AHU2-1 Zone2 Relative Humidity	%
2	108	AHU6-1 Zone4 Temperature	C	2	156	AHU2-1 Zone3 Relative Humidity	%
2	109	AHU6-1 Zone5 Temperature	C	2	157	AHU2-1 Zone4 Relative Humidity	%
2	110	AHU6-1 Zone6 Temperature	C	2	158	AHU2-1 Zone5 Relative Humidity	%
2	111	AHU6-2 Zone1 Temperature	C	2	159	AHU2-1 Zone6 Relative Humidity	%
2	112	AHU6-2 Zone2 Temperature	C	2	160	AHU2-2 Zone1 Relative Humidity	%
2	113	AHU6-2 Zone3 Temperature	C	2	161	AHU2-2 Zone2 Relative Humidity	%
2	114	AHU6-2 Zone4 Temperature	C	2	162	AHU2-2 Zone3 Relative Humidity	%
2	115	AHU6-3 Zone1 Temperature	C	2	163	AHU2-2 Zone4 Relative Humidity	%
2	116	AHU6-3 Zone2 Temperature	C	2	164	AHU2-3 Zone1 Relative Humidity	%
2	117	AHU6-3 Zone3 Temperature	C	2	165	AHU2-3 Zone2 Relative Humidity	%
2	118	AHU6-3 Zone4 Temperature	C	2	166	AHU2-3 Zone3 Relative Humidity	%
2	119	AHU6-3 Zone5 Temperature	C	2	167	AHU2-3 Zone4 Relative Humidity	%
2	120	AHU6-4 Zone1 Temperature	C	2	168	AHU2-3 Zone5 Relative Humidity	%
2	121	AHU6-4 Zone2 Temperature	C	2	169	AHU2-4 Zone1 Relative Humidity	%
2	122	AHU6-4 Zone3 Temperature	C	2	170	AHU2-4 Zone2 Relative Humidity	%
2	123	AHU6-4 Zone4 Temperature	C	2	171	AHU2-4 Zone3 Relative Humidity	%
2	124	AHU7-1 Zone1 Temperature	C	2	172	AHU2-4 Zone4 Relative Humidity	%
2	125	AHU7-1 Zone2 Temperature	C	2	173	AHU3-1 Zone1 Relative Humidity	%
2	126	AHU7-1 Zone3 Temperature	C	2	174	AHU3-1 Zone2 Relative Humidity	%
2	127	AHU7-1 Zone4 Temperature	C	2	175	AHU3-1 Zone3 Relative Humidity	%
2	128	AHU7-1 Zone5 Temperature	C	2	176	AHU3-1 Zone4 Relative Humidity	%
2	129	AHU7-1 Zone6 Temperature	C	2	177	AHU3-1 Zone5 Relative Humidity	%
2	130	AHU7-2 Zone1 Temperature	C	2	178	AHU3-1 Zone6 Relative Humidity	%
2	131	AHU7-2 Zone2 Temperature	C	2	179	AHU3-2 Zone1 Relative Humidity	%
2	132	AHU7-2 Zone3 Temperature	C	2	180	AHU3-2 Zone2 Relative Humidity	%
2	133	AHU7-2 Zone4 Temperature	C	2	181	AHU3-2 Zone3 Relative Humidity	%
2	134	AHU7-3 Zone1 Temperature	C	2	182	AHU3-2 Zone4 Relative Humidity	%
2	135	AHU7-3 Zone2 Temperature	C	2	183	AHU3-3 Zone1 Relative Humidity	%
2	136	AHU7-3 Zone3 Temperature	C	2	184	AHU3-3 Zone2 Relative Humidity	%
2	137	AHU7-3 Zone4 Temperature	C	2	185	AHU3-3 Zone3 Relative Humidity	%
2	138	AHU7-3 Zone5 Temperature	C	2	186	AHU3-3 Zone4 Relative Humidity	%
2	139	AHU7-4 Zone1 Temperature	C	2	187	AHU3-3 Zone5 Relative Humidity	%
2	140	AHU7-4 Zone2 Temperature	C	2	188	AHU3-4 Zone1 Relative Humidity	%
2	141	AHU7-4 Zone3 Temperature	C	2	189	AHU3-4 Zone2 Relative Humidity	%
2	142	AHU7-4 Zone4 Temperature	C	2	190	AHU3-4 Zone3 Relative Humidity	%
2	143	AHU1-1 Zone1 Relative Humidity	%	2	191	AHU3-4 Zone4 Relative Humidity	%
2	144	AHU1-1 Zone2 Relative Humidity	%	2	192	AHU4-1 Zone1 Relative Humidity	%
2	145	AHU1-1 Zone3 Relative Humidity	%	2	193	AHU4-1 Zone2 Relative Humidity	%

CSV	No.	Description	Unit
2	194	AHU4-1 Zone3 Relative Humidity	%
2	195	AHU4-1 Zone4 Relative Humidity	%
2	196	AHU4-1 Zone5 Relative Humidity	%
2	197	AHU4-1 Zone6 Relative Humidity	%
2	198	AHU4-2 Zone1 Relative Humidity	%
2	199	AHU4-2 Zone2 Relative Humidity	%
2	200	AHU4-2 Zone3 Relative Humidity	%
2	201	AHU4-2 Zone4 Relative Humidity	%
2	202	AHU4-3 Zone1 Relative Humidity	%
2	203	AHU4-3 Zone2 Relative Humidity	%
2	204	AHU4-3 Zone3 Relative Humidity	%
2	205	AHU4-3 Zone4 Relative Humidity	%
2	206	AHU4-3 Zone5 Relative Humidity	%
2	207	AHU4-4 Zone1 Relative Humidity	%
2	208	AHU4-4 Zone2 Relative Humidity	%
2	209	AHU4-4 Zone3 Relative Humidity	%
2	210	AHU4-4 Zone4 Relative Humidity	%
2	211	AHU5-1 Zone1 Relative Humidity	%
2	212	AHU5-1 Zone2 Relative Humidity	%
2	213	AHU5-1 Zone3 Relative Humidity	%
2	214	AHU5-1 Zone4 Relative Humidity	%
2	215	AHU5-1 Zone5 Relative Humidity	%
2	216	AHU5-1 Zone6 Relative Humidity	%
2	217	AHU5-2 Zone1 Relative Humidity	%
2	218	AHU5-2 Zone2 Relative Humidity	%
2	219	AHU5-2 Zone3 Relative Humidity	%
2	220	AHU5-2 Zone4 Relative Humidity	%
2	221	AHU5-3 Zone1 Relative Humidity	%
2	222	AHU5-3 Zone2 Relative Humidity	%
2	223	AHU5-3 Zone3 Relative Humidity	%
2	224	AHU5-3 Zone4 Relative Humidity	%
2	225	AHU5-3 Zone5 Relative Humidity	%
2	226	AHU5-4 Zone1 Relative Humidity	%
2	227	AHU5-4 Zone2 Relative Humidity	%
2	228	AHU5-4 Zone3 Relative Humidity	%
2	229	AHU5-4 Zone4 Relative Humidity	%
2	230	AHU6-1 Zone1 Relative Humidity	%
2	231	AHU6-1 Zone2 Relative Humidity	%
2	232	AHU6-1 Zone3 Relative Humidity	%
2	233	AHU6-1 Zone4 Relative Humidity	%
2	234	AHU6-1 Zone5 Relative Humidity	%
2	235	AHU6-1 Zone6 Relative Humidity	%
2	236	AHU6-2 Zone1 Relative Humidity	%
2	237	AHU6-2 Zone2 Relative Humidity	%
2	238	AHU6-2 Zone3 Relative Humidity	%
2	239	AHU6-2 Zone4 Relative Humidity	%
2	240	AHU6-3 Zone1 Relative Humidity	%
2	241	AHU6-3 Zone2 Relative Humidity	%

CSV	No.	Description	Unit
2	242	AHU6-3 Zone3 Relative Humidity	%
2	243	AHU6-3 Zone4 Relative Humidity	%
2	244	AHU6-3 Zone5 Relative Humidity	%
2	245	AHU6-4 Zone1 Relative Humidity	%
2	246	AHU6-4 Zone2 Relative Humidity	%
2	247	AHU6-4 Zone3 Relative Humidity	%
2	248	AHU6-4 Zone4 Relative Humidity	%
2	249	AHU7-1 Zone1 Relative Humidity	%
2	250	AHU7-1 Zone2 Relative Humidity	%
2	251	AHU7-1 Zone3 Relative Humidity	%
2	252	AHU7-1 Zone4 Relative Humidity	%
2	253	AHU7-1 Zone5 Relative Humidity	%
2	254	AHU7-1 Zone6 Relative Humidity	%
2	255	AHU7-2 Zone1 Relative Humidity	%
2	256	AHU7-2 Zone2 Relative Humidity	%
2	257	AHU7-2 Zone3 Relative Humidity	%
2	258	AHU7-2 Zone4 Relative Humidity	%
2	259	AHU7-3 Zone1 Relative Humidity	%
2	260	AHU7-3 Zone2 Relative Humidity	%
2	261	AHU7-3 Zone3 Relative Humidity	%
2	262	AHU7-3 Zone4 Relative Humidity	%
2	263	AHU7-3 Zone5 Relative Humidity	%
2	264	AHU7-4 Zone1 Relative Humidity	%
2	265	AHU7-4 Zone2 Relative Humidity	%
2	266	AHU7-4 Zone3 Relative Humidity	%
2	267	AHU7-4 Zone4 Relative Humidity	%
2	268	AHU1-1 Zone1 Mean Radiant Temperature	C
2	269	AHU1-1 Zone2 Mean Radiant Temperature	C
2	270	AHU1-1 Zone3 Mean Radiant Temperature	C
2	271	AHU1-2 Zone1 Mean Radiant Temperature	C
2	272	AHU1-2 Zone2 Mean Radiant Temperature	C
2	273	AHU1-3 Zone1 Mean Radiant Temperature	C
2	274	AHU1-3 Zone2 Mean Radiant Temperature	C
2	275	AHU1-3 Zone3 Mean Radiant Temperature	C
2	276	AHU1-4 Zone1 Mean Radiant Temperature	C
2	277	AHU1-4 Zone2 Mean Radiant Temperature	C
2	278	AHU1-5 Zone1 Mean Radiant Temperature	C
2	279	AHU2-1 Zone1 Mean Radiant Temperature	C
2	280	AHU2-1 Zone2 Mean Radiant Temperature	C
2	281	AHU2-1 Zone3 Mean Radiant Temperature	C
2	282	AHU2-1 Zone4 Mean Radiant Temperature	C
2	283	AHU2-1 Zone5 Mean Radiant Temperature	C
2	284	AHU2-1 Zone6 Mean Radiant Temperature	C
2	285	AHU2-2 Zone1 Mean Radiant Temperature	C
2	286	AHU2-2 Zone2 Mean Radiant Temperature	C
2	287	AHU2-2 Zone3 Mean Radiant Temperature	C
2	288	AHU2-2 Zone4 Mean Radiant Temperature	C
2	289	AHU2-3 Zone1 Mean Radiant Temperature	C

CSV	No.	Description	Unit	CSV	No.	Description	Unit
2	290	AHU2-3 Zone2 Mean Radiant Temperature	C	2	338	AHU5-1 Zone3 Mean Radiant Temperature	C
2	291	AHU2-3 Zone3 Mean Radiant Temperature	C	2	339	AHU5-1 Zone4 Mean Radiant Temperature	C
2	292	AHU2-3 Zone4 Mean Radiant Temperature	C	2	340	AHU5-1 Zone5 Mean Radiant Temperature	C
2	293	AHU2-3 Zone5 Mean Radiant Temperature	C	2	341	AHU5-1 Zone6 Mean Radiant Temperature	C
2	294	AHU2-4 Zone1 Mean Radiant Temperature	C	2	342	AHU5-2 Zone1 Mean Radiant Temperature	C
2	295	AHU2-4 Zone2 Mean Radiant Temperature	C	2	343	AHU5-2 Zone2 Mean Radiant Temperature	C
2	296	AHU2-4 Zone3 Mean Radiant Temperature	C	2	344	AHU5-2 Zone3 Mean Radiant Temperature	C
2	297	AHU2-4 Zone4 Mean Radiant Temperature	C	2	345	AHU5-2 Zone4 Mean Radiant Temperature	C
2	298	AHU3-1 Zone1 Mean Radiant Temperature	C	2	346	AHU5-3 Zone1 Mean Radiant Temperature	C
2	299	AHU3-1 Zone2 Mean Radiant Temperature	C	2	347	AHU5-3 Zone2 Mean Radiant Temperature	C
2	300	AHU3-1 Zone3 Mean Radiant Temperature	C	2	348	AHU5-3 Zone3 Mean Radiant Temperature	C
2	301	AHU3-1 Zone4 Mean Radiant Temperature	C	2	349	AHU5-3 Zone4 Mean Radiant Temperature	C
2	302	AHU3-1 Zone5 Mean Radiant Temperature	C	2	350	AHU5-3 Zone5 Mean Radiant Temperature	C
2	303	AHU3-1 Zone6 Mean Radiant Temperature	C	2	351	AHU5-4 Zone1 Mean Radiant Temperature	C
2	304	AHU3-2 Zone1 Mean Radiant Temperature	C	2	352	AHU5-4 Zone2 Mean Radiant Temperature	C
2	305	AHU3-2 Zone2 Mean Radiant Temperature	C	2	353	AHU5-4 Zone3 Mean Radiant Temperature	C
2	306	AHU3-2 Zone3 Mean Radiant Temperature	C	2	354	AHU5-4 Zone4 Mean Radiant Temperature	C
2	307	AHU3-2 Zone4 Mean Radiant Temperature	C	2	355	AHU6-1 Zone1 Mean Radiant Temperature	C
2	308	AHU3-3 Zone1 Mean Radiant Temperature	C	2	356	AHU6-1 Zone2 Mean Radiant Temperature	C
2	309	AHU3-3 Zone2 Mean Radiant Temperature	C	2	357	AHU6-1 Zone3 Mean Radiant Temperature	C
2	310	AHU3-3 Zone3 Mean Radiant Temperature	C	2	358	AHU6-1 Zone4 Mean Radiant Temperature	C
2	311	AHU3-3 Zone4 Mean Radiant Temperature	C	2	359	AHU6-1 Zone5 Mean Radiant Temperature	C
2	312	AHU3-3 Zone5 Mean Radiant Temperature	C	2	360	AHU6-1 Zone6 Mean Radiant Temperature	C
2	313	AHU3-4 Zone1 Mean Radiant Temperature	C	2	361	AHU6-2 Zone1 Mean Radiant Temperature	C
2	314	AHU3-4 Zone2 Mean Radiant Temperature	C	2	362	AHU6-2 Zone2 Mean Radiant Temperature	C
2	315	AHU3-4 Zone3 Mean Radiant Temperature	C	2	363	AHU6-2 Zone3 Mean Radiant Temperature	C
2	316	AHU3-4 Zone4 Mean Radiant Temperature	C	2	364	AHU6-2 Zone4 Mean Radiant Temperature	C
2	317	AHU4-1 Zone1 Mean Radiant Temperature	C	2	365	AHU6-3 Zone1 Mean Radiant Temperature	C
2	318	AHU4-1 Zone2 Mean Radiant Temperature	C	2	366	AHU6-3 Zone2 Mean Radiant Temperature	C
2	319	AHU4-1 Zone3 Mean Radiant Temperature	C	2	367	AHU6-3 Zone3 Mean Radiant Temperature	C
2	320	AHU4-1 Zone4 Mean Radiant Temperature	C	2	368	AHU6-3 Zone4 Mean Radiant Temperature	C
2	321	AHU4-1 Zone5 Mean Radiant Temperature	C	2	369	AHU6-3 Zone5 Mean Radiant Temperature	C
2	322	AHU4-1 Zone6 Mean Radiant Temperature	C	2	370	AHU6-4 Zone1 Mean Radiant Temperature	C
2	323	AHU4-2 Zone1 Mean Radiant Temperature	C	2	371	AHU6-4 Zone2 Mean Radiant Temperature	C
2	324	AHU4-2 Zone2 Mean Radiant Temperature	C	2	372	AHU6-4 Zone3 Mean Radiant Temperature	C
2	325	AHU4-2 Zone3 Mean Radiant Temperature	C	2	373	AHU6-4 Zone4 Mean Radiant Temperature	C
2	326	AHU4-2 Zone4 Mean Radiant Temperature	C	2	374	AHU7-1 Zone1 Mean Radiant Temperature	C
2	327	AHU4-3 Zone1 Mean Radiant Temperature	C	2	375	AHU7-1 Zone2 Mean Radiant Temperature	C
2	328	AHU4-3 Zone2 Mean Radiant Temperature	C	2	376	AHU7-1 Zone3 Mean Radiant Temperature	C
2	329	AHU4-3 Zone3 Mean Radiant Temperature	C	2	377	AHU7-1 Zone4 Mean Radiant Temperature	C
2	330	AHU4-3 Zone4 Mean Radiant Temperature	C	2	378	AHU7-1 Zone5 Mean Radiant Temperature	C
2	331	AHU4-3 Zone5 Mean Radiant Temperature	C	2	379	AHU7-1 Zone6 Mean Radiant Temperature	C
2	332	AHU4-4 Zone1 Mean Radiant Temperature	C	2	380	AHU7-2 Zone1 Mean Radiant Temperature	C
2	333	AHU4-4 Zone2 Mean Radiant Temperature	C	2	381	AHU7-2 Zone2 Mean Radiant Temperature	C
2	334	AHU4-4 Zone3 Mean Radiant Temperature	C	2	382	AHU7-2 Zone3 Mean Radiant Temperature	C
2	335	AHU4-4 Zone4 Mean Radiant Temperature	C	2	383	AHU7-2 Zone4 Mean Radiant Temperature	C
2	336	AHU5-1 Zone1 Mean Radiant Temperature	C	2	384	AHU7-3 Zone1 Mean Radiant Temperature	C
2	337	AHU5-1 Zone2 Mean Radiant Temperature	C	2	385	AHU7-3 Zone2 Mean Radiant Temperature	C

CSV	No.	Description	Unit
2	386	AHU7-3 Zone3 Mean Radiant Temperature	C
2	387	AHU7-3 Zone4 Mean Radiant Temperature	C
2	388	AHU7-3 Zone5 Mean Radiant Temperature	C
2	389	AHU7-4 Zone1 Mean Radiant Temperature	C
2	390	AHU7-4 Zone2 Mean Radiant Temperature	C
2	391	AHU7-4 Zone3 Mean Radiant Temperature	C
2	392	AHU7-4 Zone4 Mean Radiant Temperature	C
2	393	AHU1-1 Supply air drybulb temperature	C
2	394	AHU1-1 Supply air relative humidity	%
2	395	AHU1-1 Return air drybulb temperature	C
2	396	AHU1-1 Return air relative humidity	%
2	397	AHU1-1 Cooling coil load	MJ
2	398	AHU1-1 Heating coil load	MJ
2	399	AHU1-1 Cooling coil load	kW
2	400	AHU1-1 Heating coil load	kW
2	401	AHU1-1 Cooling coil water flow rate	L/min
2	402	AHU1-1 Heating coil water flow rate	L/min
2	403	AHU1-1 Cooling coil valve lift	-
2	404	AHU1-1 Heating coil valve lift	-
2	405	AHU1-1 Supply fan rotation ratio	-
2	406	AHU1-1 Return fan rotation ratio	-
2	407	AHU1-1 Supply air temperature setpoint	C
2	408	AHU1-1 Electricity	kWh
2	409	AHU1-1 Electricity	kW
2	410	AHU1-1 VAV-1 airflow set point	CMH
2	411	AHU1-1 VAV-2 airflow set point	CMH
2	412	AHU1-1 VAV-3 airflow set point	CMH
2	413	AHU1-2 Supply air drybulb temperature	C
2	414	AHU1-2 Supply air relative humidity	%
2	415	AHU1-2 Return air drybulb temperature	C
2	416	AHU1-2 Return air relative humidity	%
2	417	AHU1-2 Cooling coil load	MJ
2	418	AHU1-2 Heating coil load	MJ
2	419	AHU1-2 Cooling coil load	kW
2	420	AHU1-2 Heating coil load	kW
2	421	AHU1-2 Cooling coil water flow rate	L/min
2	422	AHU1-2 Heating coil water flow rate	L/min
2	423	AHU1-2 Cooling coil valve lift	-
2	424	AHU1-2 Heating coil valve lift	-
2	425	AHU1-2 Supply fan rotation ratio	-
2	426	AHU1-2 Return fan rotation ratio	-
2	427	AHU1-2 Supply air temperature setpoint	C
2	428	AHU1-2 Electricity	kWh
2	429	AHU1-2 Electricity	kW
2	430	AHU1-2 VAV-1 airflow set point	CMH
2	431	AHU1-2 VAV-2 airflow set point	CMH
2	432	AHU1-3 Supply air drybulb temperature	C
2	433	AHU1-3 Supply air relative humidity	%
2	434	AHU1-3 Return air drybulb temperature	C
2	435	AHU1-3 Return air relative humidity	%
2	436	AHU1-3 Cooling coil load	MJ
2	437	AHU1-3 Heating coil load	MJ
2	438	AHU1-3 Cooling coil load	kW
2	439	AHU1-3 Heating coil load	kW
2	440	AHU1-3 Cooling coil water flow rate	L/min
2	441	AHU1-3 Heating coil water flow rate	L/min
2	442	AHU1-3 Cooling coil valve lift	-
2	443	AHU1-3 Heating coil valve lift	-
2	444	AHU1-3 Supply fan rotation ratio	-
2	445	AHU1-3 Return fan rotation ratio	-
2	446	AHU1-3 Supply air temperature setpoint	C
2	447	AHU1-3 Electricity	kWh
2	448	AHU1-3 Electricity	kW
2	449	AHU1-3 VAV-1 airflow set point	CMH
2	450	AHU1-3 VAV-2 airflow set point	CMH
2	451	AHU1-3 VAV-3 airflow set point	CMH
2	452	AHU1-4 Supply air drybulb temperature	C
2	453	AHU1-4 Supply air relative humidity	%
2	454	AHU1-4 Return air drybulb temperature	C
2	455	AHU1-4 Return air relative humidity	%
2	456	AHU1-4 Cooling coil load	MJ
2	457	AHU1-4 Heating coil load	MJ
2	458	AHU1-4 Cooling coil load	kW
2	459	AHU1-4 Heating coil load	kW
2	460	AHU1-4 Cooling coil water flow rate	L/min
2	461	AHU1-4 Heating coil water flow rate	L/min
2	462	AHU1-4 Cooling coil valve lift	-
2	463	AHU1-4 Heating coil valve lift	-
2	464	AHU1-4 Supply fan rotation ratio	-
2	465	AHU1-4 Return fan rotation ratio	-
2	466	AHU1-4 Supply air temperature setpoint	C
2	467	AHU1-4 Electricity	kWh
2	468	AHU1-4 Electricity	kW
2	469	AHU1-4 VAV-1 airflow set point	CMH
2	470	AHU1-4 VAV-2 airflow set point	CMH
2	471	AHU1-5 Supply air drybulb temperature	C
2	472	AHU1-5 Supply air relative humidity	%
2	473	AHU1-5 Return air drybulb temperature	C
2	474	AHU1-5 Return air relative humidity	%
2	475	AHU1-5 Cooling coil load	MJ
2	476	AHU1-5 Heating coil load	MJ
2	477	AHU1-5 Cooling coil load	kW
2	478	AHU1-5 Heating coil load	kW
2	479	AHU1-5 Cooling coil water flow rate	L/min
2	480	AHU1-5 Heating coil water flow rate	L/min
2	481	AHU1-5 Cooling coil valve lift	-

CSV	No.	Description	Unit
2	482	AHU1-5 Heating coil valve lift	-
2	483	AHU1-5 Supply fan rotation ratio	-
2	484	AHU1-5 Return fan rotation ratio	-
2	485	AHU1-5 Supply air temperature setpoint	C
2	486	AHU1-5 Electricity	kWh
2	487	AHU1-5 Electricity	kW
2	488	AHU1-5 VAV-1 airflow set point	CMH
2	489	AHU2-1 Supply air drybulb temperature	C
2	490	AHU2-1 Supply air relative humidity	%
2	491	AHU2-1 Return air drybulb temperature	C
2	492	AHU2-1 Return air relative humidity	%
2	493	AHU2-1 Cooling coil load	MJ
2	494	AHU2-1 Heating coil load	MJ
2	495	AHU2-1 Cooling coil load	kW
2	496	AHU2-1 Heating coil load	kW
2	497	AHU2-1 Cooling coil water flow rate	L/min
2	498	AHU2-1 Heating coil water flow rate	L/min
2	499	AHU2-1 Cooling coil valve lift	-
2	500	AHU2-1 Heating coil valve lift	-
2	501	AHU2-1 Supply fan rotation ratio	-
2	502	AHU2-1 Return fan rotation ratio	-
2	503	AHU2-1 Supply air temperature setpoint	C
2	504	AHU2-1 Electricity	kWh
2	505	AHU2-1 Electricity	kW
2	506	AHU2-1 VAV-1 airflow set point	CMH
2	507	AHU2-1 VAV-2 airflow set point	CMH
2	508	AHU2-1 VAV-3 airflow set point	CMH
2	509	AHU2-1 VAV-4 airflow set point	CMH
2	510	AHU2-1 VAV-5 airflow set point	CMH
2	511	AHU2-1 VAV-6 airflow set point	CMH
2	512	AHU2-2 Supply air drybulb temperature	C
2	513	AHU2-2 Supply air relative humidity	%
2	514	AHU2-2 Return air drybulb temperature	C
2	515	AHU2-2 Return air relative humidity	%
2	516	AHU2-2 Cooling coil load	MJ
2	517	AHU2-2 Heating coil load	MJ
2	518	AHU2-2 Cooling coil load	kW
2	519	AHU2-2 Heating coil load	kW
2	520	AHU2-2 Cooling coil water flow rate	L/min
2	521	AHU2-2 Heating coil water flow rate	L/min
2	522	AHU2-2 Cooling coil valve lift	-
2	523	AHU2-2 Heating coil valve lift	-
2	524	AHU2-2 Supply fan rotation ratio	-
2	525	AHU2-2 Return fan rotation ratio	-
2	526	AHU2-2 Supply air temperature setpoint	C
2	527	AHU2-2 Electricity	kWh
2	528	AHU2-2 Electricity	kW
2	529	AHU2-2 VAV-1 airflow set point	CMH
2	530	AHU2-2 VAV-2 airflow set point	CMH
2	531	AHU2-2 VAV-3 airflow set point	CMH
2	532	AHU2-2 VAV-4 airflow set point	CMH
2	533	AHU2-3 Supply air drybulb temperature	C
2	534	AHU2-3 Supply air relative humidity	%
2	535	AHU2-3 Return air drybulb temperature	C
2	536	AHU2-3 Return air relative humidity	%
2	537	AHU2-3 Cooling coil load	MJ
2	538	AHU2-3 Heating coil load	MJ
2	539	AHU2-3 Cooling coil load	kW
2	540	AHU2-3 Heating coil load	kW
2	541	AHU2-3 Cooling coil water flow rate	L/min
2	542	AHU2-3 Heating coil water flow rate	L/min
2	543	AHU2-3 Cooling coil valve lift	-
2	544	AHU2-3 Heating coil valve lift	-
2	545	AHU2-3 Supply fan rotation ratio	-
2	546	AHU2-3 Return fan rotation ratio	-
2	547	AHU2-3 Supply air temperature setpoint	C
2	548	AHU2-3 Electricity	kWh
2	549	AHU2-3 Electricity	kW
2	550	AHU2-3 VAV-1 airflow set point	CMH
2	551	AHU2-3 VAV-2 airflow set point	CMH
2	552	AHU2-3 VAV-3 airflow set point	CMH
2	553	AHU2-3 VAV-4 airflow set point	CMH
2	554	AHU2-3 VAV-5 airflow set point	CMH
2	555	AHU2-4 Supply air drybulb temperature	C
2	556	AHU2-4 Supply air relative humidity	%
2	557	AHU2-4 Return air drybulb temperature	C
2	558	AHU2-4 Return air relative humidity	%
2	559	AHU2-4 Cooling coil load	MJ
2	560	AHU2-4 Heating coil load	MJ
2	561	AHU2-4 Cooling coil load	kW
2	562	AHU2-4 Heating coil load	kW
2	563	AHU2-4 Cooling coil water flow rate	L/min
2	564	AHU2-4 Heating coil water flow rate	L/min
2	565	AHU2-4 Cooling coil valve lift	-
2	566	AHU2-4 Heating coil valve lift	-
2	567	AHU2-4 Supply fan rotation ratio	-
2	568	AHU2-4 Return fan rotation ratio	-
2	569	AHU2-4 Supply air temperature setpoint	C
2	570	AHU2-4 Electricity	kWh
2	571	AHU2-4 Electricity	kW
2	572	AHU2-4 VAV-1 airflow set point	CMH
2	573	AHU2-4 VAV-2 airflow set point	CMH
2	574	AHU2-4 VAV-3 airflow set point	CMH
2	575	AHU2-4 VAV-4 airflow set point	CMH
2	576	AHU3-1 Supply air drybulb temperature	C
2	577	AHU3-1 Supply air relative humidity	%

CSV	No.	Description	Unit
2	578	AHU3-1 Return air drybulb temperature	C
2	579	AHU3-1 Return air relative humidity	%
2	580	AHU3-1 Cooling coil load	MJ
2	581	AHU3-1 Heating coil load	MJ
2	582	AHU3-1 Cooling coil load	kW
2	583	AHU3-1 Heating coil load	kW
2	584	AHU3-1 Cooling coil water flow rate	L/min
2	585	AHU3-1 Heating coil water flow rate	L/min
2	586	AHU3-1 Cooling coil valve lift	-
2	587	AHU3-1 Heating coil valve lift	-
2	588	AHU3-1 Supply fan rotation ratio	-
2	589	AHU3-1 Return fan rotation ratio	-
2	590	AHU3-1 Supply air temperature setpoint	C
2	591	AHU3-1 Electricity	kWh
2	592	AHU3-1 Electricity	kW
2	593	AHU3-1 VAV-1 airflow set point	CMH
2	594	AHU3-1 VAV-2 airflow set point	CMH
2	595	AHU3-1 VAV-3 airflow set point	CMH
2	596	AHU3-1 VAV-4 airflow set point	CMH
2	597	AHU3-1 VAV-5 airflow set point	CMH
2	598	AHU3-1 VAV-6 airflow set point	CMH
2	599	AHU3-2 Supply air drybulb temperature	C
2	600	AHU3-2 Supply air relative humidity	%
2	601	AHU3-2 Return air drybulb temperature	C
2	602	AHU3-2 Return air relative humidity	%
2	603	AHU3-2 Cooling coil load	MJ
2	604	AHU3-2 Heating coil load	MJ
2	605	AHU3-2 Cooling coil load	kW
2	606	AHU3-2 Heating coil load	kW
2	607	AHU3-2 Cooling coil water flow rate	L/min
2	608	AHU3-2 Heating coil water flow rate	L/min
2	609	AHU3-2 Cooling coil valve lift	-
2	610	AHU3-2 Heating coil valve lift	-
2	611	AHU3-2 Supply fan rotation ratio	-
2	612	AHU3-2 Return fan rotation ratio	-
2	613	AHU3-2 Supply air temperature setpoint	C
2	614	AHU3-2 Electricity	kWh
2	615	AHU3-2 Electricity	kW
2	616	AHU3-2 VAV-1 airflow set point	CMH
2	617	AHU3-2 VAV-2 airflow set point	CMH
2	618	AHU3-2 VAV-3 airflow set point	CMH
2	619	AHU3-2 VAV-4 airflow set point	CMH
2	620	AHU3-3 Supply air drybulb temperature	C
2	621	AHU3-3 Supply air relative humidity	%
2	622	AHU3-3 Return air drybulb temperature	C
2	623	AHU3-3 Return air relative humidity	%
2	624	AHU3-3 Cooling coil load	MJ
2	625	AHU3-3 Heating coil load	MJ
2	626	AHU3-3 Cooling coil load	kW
2	627	AHU3-3 Heating coil load	kW
2	628	AHU3-3 Cooling coil water flow rate	L/min
2	629	AHU3-3 Heating coil water flow rate	L/min
2	630	AHU3-3 Cooling coil valve lift	-
2	631	AHU3-3 Heating coil valve lift	-
2	632	AHU3-3 Supply fan rotation ratio	-
2	633	AHU3-3 Return fan rotation ratio	-
2	634	AHU3-3 Supply air temperature setpoint	C
2	635	AHU3-3 Electricity	kWh
2	636	AHU3-3 Electricity	kW
2	637	AHU3-3 VAV-1 airflow set point	CMH
2	638	AHU3-3 VAV-2 airflow set point	CMH
2	639	AHU3-3 VAV-3 airflow set point	CMH
2	640	AHU3-3 VAV-4 airflow set point	CMH
2	641	AHU3-3 VAV-5 airflow set point	CMH
2	642	AHU3-4 Supply air drybulb temperature	C
2	643	AHU3-4 Supply air relative humidity	%
2	644	AHU3-4 Return air drybulb temperature	C
2	645	AHU3-4 Return air relative humidity	%
2	646	AHU3-4 Cooling coil load	MJ
2	647	AHU3-4 Heating coil load	MJ
2	648	AHU3-4 Cooling coil load	kW
2	649	AHU3-4 Heating coil load	kW
2	650	AHU3-4 Cooling coil water flow rate	L/min
2	651	AHU3-4 Heating coil water flow rate	L/min
2	652	AHU3-4 Cooling coil valve lift	-
2	653	AHU3-4 Heating coil valve lift	-
2	654	AHU3-4 Supply fan rotation ratio	-
2	655	AHU3-4 Return fan rotation ratio	-
2	656	AHU3-4 Supply air temperature setpoint	C
2	657	AHU3-4 Electricity	kWh
2	658	AHU3-4 Electricity	kW
2	659	AHU3-4 VAV-1 airflow set point	CMH
2	660	AHU3-4 VAV-2 airflow set point	CMH
2	661	AHU3-4 VAV-3 airflow set point	CMH
2	662	AHU3-4 VAV-4 airflow set point	CMH
2	663	AHU4-1 Supply air drybulb temperature	C
2	664	AHU4-1 Supply air relative humidity	%
2	665	AHU4-1 Return air drybulb temperature	C
2	666	AHU4-1 Return air relative humidity	%
2	667	AHU4-1 Cooling coil load	MJ
2	668	AHU4-1 Heating coil load	MJ
2	669	AHU4-1 Cooling coil load	kW
2	670	AHU4-1 Heating coil load	kW
2	671	AHU4-1 Cooling coil water flow rate	L/min
2	672	AHU4-1 Heating coil water flow rate	L/min
2	673	AHU4-1 Cooling coil valve lift	-

CSV	No.	Description	Unit
2	674	AHU4-1 Heating coil valve lift	-
2	675	AHU4-1 Supply fan rotation ratio	-
2	676	AHU4-1 Return fan rotation ratio	-
2	677	AHU4-1 Supply air temperature setpoint	C
2	678	AHU4-1 Electricity	kWh
2	679	AHU4-1 Electricity	kW
2	680	AHU4-1 VAV-1 airflow set point	CMH
2	681	AHU4-1 VAV-2 airflow set point	CMH
2	682	AHU4-1 VAV-3 airflow set point	CMH
2	683	AHU4-1 VAV-4 airflow set point	CMH
2	684	AHU4-1 VAV-5 airflow set point	CMH
2	685	AHU4-1 VAV-6 airflow set point	CMH
2	686	AHU4-2 Supply air drybulb temperature	C
2	687	AHU4-2 Supply air relative humidity	%
2	688	AHU4-2 Return air drybulb temperature	C
2	689	AHU4-2 Return air relative humidity	%
2	690	AHU4-2 Cooling coil load	MJ
2	691	AHU4-2 Heating coil load	MJ
2	692	AHU4-2 Cooling coil load	kW
2	693	AHU4-2 Heating coil load	kW
2	694	AHU4-2 Cooling coil water flow rate	L/min
2	695	AHU4-2 Heating coil water flow rate	L/min
2	696	AHU4-2 Cooling coil valve lift	-
2	697	AHU4-2 Heating coil valve lift	-
2	698	AHU4-2 Supply fan rotation ratio	-
2	699	AHU4-2 Return fan rotation ratio	-
2	700	AHU4-2 Supply air temperature setpoint	C
2	701	AHU4-2 Electricity	kWh
2	702	AHU4-2 Electricity	kW
2	703	AHU4-2 VAV-1 airflow set point	CMH
2	704	AHU4-2 VAV-2 airflow set point	CMH
2	705	AHU4-2 VAV-3 airflow set point	CMH
2	706	AHU4-2 VAV-4 airflow set point	CMH
2	707	AHU4-3 Supply air drybulb temperature	C
2	708	AHU4-3 Supply air relative humidity	%
2	709	AHU4-3 Return air drybulb temperature	C
2	710	AHU4-3 Return air relative humidity	%
2	711	AHU4-3 Cooling coil load	MJ
2	712	AHU4-3 Heating coil load	MJ
2	713	AHU4-3 Cooling coil load	kW
2	714	AHU4-3 Heating coil load	kW
2	715	AHU4-3 Cooling coil water flow rate	L/min
2	716	AHU4-3 Heating coil water flow rate	L/min
2	717	AHU4-3 Cooling coil valve lift	-
2	718	AHU4-3 Heating coil valve lift	-
2	719	AHU4-3 Supply fan rotation ratio	-
2	720	AHU4-3 Return fan rotation ratio	-
2	721	AHU4-3 Supply air temperature setpoint	C
2	722	AHU4-3 Electricity	kWh
2	723	AHU4-3 Electricity	kW
2	724	AHU4-3 VAV-1 airflow set point	CMH
2	725	AHU4-3 VAV-2 airflow set point	CMH
2	726	AHU4-3 VAV-3 airflow set point	CMH
2	727	AHU4-3 VAV-4 airflow set point	CMH
2	728	AHU4-3 VAV-5 airflow set point	CMH
2	729	AHU4-4 Supply air drybulb temperature	C
2	730	AHU4-4 Supply air relative humidity	%
2	731	AHU4-4 Return air drybulb temperature	C
2	732	AHU4-4 Return air relative humidity	%
2	733	AHU4-4 Cooling coil load	MJ
2	734	AHU4-4 Heating coil load	MJ
2	735	AHU4-4 Cooling coil load	kW
2	736	AHU4-4 Heating coil load	kW
2	737	AHU4-4 Cooling coil water flow rate	L/min
2	738	AHU4-4 Heating coil water flow rate	L/min
2	739	AHU4-4 Cooling coil valve lift	-
2	740	AHU4-4 Heating coil valve lift	-
2	741	AHU4-4 Supply fan rotation ratio	-
2	742	AHU4-4 Return fan rotation ratio	-
2	743	AHU4-4 Supply air temperature setpoint	C
2	744	AHU4-4 Electricity	kWh
2	745	AHU4-4 Electricity	kW
2	746	AHU4-4 VAV-1 airflow set point	CMH
2	747	AHU4-4 VAV-2 airflow set point	CMH
2	748	AHU4-4 VAV-3 airflow set point	CMH
2	749	AHU4-4 VAV-4 airflow set point	CMH
2	750	AHU5-1 Supply air drybulb temperature	C
2	751	AHU5-1 Supply air relative humidity	%
2	752	AHU5-1 Return air drybulb temperature	C
2	753	AHU5-1 Return air relative humidity	%
2	754	AHU5-1 Cooling coil load	MJ
2	755	AHU5-1 Heating coil load	MJ
2	756	AHU5-1 Cooling coil load	kW
2	757	AHU5-1 Heating coil load	kW
2	758	AHU5-1 Cooling coil water flow rate	L/min
2	759	AHU5-1 Heating coil water flow rate	L/min
2	760	AHU5-1 Cooling coil valve lift	-
2	761	AHU5-1 Heating coil valve lift	-
2	762	AHU5-1 Supply fan rotation ratio	-
2	763	AHU5-1 Return fan rotation ratio	-
2	764	AHU5-1 Supply air temperature setpoint	C
2	765	AHU5-1 Electricity	kWh
2	766	AHU5-1 Electricity	kW
2	767	AHU5-1 VAV-1 airflow set point	CMH
2	768	AHU5-1 VAV-2 airflow set point	CMH
2	769	AHU5-1 VAV-3 airflow set point	CMH

CSV	No.	Description	Unit
2	770	AHU5-1 VAV-4 airflow set point	CMH
2	771	AHU5-1 VAV-5 airflow set point	CMH
2	772	AHU5-1 VAV-6 airflow set point	CMH
2	773	AHU5-2 Supply air drybulb temperature	C
2	774	AHU5-2 Supply air relative humidity	%
2	775	AHU5-2 Return air drybulb temperature	C
2	776	AHU5-2 Return air relative humidity	%
2	777	AHU5-2 Cooling coil load	MJ
2	778	AHU5-2 Heating coil load	MJ
2	779	AHU5-2 Cooling coil load	kW
2	780	AHU5-2 Heating coil load	kW
2	781	AHU5-2 Cooling coil water flow rate	L/min
2	782	AHU5-2 Heating coil water flow rate	L/min
2	783	AHU5-2 Cooling coil valve lift	-
2	784	AHU5-2 Heating coil valve lift	-
2	785	AHU5-2 Supply fan rotation ratio	-
2	786	AHU5-2 Return fan rotation ratio	-
2	787	AHU5-2 Supply air temperature setpoint	C
2	788	AHU5-2 Electricity	kWh
2	789	AHU5-2 Electricity	kW
2	790	AHU5-2 VAV-1 airflow set point	CMH
2	791	AHU5-2 VAV-2 airflow set point	CMH
2	792	AHU5-2 VAV-3 airflow set point	CMH
2	793	AHU5-2 VAV-4 airflow set point	CMH
2	794	AHU5-3 Supply air drybulb temperature	C
2	795	AHU5-3 Supply air relative humidity	%
2	796	AHU5-3 Return air drybulb temperature	C
2	797	AHU5-3 Return air relative humidity	%
2	798	AHU5-3 Cooling coil load	MJ
2	799	AHU5-3 Heating coil load	MJ
2	800	AHU5-3 Cooling coil load	kW
2	801	AHU5-3 Heating coil load	kW
2	802	AHU5-3 Cooling coil water flow rate	L/min
2	803	AHU5-3 Heating coil water flow rate	L/min
2	804	AHU5-3 Cooling coil valve lift	-
2	805	AHU5-3 Heating coil valve lift	-
2	806	AHU5-3 Supply fan rotation ratio	-
2	807	AHU5-3 Return fan rotation ratio	-
2	808	AHU5-3 Supply air temperature setpoint	C
2	809	AHU5-3 Electricity	kWh
2	810	AHU5-3 Electricity	kW
2	811	AHU5-3 VAV-1 airflow set point	CMH
2	812	AHU5-3 VAV-2 airflow set point	CMH
2	813	AHU5-3 VAV-3 airflow set point	CMH
2	814	AHU5-3 VAV-4 airflow set point	CMH
2	815	AHU5-3 VAV-5 airflow set point	CMH
2	816	AHU5-4 Supply air drybulb temperature	C
2	817	AHU5-4 Supply air relative humidity	%
2	818	AHU5-4 Return air drybulb temperature	C
2	819	AHU5-4 Return air relative humidity	%
2	820	AHU5-4 Cooling coil load	MJ
2	821	AHU5-4 Heating coil load	MJ
2	822	AHU5-4 Cooling coil load	kW
2	823	AHU5-4 Heating coil load	kW
2	824	AHU5-4 Cooling coil water flow rate	L/min
2	825	AHU5-4 Heating coil water flow rate	L/min
2	826	AHU5-4 Cooling coil valve lift	-
2	827	AHU5-4 Heating coil valve lift	-
2	828	AHU5-4 Supply fan rotation ratio	-
2	829	AHU5-4 Return fan rotation ratio	-
2	830	AHU5-4 Supply air temperature setpoint	C
2	831	AHU5-4 Electricity	kWh
2	832	AHU5-4 Electricity	kW
2	833	AHU5-4 VAV-1 airflow set point	CMH
2	834	AHU5-4 VAV-2 airflow set point	CMH
2	835	AHU5-4 VAV-3 airflow set point	CMH
2	836	AHU5-4 VAV-4 airflow set point	CMH
2	837	AHU6-1 Supply air drybulb temperature	C
2	838	AHU6-1 Supply air relative humidity	%
2	839	AHU6-1 Return air drybulb temperature	C
2	840	AHU6-1 Return air relative humidity	%
2	841	AHU6-1 Cooling coil load	MJ
2	842	AHU6-1 Heating coil load	MJ
2	843	AHU6-1 Cooling coil load	kW
2	844	AHU6-1 Heating coil load	kW
2	845	AHU6-1 Cooling coil water flow rate	L/min
2	846	AHU6-1 Heating coil water flow rate	L/min
2	847	AHU6-1 Cooling coil valve lift	-
2	848	AHU6-1 Heating coil valve lift	-
2	849	AHU6-1 Supply fan rotation ratio	-
2	850	AHU6-1 Return fan rotation ratio	-
2	851	AHU6-1 Supply air temperature setpoint	C
2	852	AHU6-1 Electricity	kWh
2	853	AHU6-1 Electricity	kW
2	854	AHU6-1 VAV-1 airflow set point	CMH
2	855	AHU6-1 VAV-2 airflow set point	CMH
2	856	AHU6-1 VAV-3 airflow set point	CMH
2	857	AHU6-1 VAV-4 airflow set point	CMH
2	858	AHU6-1 VAV-5 airflow set point	CMH
2	859	AHU6-1 VAV-6 airflow set point	CMH
2	860	AHU6-2 Supply air drybulb temperature	C
2	861	AHU6-2 Supply air relative humidity	%
2	862	AHU6-2 Return air drybulb temperature	C
2	863	AHU6-2 Return air relative humidity	%
2	864	AHU6-2 Cooling coil load	MJ
2	865	AHU6-2 Heating coil load	MJ

CSV	No.	Description	Unit
2	866	AHU6-2 Cooling coil load	kW
2	867	AHU6-2 Heating coil load	kW
2	868	AHU6-2 Cooling coil water flow rate	L/min
2	869	AHU6-2 Heating coil water flow rate	L/min
2	870	AHU6-2 Cooling coil valve lift	-
2	871	AHU6-2 Heating coil valve lift	-
2	872	AHU6-2 Supply fan rotation ratio	-
2	873	AHU6-2 Return fan rotation ratio	-
2	874	AHU6-2 Supply air temperature setpoint	C
2	875	AHU6-2 Electricity	kWh
2	876	AHU6-2 Electricity	kW
2	877	AHU6-2 VAV-1 airflow set point	CMH
2	878	AHU6-2 VAV-2 airflow set point	CMH
2	879	AHU6-2 VAV-3 airflow set point	CMH
2	880	AHU6-2 VAV-4 airflow set point	CMH
2	881	AHU6-3 Supply air drybulb temperature	C
2	882	AHU6-3 Supply air relative humidity	%
2	883	AHU6-3 Return air drybulb temperature	C
2	884	AHU6-3 Return air relative humidity	%
2	885	AHU6-3 Cooling coil load	MJ
2	886	AHU6-3 Heating coil load	MJ
2	887	AHU6-3 Cooling coil load	kW
2	888	AHU6-3 Heating coil load	kW
2	889	AHU6-3 Cooling coil water flow rate	L/min
2	890	AHU6-3 Heating coil water flow rate	L/min
2	891	AHU6-3 Cooling coil valve lift	-
2	892	AHU6-3 Heating coil valve lift	-
2	893	AHU6-3 Supply fan rotation ratio	-
2	894	AHU6-3 Return fan rotation ratio	-
2	895	AHU6-3 Supply air temperature setpoint	C
2	896	AHU6-3 Electricity	kWh
2	897	AHU6-3 Electricity	kW
2	898	AHU6-3 VAV-1 airflow set point	CMH
2	899	AHU6-3 VAV-2 airflow set point	CMH
2	900	AHU6-3 VAV-3 airflow set point	CMH
2	901	AHU6-3 VAV-4 airflow set point	CMH
2	902	AHU6-3 VAV-5 airflow set point	CMH
2	903	AHU6-4 Supply air drybulb temperature	C
2	904	AHU6-4 Supply air relative humidity	%
2	905	AHU6-4 Return air drybulb temperature	C
2	906	AHU6-4 Return air relative humidity	%
2	907	AHU6-4 Cooling coil load	MJ
2	908	AHU6-4 Heating coil load	MJ
2	909	AHU6-4 Cooling coil load	kW
2	910	AHU6-4 Heating coil load	kW
2	911	AHU6-4 Cooling coil water flow rate	L/min
2	912	AHU6-4 Heating coil water flow rate	L/min
2	913	AHU6-4 Cooling coil valve lift	-

CSV	No.	Description	Unit
2	914	AHU6-4 Heating coil valve lift	-
2	915	AHU6-4 Supply fan rotation ratio	-
2	916	AHU6-4 Return fan rotation ratio	-
2	917	AHU6-4 Supply air temperature setpoint	C
2	918	AHU6-4 Electricity	kWh
2	919	AHU6-4 Electricity	kW
2	920	AHU6-4 VAV-1 airflow set point	CMH
2	921	AHU6-4 VAV-2 airflow set point	CMH
2	922	AHU6-4 VAV-3 airflow set point	CMH
2	923	AHU6-4 VAV-4 airflow set point	CMH
2	924	AHU7-1 Supply air drybulb temperature	C
2	925	AHU7-1 Supply air relative humidity	%
2	926	AHU7-1 Return air drybulb temperature	C
2	927	AHU7-1 Return air relative humidity	%
2	928	AHU7-1 Cooling coil load	MJ
2	929	AHU7-1 Heating coil load	MJ
2	930	AHU7-1 Cooling coil load	kW
2	931	AHU7-1 Heating coil load	kW
2	932	AHU7-1 Cooling coil water flow rate	L/min
2	933	AHU7-1 Heating coil water flow rate	L/min
2	934	AHU7-1 Cooling coil valve lift	-
2	935	AHU7-1 Heating coil valve lift	-
2	936	AHU7-1 Supply fan rotation ratio	-
2	937	AHU7-1 Return fan rotation ratio	-
2	938	AHU7-1 Supply air temperature setpoint	C
2	939	AHU7-1 Electricity	kWh
2	940	AHU7-1 Electricity	kW
2	941	AHU7-1 VAV-1 airflow set point	CMH
2	942	AHU7-1 VAV-2 airflow set point	CMH
2	943	AHU7-1 VAV-3 airflow set point	CMH
2	944	AHU7-1 VAV-4 airflow set point	CMH
2	945	AHU7-1 VAV-5 airflow set point	CMH
2	946	AHU7-1 VAV-6 airflow set point	CMH
2	947	AHU7-2 Supply air drybulb temperature	C
2	948	AHU7-2 Supply air relative humidity	%
2	949	AHU7-2 Return air drybulb temperature	C
2	950	AHU7-2 Return air relative humidity	%
2	951	AHU7-2 Cooling coil load	MJ
2	952	AHU7-2 Heating coil load	MJ
2	953	AHU7-2 Cooling coil load	kW
2	954	AHU7-2 Heating coil load	kW
2	955	AHU7-2 Cooling coil water flow rate	L/min
2	956	AHU7-2 Heating coil water flow rate	L/min
2	957	AHU7-2 Cooling coil valve lift	-
2	958	AHU7-2 Heating coil valve lift	-
2	959	AHU7-2 Supply fan rotation ratio	-
2	960	AHU7-2 Return fan rotation ratio	-
2	961	AHU7-2 Supply air temperature setpoint	C

CSV	No.	Description	Unit
2	962	AHU7-2 Electricity	kWh
2	963	AHU7-2 Electricity	kW
2	964	AHU7-2 VAV-1 airflow set point	CMH
2	965	AHU7-2 VAV-2 airflow set point	CMH
2	966	AHU7-2 VAV-3 airflow set point	CMH
2	967	AHU7-2 VAV-4 airflow set point	CMH
2	968	AHU7-3 Supply air drybulb temperature	C
2	969	AHU7-3 Supply air relative humidity	%
2	970	AHU7-3 Return air drybulb temperature	C
2	971	AHU7-3 Return air relative humidity	%
2	972	AHU7-3 Cooling coil load	MJ
2	973	AHU7-3 Heating coil load	MJ
2	974	AHU7-3 Cooling coil load	kW
2	975	AHU7-3 Heating coil load	kW
2	976	AHU7-3 Cooling coil water flow rate	L/min
2	977	AHU7-3 Heating coil water flow rate	L/min
2	978	AHU7-3 Cooling coil valve lift	-
2	979	AHU7-3 Heating coil valve lift	-
2	980	AHU7-3 Supply fan rotation ratio	-
2	981	AHU7-3 Return fan rotation ratio	-
2	982	AHU7-3 Supply air temperature setpoint	C
2	983	AHU7-3 Electricity	kWh
2	984	AHU7-3 Electricity	kW
2	985	AHU7-3 VAV-1 airflow set point	CMH
2	986	AHU7-3 VAV-2 airflow set point	CMH
2	987	AHU7-3 VAV-3 airflow set point	CMH
2	988	AHU7-3 VAV-4 airflow set point	CMH
2	989	AHU7-3 VAV-5 airflow set point	CMH
2	990	AHU7-4 Supply air drybulb temperature	C
2	991	AHU7-4 Supply air relative humidity	%
2	992	AHU7-4 Return air drybulb temperature	C
2	993	AHU7-4 Return air relative humidity	%
2	994	AHU7-4 Cooling coil load	MJ
2	995	AHU7-4 Heating coil load	MJ
2	996	AHU7-4 Cooling coil load	kW
2	997	AHU7-4 Heating coil load	kW
2	998	AHU7-4 Cooling coil water flow rate	L/min
2	999	AHU7-4 Heating coil water flow rate	L/min
2	1000	AHU7-4 Cooling coil valve lift	-
2	1001	AHU7-4 Heating coil valve lift	-
2	1002	AHU7-4 Supply fan rotation ratio	-
2	1003	AHU7-4 Return fan rotation ratio	-
2	1004	AHU7-4 Supply air temperature setpoint	C
2	1005	AHU7-4 Electricity	kWh
2	1006	AHU7-4 Electricity	kW
2	1007	AHU7-4 VAV-1 airflow set point	CMH
2	1008	AHU7-4 VAV-2 airflow set point	CMH
2	1009	AHU7-4 VAV-3 airflow set point	CMH

CSV	No.	Description	Unit
2	1010	AHU7-4 VAV-4 airflow set point	CMH
3	-	Occupant location data	-
4	-	Occupant thermal sensation data	-

Appendix 5   List of BACnet Devices

Device ID List

Device ID	Description	Device ID	Description
100000	Whole Building Controller	106300	Blind Controller-3F North
101000	Heat Source System Controller	106301	Blind Controller-3F South
101100	Modular Chiller Controller	106400	Blind Controller-4F North
101200	Absorption Chiller Controller	106401	Blind Controller-4F South
102000	Water Heat Storage Controller	106500	Blind Controller-5F North
103000	Secondary Pump System Controller (C)	106501	Blind Controller-5F South
103001	Secondary Pump System Controller (H)	106600	Blind Controller-6F North
104101	Controller of AHU1-1 (1F North)	106601	Blind Controller-6F South
104102	Controller of AHU1-2 (1F North)	106700	Blind Controller-7F North
104103	Controller of AHU1-3 (1F South)	106701	Blind Controller-7F South
104104	Controller of AHU1-4 (1F South)	107101	Occupants Controller-1F (Clo Value)
104105	Controller of AHU1-5 (1F Entrance Hall)	107201	Occupants Controller-2F (Clo Value)
104201	Controller of AHU2-1 (2F North)	107301	Occupants Controller-3F (Clo Value)
104202	Controller of AHU2-2 (2F North)	107401	Occupants Controller-4F (Clo Value)
104203	Controller of AHU2-3 (2F South)	107501	Occupants Controller-5F (Clo Value)
104204	Controller of AHU2-4 (2F South)	107601	Occupants Controller-6F (Clo Value)
104301	Controller of AHU3-1 (3F North)	107701	Occupants Controller-7F (Clo Value)
104302	Controller of AHU3-2 (3F North)	107102	Occupants Controller-1F (Thermal Sensation)
104303	Controller of AHU3-3 (3F South)	107202	Occupants Controller-2F (Thermal Sensation)
104304	Controller of AHU3-4 (3F South)	107302	Occupants Controller-3F (Thermal Sensation)
104401	Controller of AHU4-1 (4F North)	107402	Occupants Controller-4F (Thermal Sensation)
104402	Controller of AHU4-2 (4F North)	107502	Occupants Controller-5F (Thermal Sensation)
104403	Controller of AHU4-3 (4F South)	107602	Occupants Controller-6F (Thermal Sensation)
104404	Controller of AHU4-4 (4F South)	107702	Occupants Controller-7F (Thermal Sensation)
104501	Controller of AHU5-1 (5F North)	107103	Occupants Controller-1F (Stay at Desk)
104502	Controller of AHU5-2 (5F North)	107203	Occupants Controller-2F (Stay at Desk)
104503	Controller of AHU5-3 (5F South)	107303	Occupants Controller-3F (Stay at Desk)
104504	Controller of AHU5-4 (5F South)	107403	Occupants Controller-4F (Stay at Desk)
104601	Controller of AHU6-1 (6F North)	107503	Occupants Controller-5F (Stay at Desk)
104602	Controller of AHU6-2 (6F North)	107603	Occupants Controller-6F (Stay at Desk)
104603	Controller of AHU6-3 (6F South)	107703	Occupants Controller-7F (Stay at Desk)
104604	Controller of AHU6-4 (6F South)	107104	Occupants Controller-1F (Stay Zone Number)
104701	Controller of AHU7-1 (7F North)	107204	Occupants Controller-2F (Stay Zone Number)
104702	Controller of AHU7-2 (7F North)	107304	Occupants Controller-3F (Stay Zone Number)
104703	Controller of AHU7-3 (7F South)	107404	Occupants Controller-4F (Stay Zone Number)
104704	Controller of AHU7-4 (7F South)	107504	Occupants Controller-5F (Stay Zone Number)
105100	Controller of FCU 1F	107604	Occupants Controller-6F (Stay Zone Number)
105200	Controller of FCU 2F	107704	Occupants Controller-7F (Stay Zone Number)
105300	Controller of FCU 3F	107105	Occupants Controller-1F (Dissatisfied)
105400	Controller of FCU 4F	107205	Occupants Controller-2F (Dissatisfied)
105500	Controller of FCU 5F	107305	Occupants Controller-3F (Dissatisfied)
105600	Controller of FCU 6F	107405	Occupants Controller-4F (Dissatisfied)
105700	Controller of FCU 7F	107505	Occupants Controller-5F (Dissatisfied)
106100	Blind Controller-1F North	107605	Occupants Controller-6F (Dissatisfied)
106101	Blind Controller-1F South	107705	Occupants Controller-7F (Dissatisfied)
106200	Blind Controller-2F North	199999	Emulator System controller
106201	Blind Controller-2F South	-	-

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
100000	0	OBJECT_DATETIME_VALUE	DATETIME	2019/1/1 0:00	Date and time
100000	1	OBJECT_ANALOG_INPUT	DOUBLE	26	Outdoor air drybulb temperature [C]
100000	2	OBJECT_ANALOG_INPUT	DOUBLE	50	Outdoor air relative humidity [%]
100000	3	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 1
100000	4	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 2
100000	5	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 3
100000	6	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 4
100000	7	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 5
100000	8	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 6
100000	9	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 7
100000	10	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 8
100000	11	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 9
100000	12	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 10
100000	13	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 11
100000	14	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 12
100000	15	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 13
100000	16	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 14
100000	17	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 15
100000	18	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 16
100000	19	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 17
100000	20	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 18
100000	21	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 19
100000	22	OBJECT_CALENDAR	BOOLEAN	FALSE	Calendar 20
100000	23	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	None	Calendar 1 name
100000	24	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Winter season	Calendar 2 name
100000	25	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Summer season	Calendar 3 name
100000	26	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Mid season	Calendar 4 name
100000	27	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Whole year	Calendar 5 name
100000	28	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 6	Calendar 6 name
100000	29	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 7	Calendar 7 name
100000	30	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 8	Calendar 8 name
100000	31	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 9	Calendar 9 name
100000	32	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 10	Calendar 10 name
100000	33	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 11	Calendar 11 name
100000	34	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 12	Calendar 12 name
100000	35	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 13	Calendar 13 name
100000	36	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 14	Calendar 14 name
100000	37	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 15	Calendar 15 name
100000	38	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 16	Calendar 16 name
100000	39	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 17	Calendar 17 name
100000	40	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 18	Calendar 18 name
100000	41	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 19	Calendar 19 name
100000	42	OBJECT_CHARACTERSTRING_VALUE	CHARACTER_STRING	Calendar 20	Calendar 20 name
100000	43	OBJECT_ANALOG_INPUT	DOUBLE	0	Solar altitude [radian]
100000	44	OBJECT_ANALOG_INPUT	DOUBLE	0	Solar orientation [radian]
101000	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
101000	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
101000	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
101000	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
101000	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Cooling; 2:Heating; 3:Cooling And Heating)
101000	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Cooling; 2:Heating; 3:Cooling And Heating)
101000	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Cooling; 2:Heating; 3:Cooling And Heating)
101000	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Cooling; 2:Heating; 3:Cooling And Heating)
101000	8	OBJECT_ANALOG_OUTPUT	SIGNED_INT	20	Time to delay changing operating stage. [min]
101000	9	OBJECT_ANALOG_OUTPUT	DOUBLE	0.8	Limit to increase operating stage.
101000	10	OBJECT_ANALOG_OUTPUT	DOUBLE	0.6	Limit to decrease operating stage.
101000	11	OBJECT_ANALOG_OUTPUT	DOUBLE	12	Limit temperature to increase operating stage (Cooling) for schedule 1.
101000	12	OBJECT_ANALOG_OUTPUT	DOUBLE	12	Limit temperature to increase operating stage (Cooling) for schedule 2.
101000	13	OBJECT_ANALOG_OUTPUT	DOUBLE	12	Limit temperature to increase operating stage (Cooling) for schedule 3.
101000	14	OBJECT_ANALOG_OUTPUT	DOUBLE	12	Limit temperature to increase operating stage (Cooling) for schedule 4.
101000	15	OBJECT_ANALOG_OUTPUT	DOUBLE	35	Limit temperature to increase operating stage (Heatling) for schedule 1.
101000	16	OBJECT_ANALOG_OUTPUT	DOUBLE	35	Limit temperature to increase operating stage (Heatling) for schedule 2.
101000	17	OBJECT_ANALOG_OUTPUT	DOUBLE	35	Limit temperature to increase operating stage (Heatling) for schedule 3.
101000	18	OBJECT_ANALOG_OUTPUT	DOUBLE	35	Limit temperature to increase operating stage (Heatling) for schedule 4.
101000	19	OBJECT_SCHEDULE	SIGNED_INT	3	AHP Operation Stage Schedule 1(0~3)
101000	20	OBJECT_SCHEDULE	SIGNED_INT	3	AHP Operation Stage Schedule 2(0~3)
101000	21	OBJECT_SCHEDULE	SIGNED_INT	3	AHP Operation Stage Schedule 3(0~3)
101000	22	OBJECT_SCHEDULE	SIGNED_INT	3	AHP Operation Stage Schedule 4(0~3)
101000	23	OBJECT_SCHEDULE	SIGNED_INT	2	AR Operation Stage Schedule 1(0~3)
101000	24	OBJECT_SCHEDULE	SIGNED_INT	2	AR Operation Stage Schedule 2(0~3)
101000	25	OBJECT_SCHEDULE	SIGNED_INT	2	AR Operation Stage Schedule 3(0~3)
101000	26	OBJECT_SCHEDULE	SIGNED_INT	2	AR Operation Stage Schedule 4(0~3)
101000	27	OBJECT_SCHEDULE	SIGNED_INT	1	HEX Operation Stage Schedule 1(0~3)
101000	28	OBJECT_SCHEDULE	SIGNED_INT	1	HEX Operation Stage Schedule 2(0~3)
101000	29	OBJECT_SCHEDULE	SIGNED_INT	1	HEX Operation Stage Schedule 3(0~3)
101000	30	OBJECT_SCHEDULE	SIGNED_INT	1	HEX Operation Stage Schedule 4(0~3)
101000	31	OBJECT_SCHEDULE	SIGNED_INT	1	Heat storage Schedule 1(0:Shutoff; 1:Storage)
101000	32	OBJECT_SCHEDULE	SIGNED_INT	1	Heat storage Schedule 2(0:Shutoff; 1:Storage)
101000	33	OBJECT_SCHEDULE	SIGNED_INT	0	Heat storage Schedule 3(0:Shutoff; 1:Storage)
101000	34	OBJECT_SCHEDULE	SIGNED_INT	0	Heat storage Schedule 4(0:Shutoff; 1:Storage)
101000	35	OBJECT_ANALOG_INPUT	DOUBLE	7	Chilled water supply header temperature [C]
101000	36	OBJECT_ANALOG_INPUT	DOUBLE	7	Chilled water return header temperature [C]
101000	37	OBJECT_ANALOG_INPUT	DOUBLE	7	Chilled water return temperature [C]
101000	38	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled water supply flow rate [L/min]
101000	39	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled water supply heat flow [kW]
101000	40	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled water supply-supply header byapss flow rate [L/min]
101000	41	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled water supply-return header byapss flow rate [L/min]
101000	42	OBJECT_ANALOG_INPUT	DOUBLE	7	Hot water supply header temperature [C]
101000	43	OBJECT_ANALOG_INPUT	DOUBLE	7	Hot water return header temperature [C]
101000	44	OBJECT_ANALOG_INPUT	DOUBLE	7	Hot water return temperature [C]
101000	45	OBJECT_ANALOG_INPUT	DOUBLE	0	Hot water supply flow rate [L/min]
101000	46	OBJECT_ANALOG_INPUT	DOUBLE	0	Hot water supply heat flow [kW]
101000	47	OBJECT_ANALOG_INPUT	DOUBLE	0	Hot water supply-supply header byapss flow rate [L/min]
101000	48	OBJECT_ANALOG_INPUT	DOUBLE	0	Hot water supply-return header byapss flow rate [L/min]
101000	49	OBJECT_ANALOG_INPUT	SIGNED_INT	0	Chilled water secondary pump operating number
101000	50	OBJECT_ANALOG_INPUT	SIGNED_INT	0	Hot water secondary pump operating number
101000	51	OBJECT_ANALOG_OUTPUT	SIGNED_INT	0	Current operating mode (0:Shutoff; 1:Cooling; 2:Heating; 3:Cooling And Heating)
101000	52	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is AHP operating or not. (false: Off; true: Operating)
101000	53	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is AR operating or not. (false: Off; true: Operating)
101000	54	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is water storage tank HEX operating or not. (false: Off; true: Operating)
103000	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
103000	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
103000	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
103000	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
103000	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1 (0:Shutoff; 1:Move)
103000	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2 (0:Shutoff; 1:Move)
103000	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3 (0:Shutoff; 1:Move)
103000	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4 (0:Shutoff; 1:Move)
103000	8	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Time to delay changing operating stage. [min]
103000	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Limit to increase operating stage.
103000	10	OBJECT_ANALOG_OUTPUT	DOUBLE	0.8	Limit to decrease operating stage.
103000	11	OBJECT_ANALOG_INPUT	DOUBLE	0	Supply water flow rate [L/min]
103000	12	OBJECT_ANALOG_INPUT	DOUBLE	0	supply-supply header bypass water flow rate [L/min]
103000	13	OBJECT_ANALOG_INPUT	DOUBLE	0	supply-return header bypass water flow rate [L/min]
103000	14	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-1 water flow rate [L/min]
103000	15	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-2 water flow rate [L/min]
103000	16	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-3 water flow rate [L/min]
103000	17	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-4 water flow rate [L/min]
103000	18	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-5 water flow rate [L/min]
103000	19	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-1 water flow rate [L/min]
103000	20	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-2 water flow rate [L/min]
103000	21	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-3 water flow rate [L/min]
103000	22	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-4 water flow rate [L/min]
103000	23	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-1 water flow rate [L/min]
103000	24	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-2 water flow rate [L/min]
103000	25	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-3 water flow rate [L/min]
103000	26	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-4 water flow rate [L/min]
103000	27	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-1 water flow rate [L/min]
103000	28	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-2 water flow rate [L/min]
103000	29	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-3 water flow rate [L/min]
103000	30	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-4 water flow rate [L/min]
103000	31	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-1 water flow rate [L/min]
103000	32	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-2 water flow rate [L/min]
103000	33	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-3 water flow rate [L/min]
103000	34	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-4 water flow rate [L/min]
103000	35	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-1 water flow rate [L/min]
103000	36	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-2 water flow rate [L/min]
103000	37	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-3 water flow rate [L/min]
103000	38	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-4 water flow rate [L/min]
103000	39	OBJECT_SCHEDULE	DOUBLE	0	AHU7-1 water flow rate [L/min]
103000	40	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-2 water flow rate [L/min]
103000	41	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-3 water flow rate [L/min]
103000	42	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-4 water flow rate [L/min]
103000	43	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU1-1 water flow rate [L/min]
103000	44	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU1-2 water flow rate [L/min]
103000	45	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU2-1 water flow rate [L/min]
103000	46	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU2-2 water flow rate [L/min]
103000	47	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU3-1 water flow rate [L/min]
103000	48	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU3-2 water flow rate [L/min]
103000	49	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU4-1 water flow rate [L/min]
103000	50	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU4-2 water flow rate [L/min]
103000	51	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU5-1 water flow rate [L/min]
103000	52	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU5-2 water flow rate [L/min]
103000	53	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU6-1 water flow rate [L/min]
103000	54	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU6-2 water flow rate [L/min]
103000	55	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU7-1 water flow rate [L/min]
103000	56	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU7-2 flow rate [L/min]
103000	57	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-1 valve lift [-]

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
103000	58	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-2 valve lift [-]
103000	59	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-3 valve lift [-]
103000	60	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-4 valve lift [-]
103000	61	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-5 valve lift [-]
103000	62	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-1 valve lift [-]
103000	63	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-2 valve lift [-]
103000	64	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-3 valve lift [-]
103000	65	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-4 valve lift [-]
103000	66	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-1 valve lift [-]
103000	67	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-2 valve lift [-]
103000	68	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-3 valve lift [-]
103000	69	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-4 valve lift [-]
103000	70	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-1 valve lift [-]
103000	71	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-2 valve lift [-]
103000	72	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-3 valve lift [-]
103000	73	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-4 valve lift [-]
103000	74	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-1 valve lift [-]
103000	75	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-2 valve lift [-]
103000	76	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-3 valve lift [-]
103000	77	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-4 valve lift [-]
103000	78	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-1 valve lift [-]
103000	79	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-2 valve lift [-]
103000	80	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-3 valve lift [-]
103000	81	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-4 valve lift [-]
103000	82	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-1 valve lift [-]
103000	83	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-2 valve lift [-]
103000	84	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-3 valve lift [-]
103000	85	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-4 valve lift [-]
103000	86	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Outlet Pressure Setpoint [kPa]
103000	87	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is operating or not
103000	88	OBJECT_ANALOG_OUTPUT	SIGNED_INT	0	Secondary Pump Operating Number
103000	89	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Secondary Pump Rotation Ratio
103000	90	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Supply-Supply header bypass valve Lift
103000	91	OBJECT_ANALOG_OUTPUT	DOUBLE	1545.595054	Coefficient for constant terminal pressure control
103000	92	OBJECT_ANALOG_OUTPUT	DOUBLE	200	Coefficient for constant terminal pressure control
103000	93	OBJECT_ANALOG_OUTPUT	DOUBLE	0.2	Supply-Return header bypass valve Lift
103001	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
103001	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
103001	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
103001	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
103001	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1 (0:Shutoff; 1:Move)
103001	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2 (0:Shutoff; 1:Move)
103001	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3 (0:Shutoff; 1:Move)
103001	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4 (0:Shutoff; 1:Move)
103001	8	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Time to delay changing operating stage. [min]
103001	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Limit to increase operating stage.
103001	10	OBJECT_ANALOG_OUTPUT	DOUBLE	0.8	Limit to decrease operating stage.
103001	11	OBJECT_ANALOG_INPUT	DOUBLE	0	Supply water flow rate [L/min]
103001	12	OBJECT_ANALOG_INPUT	DOUBLE	0	supply-supply header bypass water flow rate [L/min]
103001	13	OBJECT_ANALOG_INPUT	DOUBLE	0	supply-return header bypass water flow rate [L/min]
103001	14	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-1 water flow rate [L/min]
103001	15	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-2 water flow rate [L/min]
103001	16	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-3 water flow rate [L/min]
103001	17	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-4 water flow rate [L/min]
103001	18	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-5 water flow rate [L/min]
103001	19	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-1 water flow rate [L/min]
103001	20	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-2 water flow rate [L/min]
103001	21	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-3 water flow rate [L/min]
103001	22	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-4 water flow rate [L/min]
103001	23	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-1 water flow rate [L/min]
103001	24	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-2 water flow rate [L/min]
103001	25	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-3 water flow rate [L/min]
103001	26	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-4 water flow rate [L/min]
103001	27	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-1 water flow rate [L/min]
103001	28	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-2 water flow rate [L/min]
103001	29	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-3 water flow rate [L/min]
103001	30	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-4 water flow rate [L/min]
103001	31	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-1 water flow rate [L/min]
103001	32	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-2 water flow rate [L/min]
103001	33	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-3 water flow rate [L/min]
103001	34	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-4 water flow rate [L/min]
103001	35	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-1 water flow rate [L/min]
103001	36	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-2 water flow rate [L/min]
103001	37	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-3 water flow rate [L/min]
103001	38	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-4 water flow rate [L/min]
103001	39	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-1 water flow rate [L/min]
103001	40	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-2 water flow rate [L/min]
103001	41	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-3 water flow rate [L/min]
103001	42	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-4 water flow rate [L/min]

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
103001	43	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU1-1 water flow rate [L/min]
103001	44	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU1-2 water flow rate [L/min]
103001	45	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU2-1 water flow rate [L/min]
103001	46	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU2-2 water flow rate [L/min]
103001	47	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU3-1 water flow rate [L/min]
103001	48	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU3-2 water flow rate [L/min]
103001	49	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU4-1 water flow rate [L/min]
103001	50	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU4-2 water flow rate [L/min]
103001	51	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU5-1 water flow rate [L/min]
103001	52	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU5-2 water flow rate [L/min]
103001	53	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU6-1 water flow rate [L/min]
103001	54	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU6-2 water flow rate [L/min]
103001	55	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU7-1 water flow rate [L/min]
103001	56	OBJECT_ANALOG_INPUT	DOUBLE	0	FCU7-2 flow rate [L/min]
103001	57	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-1 valve lift [-]
103001	58	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-2 valve lift [-]
103001	59	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-3 valve lift [-]
103001	60	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-4 valve lift [-]
103001	61	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU1-5 valve lift [-]
103001	62	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-1 valve lift [-]
103001	63	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-2 valve lift [-]
103001	64	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-3 valve lift [-]
103001	65	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU2-4 valve lift [-]
103001	66	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-1 valve lift [-]
103001	67	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-2 valve lift [-]
103001	68	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-3 valve lift [-]
103001	69	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU3-4 valve lift [-]
103001	70	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-1 valve lift [-]
103001	71	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-2 valve lift [-]
103001	72	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-3 valve lift [-]
103001	73	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU4-4 valve lift [-]
103001	74	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-1 valve lift [-]
103001	75	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-2 valve lift [-]
103001	76	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-3 valve lift [-]
103001	77	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU5-4 valve lift [-]
103001	78	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-1 valve lift [-]
103001	79	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-2 valve lift [-]
103001	80	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-3 valve lift [-]
103001	81	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU6-4 valve lift [-]
103001	82	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-1 valve lift [-]
103001	83	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-2 valve lift [-]
103001	84	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-3 valve lift [-]
103001	85	OBJECT_ANALOG_INPUT	DOUBLE	0	AHU7-4 valve lift [-]
103001	86	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Outlet Pressure Setpoint [kPa]
103001	87	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is operating or not
103001	88	OBJECT_ANALOG_OUTPUT	SIGNED_INT	0	Secondary Pump Operating Number
103001	89	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Secondary Pump Rotation Ratio
103001	90	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Supply-Supply header bypass valve Lift
103001	91	OBJECT_ANALOG_OUTPUT	DOUBLE	2386.634845	Coefficient for constant terminal pressure control
103001	92	OBJECT_ANALOG_OUTPUT	DOUBLE	200	Coefficient for constant terminal pressure control
103001	93	OBJECT_ANALOG_OUTPUT	DOUBLE	0.2	Supply-Return header bypass valve Lift
101100	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
101100	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
101100	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
101100	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
101100	4	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is cooling mode or not. (season 1)
101100	5	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 2)
101100	6	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 3)
101100	7	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 4)
101100	8	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 1 [C]
101100	9	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 2 [C]
101100	10	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 3 [C]
101100	11	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 4 [C]
101100	12	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 1 [C]
101100	13	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 2 [C]
101100	14	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 3 [C]
101100	15	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 4 [C]
101100	16	OBJECT_ANALOG_OUTPUT	DOUBLE	5	Charging chilled water outlet setpoint temperature for season 1 [C]
101100	17	OBJECT_ANALOG_OUTPUT	DOUBLE	5	Charging chilled water outlet setpoint temperature for season 2 [C]
101100	18	OBJECT_ANALOG_OUTPUT	DOUBLE	5	Charging chilled water outlet setpoint temperature for season 3 [C]
101100	19	OBJECT_ANALOG_OUTPUT	DOUBLE	5	Charging chilled water outlet setpoint temperature for season 4 [C]
101100	20	OBJECT_ANALOG_OUTPUT	DOUBLE	46	Charging hot water outlet setpoint temperature for season 1 [C]
101100	21	OBJECT_ANALOG_OUTPUT	DOUBLE	46	Charging hot water outlet setpoint temperature for season 2 [C]
101100	22	OBJECT_ANALOG_OUTPUT	DOUBLE	46	Charging hot water outlet setpoint temperature for season 3 [C]
101100	23	OBJECT_ANALOG_OUTPUT	DOUBLE	46	Charging hot water outlet setpoint temperature for season 4 [C]
101100	24	OBJECT_ANALOG_INPUT	SIGNED_INT	0	Operating number
101100	25	OBJECT_ANALOG_INPUT	DOUBLE	20	Chilled and hot water outlet temperature [C]
101100	26	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled and hot water flow rate [L/min]
101100	27	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled and hot water heat flow [kW]

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
101100	28	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled and hot water pump electricity [kW]
101100	29	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is cooling mode or not.
101100	30	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature [C]
101100	31	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature [C]
101100	32	OBJECT_ANALOG_OUTPUT	DOUBLE	5	Charging chilled water outlet setpoint temperature [C]
101100	33	OBJECT_ANALOG_OUTPUT	DOUBLE	46	Charging hot water outlet setpoint temperature [C]
101200	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
101200	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
101200	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
101200	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
101200	4	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is cooling mode or not. (season 1)
101200	5	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 2)
101200	6	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 3)
101200	7	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 4)
101200	8	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 1 [C]
101200	9	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 2 [C]
101200	10	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 3 [C]
101200	11	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature for season 4 [C]
101200	12	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 1 [C]
101200	13	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 2 [C]
101200	14	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 3 [C]
101200	15	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature for season 4 [C]
101200	16	OBJECT_ANALOG_OUTPUT	DOUBLE	32	Cooling water outlet setpoint temperature for season 1 [C]
101200	17	OBJECT_ANALOG_OUTPUT	DOUBLE	32	Cooling water outlet setpoint temperature for season 2 [C]
101200	18	OBJECT_ANALOG_OUTPUT	DOUBLE	32	Cooling water outlet setpoint temperature for season 3 [C]
101200	19	OBJECT_ANALOG_OUTPUT	DOUBLE	32	Cooling water outlet setpoint temperature for season 4 [C]
101200	20	OBJECT_ANALOG_OUTPUT	DOUBLE	2	Temperature difference of cooling tower On/Off control [C]
101200	21	OBJECT_ANALOG_OUTPUT	DOUBLE	32	Current cooling water outlet setpoint temperature [C]
101200	22	OBJECT_ANALOG_INPUT	DOUBLE	32	Cooling water inlet temperature [C]
101200	23	OBJECT_ANALOG_INPUT	DOUBLE	37	Cooling water outlet temperature [C]
101200	24	OBJECT_ANALOG_INPUT	DOUBLE	0	Cooling water flow rate [L/min]
101200	25	OBJECT_ANALOG_INPUT	DOUBLE	20	Chilled and hot water outlet temperature [C]
101200	26	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled and hot water flow rate [L/min]
101200	27	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled and hot water heat flow [kW]
101200	28	OBJECT_ANALOG_INPUT	DOUBLE	0	Absorption chiller and cooling water pump electricity [kW]
101200	29	OBJECT_ANALOG_INPUT	DOUBLE	0	Cooling tower and makeup pump electricity [kW]
101200	30	OBJECT_ANALOG_INPUT	DOUBLE	0	Chilled and hot water pump electricity [kW]
101200	31	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not.
101200	32	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Chilled water outlet setpoint temperature [C]
101200	33	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Hot water outlet setpoint temperature [C]
102000	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
102000	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
102000	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
102000	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
102000	4	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is cooling mode or not. (season 1)
102000	5	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 2)
102000	6	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 3)
102000	7	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Is cooling mode or not. (season 4)
102000	8	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Supply hex outlet water setpoint temperature for season 1 [C]
102000	9	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Supply hex outlet water setpoint temperature for season 2 [C]
102000	10	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Supply hex outlet water setpoint temperature for season 3 [C]
102000	11	OBJECT_ANALOG_OUTPUT	DOUBLE	7	Supply hex outlet water setpoint temperature for season 4 [C]
102000	12	OBJECT_ANALOG_OUTPUT	DOUBLE	45	Water tank setpoint temperature for season 1 [C]
102000	13	OBJECT_ANALOG_OUTPUT	DOUBLE	6	Water tank setpoint temperature for season 2 [C]
102000	14	OBJECT_ANALOG_OUTPUT	DOUBLE	6	Water tank setpoint temperature for season 3 [C]
102000	15	OBJECT_ANALOG_OUTPUT	DOUBLE	6	Water tank setpoint temperature for season 4 [C]
102000	16	OBJECT_ANALOG_OUTPUT	DOUBLE	0.5	Proporional gain of supply temperature control PID
102000	17	OBJECT_ANALOG_OUTPUT	DOUBLE	600	Integral time of supply temperature control PID [sec]
102000	18	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time of supply temperature control PID [sec]
102000	19	OBJECT_ANALOG_OUTPUT	DOUBLE	0.5	Proporional gain of supply temperature control PID
102000	20	OBJECT_ANALOG_OUTPUT	DOUBLE	600	Integral time of supply temperature control PID [sec]
102000	21	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time of supply temperature control PID [sec]
102000	22	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 1 [C]
102000	23	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 2 [C]
102000	24	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 3 [C]
102000	25	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 4 [C]
102000	26	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 5 [C]
102000	27	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 6 [C]
102000	28	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 7 [C]
102000	29	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 8 [C]
102000	30	OBJECT_ANALOG_INPUT	DOUBLE	20	Water tank temperature 9 [C]
102000	31	OBJECT_ANALOG_INPUT	DOUBLE	20	Heat charging HEX inlet temperature [C]
102000	32	OBJECT_ANALOG_INPUT	DOUBLE	20	Heat charging HEX outlet temperature [C]
102000	33	OBJECT_ANALOG_INPUT	DOUBLE	20	Heat supply HEX inlet temperature [C]
102000	34	OBJECT_ANALOG_INPUT	DOUBLE	20	Heat supply HEX outlet temperature [C]
102000	35	OBJECT_ANALOG_INPUT	DOUBLE	0	Heat charging HEX water flow rate [L/min]
102000	36	OBJECT_ANALOG_INPUT	DOUBLE	0	Heat supply HEX water flow rate [L/min]
102000	37	OBJECT_ANALOG_INPUT	DOUBLE	0	Heat charging HEX heat flow [kw]
102000	38	OBJECT_ANALOG_INPUT	DOUBLE	0	Heat supply HEX heat flow [kw]
102000	39	OBJECT_ANALOG_INPUT	DOUBLE	0	Supply temperature [C]
102000	40	OBJECT_ANALOG_INPUT	DOUBLE	0	Supply water flow rate [L/min]
102000	41	OBJECT_ANALOG_INPUT	DOUBLE	0	Supply water heat flow [kW]
102000	42	OBJECT_ANALOG_INPUT	DOUBLE	0	Heat charged in water tank [MJ]
102000	43	OBJECT_ANALOG_INPUT	DOUBLE	0	Electricity of primary pump [kW]
102000	44	OBJECT_ANALOG_INPUT	DOUBLE	0	Electricity of secondary pump [kW]
102000	45	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Is cooling mode or not.
102000	46	OBJECT_ANALOG_OUTPUT	DOUBLE	44	Supply hex outlet water setpoint temperature [C]
102000	47	OBJECT_ANALOG_OUTPUT	DOUBLE	45	Water tank setpoint temperature [C]
104101	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
104101	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
104101	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
104101	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
104101	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104101	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104101	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104101	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104101	8	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Load reset control is enabled or not
104101	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of OA Damper [-]
104101	10	OBJECT_ANALOG_OUTPUT	DOUBLE	30	Outdoor air-cutting minutes during precooling or preheating [min]
104101	11	OBJECT_SCHEDULE	DOUBLE	28.5	Setpoint of Supply Air Drybulb Temperature[C] for season 1
104101	12	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 2
104101	13	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 3
104101	14	OBJECT_SCHEDULE	DOUBLE	26.5	Setpoint of Supply Air Drybulb Temperature[C] for season 4
104101	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.05	Proportial gain for supply air temperature control
104101	16	OBJECT_ANALOG_OUTPUT	DOUBLE	1680	Integral time for supply air temperature control
104101	17	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time for supply air temperature control
104101	18	OBJECT_ANALOG_OUTPUT	DOUBLE	40	SetPoint of Return Air Relative Humidity[%]
104101	19	OBJECT_ANALOG_OUTPUT	DOUBLE	10	On/Off band of Relative Humidity control[%]
104101	20	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 1 Drybulb Temperature[C] for season 1
104101	21	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 1 Drybulb Temperature[C] for season 2
104101	22	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 3
104101	23	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 4
104101	24	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 2 Drybulb Temperature[C] for season 1
104101	25	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 2 Drybulb Temperature[C] for season 2
104101	26	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 3
104101	27	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 4
104101	28	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 3 Drybulb Temperature[C] for season 1
104101	29	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 3 Drybulb Temperature[C] for season 2
104101	30	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 3
104101	31	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 4
104101	32	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 4 Drybulb Temperature[C] for season 1
104101	33	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 4 Drybulb Temperature[C] for season 2
104101	34	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 3
104101	35	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 4
104101	36	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 5 Drybulb Temperature[C] for season 1
104101	37	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 5 Drybulb Temperature[C] for season 2
104101	38	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 3
104101	39	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 4
104101	40	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 6 Drybulb Temperature[C] for season 1
104101	41	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 6 Drybulb Temperature[C] for season 2
104101	42	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 3
104101	43	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 4
104101	44	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 1 VAV PID Control
104101	45	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 2 VAV PID Control
104101	46	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 3 VAV PID Control
104101	47	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 4 VAV PID Control
104101	48	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 5 VAV PID Control
104101	49	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 6 VAV PID Control
104101	50	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 1 VAV PID Control
104101	51	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 2 VAV PID Control
104101	52	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 3 VAV PID Control
104101	53	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 4 VAV PID Control
104101	54	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 5 VAV PID Control
104101	55	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 6 VAV PID Control
104101	56	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 1 VAV PID Control
104101	57	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 2 VAV PID Control
104101	58	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 3 VAV PID Control
104101	59	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 4 VAV PID Control
104101	60	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 5 VAV PID Control
104101	61	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 6 VAV PID Control
104101	62	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Drybulb Temperature[C]
104101	63	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Drybulb Temperature[C]
104101	64	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Drybulb Temperature[C]
104101	65	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Drybulb Temperature[C]
104101	66	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Drybulb Temperature[C]
104101	67	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Drybulb Temperature[C]
104101	68	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 1 Relative Humidity[%]
104101	69	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 2 Relative Humidity[%]

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
104101	70	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 3 Relative Humidity[%]
104101	71	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 4 Relative Humidity[%]
104101	72	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 5 Relative Humidity[%]
104101	73	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 6 Relative Humidity[%]
104101	74	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C]
104101	75	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C]
104101	76	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C]
104101	77	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C]
104101	78	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C]
104101	79	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C]
104101	80	OBJECT_ANALOG_INPUT	DOUBLE	0.5	Rotation ratio of Supply and Return Fan[-]
104101	81	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Drybulb Temperature[C]
104101	82	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Relative Humidity[%]
104101	83	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Drybulb Temperature[C]
104101	84	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Relative Humidity[%]
104101	85	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Supply Air Drybulb Temperature Setpoint[C]
104101	86	OBJECT_ANALOG_INPUT	DOUBLE	400	CO2 level [ppm]
104101	87	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Valve lift[-]
104101	88	OBJECT_BINARY_INPUT	ENUMERATED	0	Is AHU Operating or not.
104101	89	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 1 VAV
104101	90	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 2 VAV
104101	91	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 3 VAV
104101	92	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 4 VAV
104101	93	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 5 VAV
104101	94	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 6 VAV
104101	95	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Radiative Temperature[C]
104101	96	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Radiative Temperature[C]
104101	97	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Radiative Temperature[C]
104101	98	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Radiative Temperature[C]
104101	99	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Radiative Temperature[C]
104101	100	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Radiative Temperature[C]
104101	101	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Bypass total heat exchanger or not.
104102	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
104102	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
104102	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
104102	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
104102	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104102	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104102	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104102	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104102	8	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Load reset control is enabled or not
104102	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of OA Damper [-]
104102	10	OBJECT_ANALOG_OUTPUT	DOUBLE	30	Outdoor air-cutting minutes during precooling or preheating [min]
104102	11	OBJECT_SCHEDULE	DOUBLE	22.5	Setpoint of Supply Air Drybulb Temperature[C] for season 1
104102	12	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 2
104102	13	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 3
104102	14	OBJECT_SCHEDULE	DOUBLE	26.5	Setpoint of Supply Air Drybulb Temperature[C] for season 4
104102	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.05	Proportinal gain for supply air temperature control
104102	16	OBJECT_ANALOG_OUTPUT	DOUBLE	1680	Integral time for supply air temperature control
104102	17	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time for supply air temperature control
104102	18	OBJECT_ANALOG_OUTPUT	DOUBLE	40	SetPoint of Return Air Relative Humidity[%]
104102	19	OBJECT_ANALOG_OUTPUT	DOUBLE	10	On/Off band of Relative Humidity control[%]
104102	20	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 1 Drybulb Temperature[C] for season 1
104102	21	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 1 Drybulb Temperature[C] for season 2
104102	22	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 3
104102	23	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 4
104102	24	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 2 Drybulb Temperature[C] for season 1
104102	25	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 2 Drybulb Temperature[C] for season 2
104102	26	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 3
104102	27	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 4
104102	28	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 3 Drybulb Temperature[C] for season 1
104102	29	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 3 Drybulb Temperature[C] for season 2
104102	30	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 3
104102	31	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 4
104102	32	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 4 Drybulb Temperature[C] for season 1
104102	33	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 4 Drybulb Temperature[C] for season 2
104102	34	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 3
104102	35	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 4
104102	36	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 5 Drybulb Temperature[C] for season 1
104102	37	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 5 Drybulb Temperature[C] for season 2
104102	38	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 3
104102	39	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 4
104102	40	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 6 Drybulb Temperature[C] for season 1
104102	41	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 6 Drybulb Temperature[C] for season 2
104102	42	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 3
104102	43	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 4
104102	44	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 1 VAV PID Control
104102	45	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 2 VAV PID Control
104102	46	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 3 VAV PID Control

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
104102	47	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 4 VAV PID Control
104102	48	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 5 VAV PID Control
104102	49	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 6 VAV PID Control
104102	50	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 1 VAV PID Control
104102	51	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 2 VAV PID Control
104102	52	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 3 VAV PID Control
104102	53	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 4 VAV PID Control
104102	54	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 5 VAV PID Control
104102	55	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 6 VAV PID Control
104102	56	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 1 VAV PID Control
104102	57	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 2 VAV PID Control
104102	58	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 3 VAV PID Control
104102	59	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 4 VAV PID Control
104102	60	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 5 VAV PID Control
104102	61	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 6 VAV PID Control
104102	62	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Drybulb Temperature[C]
104102	63	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Drybulb Temperature[C]
104102	64	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Drybulb Temperature[C]
104102	65	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Drybulb Temperature[C]
104102	66	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Drybulb Temperature[C]
104102	67	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Drybulb Temperature[C]
104102	68	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 1 Relative Humidity[%]
104102	69	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 2 Relative Humidity[%]
104102	70	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 3 Relative Humidity[%]
104102	71	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 4 Relative Humidity[%]
104102	72	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 5 Relative Humidity[%]
104102	73	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 6 Relative Humidity[%]
104102	74	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C]
104102	75	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C]
104102	76	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C]
104102	77	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C]
104102	78	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C]
104102	79	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C]
104102	80	OBJECT_ANALOG_INPUT	DOUBLE	0.5	Rotation ratio of Supply and Return Fan[-]
104102	81	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Drybulb Temperature[C]
104102	82	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Relative Humidity[%]
104102	83	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Drybulb Temperature[C]
104102	84	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Relative Humidity[%]
104102	85	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Supply Air Drybulb Temperature Setpoint[C]
104102	86	OBJECT_ANALOG_INPUT	DOUBLE	400	CO2 level [ppm]
104102	87	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Valve lift[-]
104102	88	OBJECT_BINARY_INPUT	ENUMERATED	0	Is AHU Operating or not.
104102	89	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 1 VAV
104102	90	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 2 VAV
104102	91	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 3 VAV
104102	92	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 4 VAV
104102	93	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 5 VAV
104102	94	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 6 VAV
104102	95	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Radiative Temperature[C]
104102	96	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Radiative Temperature[C]
104102	97	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Radiative Temperature[C]
104102	98	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Radiative Temperature[C]
104102	99	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Radiative Temperature[C]
104102	100	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Radiative Temperature[C]
104102	101	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Bypass total heat exchanger or not.
104103	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
104103	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
104103	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
104103	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
104103	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104103	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104103	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104103	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104103	8	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Load reset control is enabled or not
104103	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of OA Damper [-]
104103	10	OBJECT_ANALOG_OUTPUT	DOUBLE	30	Outdoor air-cutting minutes during precooling or preheating [min]
104103	11	OBJECT_SCHEDULE	DOUBLE	28.5	Setpoint of Supply Air Drybulb Temperature[C] for season 1
104103	12	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 2
104103	13	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 3
104103	14	OBJECT_SCHEDULE	DOUBLE	26.5	Setpoint of Supply Air Drybulb Temperature[C] for season 4
104103	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.05	Proportinal gain for supply air temperature control
104103	16	OBJECT_ANALOG_OUTPUT	DOUBLE	1680	Integral time for supply air temperature control
104103	17	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time for supply air temperature control
104103	18	OBJECT_ANALOG_OUTPUT	DOUBLE	40	SetPoint of Return Air Relative Humidity[%]
104103	19	OBJECT_ANALOG_OUTPUT	DOUBLE	10	On/Off band of Relative Humidity control[%]
104103	20	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 1 Drybulb Temperature[C] for season 1
104103	21	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 1 Drybulb Temperature[C] for season 2
104103	22	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 3
104103	23	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 4

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
104103	24	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 2 Drybulb Temperature[C] for season 1
104103	25	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 2 Drybulb Temperature[C] for season 2
104103	26	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 3
104103	27	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 4
104103	28	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 3 Drybulb Temperature[C] for season 1
104103	29	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 3 Drybulb Temperature[C] for season 2
104103	30	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 3
104103	31	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 4
104103	32	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 4 Drybulb Temperature[C] for season 1
104103	33	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 4 Drybulb Temperature[C] for season 2
104103	34	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 3
104103	35	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 4
104103	36	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 5 Drybulb Temperature[C] for season 1
104103	37	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 5 Drybulb Temperature[C] for season 2
104103	38	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 3
104103	39	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 4
104103	40	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 6 Drybulb Temperature[C] for season 1
104103	41	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 6 Drybulb Temperature[C] for season 2
104103	42	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 3
104103	43	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 4
104103	44	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 1 VAV PID Control
104103	45	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 2 VAV PID Control
104103	46	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 3 VAV PID Control
104103	47	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 4 VAV PID Control
104103	48	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 5 VAV PID Control
104103	49	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 6 VAV PID Control
104103	50	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 1 VAV PID Control
104103	51	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 2 VAV PID Control
104103	52	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 3 VAV PID Control
104103	53	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 4 VAV PID Control
104103	54	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 5 VAV PID Control
104103	55	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 6 VAV PID Control
104103	56	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 1 VAV PID Control
104103	57	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 2 VAV PID Control
104103	58	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 3 VAV PID Control
104103	59	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 4 VAV PID Control
104103	60	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 5 VAV PID Control
104103	61	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 6 VAV PID Control
104103	62	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Drybulb Temperature[C]
104103	63	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Drybulb Temperature[C]
104103	64	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Drybulb Temperature[C]
104103	65	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Drybulb Temperature[C]
104103	66	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Drybulb Temperature[C]
104103	67	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Drybulb Temperature[C]
104103	68	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 1 Relative Humidity[%]
104103	69	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 2 Relative Humidity[%]
104103	70	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 3 Relative Humidity[%]
104103	71	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 4 Relative Humidity[%]
104103	72	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 5 Relative Humidity[%]
104103	73	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 6 Relative Humidity[%]
104103	74	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C]
104103	75	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C]
104103	76	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C]
104103	77	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C]
104103	78	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C]
104103	79	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C]
104103	80	OBJECT_ANALOG_INPUT	DOUBLE	0.5	Rotation ratio of Supply and Return Fan[-]
104103	81	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Drybulb Temperature[C]
104103	82	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Relative Humidity[%]
104103	83	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Drybulb Temperature[C]
104103	84	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Relative Humidity[%]
104103	85	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Supply Air Drybulb Temperature Setpoint[C]
104103	86	OBJECT_ANALOG_INPUT	DOUBLE	400	CO2 level [ppm]
104103	87	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Valve lift[-]
104103	88	OBJECT_BINARY_INPUT	ENUMERATED	0	Is AHU Operating or not.
104103	89	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 1 VAV
104103	90	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 2 VAV
104103	91	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 3 VAV
104103	92	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 4 VAV
104103	93	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 5 VAV
104103	94	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 6 VAV
104103	95	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Radiative Temperature[C]
104103	96	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Radiative Temperature[C]
104103	97	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Radiative Temperature[C]
104103	98	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Radiative Temperature[C]
104103	99	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Radiative Temperature[C]
104103	100	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Radiative Temperature[C]
104103	101	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Bypass total heat exchanger or not.
104104	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
104104	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
104104	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
104104	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
104104	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104104	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104104	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104104	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104104	8	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Load reset control is enabled or not
104104	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of OA Damper [-]
104104	10	OBJECT_ANALOG_OUTPUT	DOUBLE	30	Outdoor air-cutting minutes during precooling or preheating [min]
104104	11	OBJECT_SCHEDULE	DOUBLE	22.5	Setpoint of Supply Air Drybulb Temperature[C] for season 1
104104	12	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 2
104104	13	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 3
104104	14	OBJECT_SCHEDULE	DOUBLE	26.5	Setpoint of Supply Air Drybulb Temperature[C] for season 4
104104	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.05	Proportional gain for supply air temperature control
104104	16	OBJECT_ANALOG_OUTPUT	DOUBLE	1680	Integral time for supply air temperature control
104104	17	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time for supply air temperature control
104104	18	OBJECT_ANALOG_OUTPUT	DOUBLE	40	SetPoint of Return Air Relative Humidity[%]
104104	19	OBJECT_ANALOG_OUTPUT	DOUBLE	10	On/Off band of Relative Humidity control[%]
104104	20	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 1 Drybulb Temperature[C] for season 1
104104	21	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 1 Drybulb Temperature[C] for season 2
104104	22	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 3
104104	23	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 4
104104	24	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 2 Drybulb Temperature[C] for season 1
104104	25	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 2 Drybulb Temperature[C] for season 2
104104	26	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 3
104104	27	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 4
104104	28	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 3 Drybulb Temperature[C] for season 1
104104	29	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 3 Drybulb Temperature[C] for season 2
104104	30	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 3
104104	31	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 4
104104	32	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 4 Drybulb Temperature[C] for season 1
104104	33	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 4 Drybulb Temperature[C] for season 2
104104	34	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 3
104104	35	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 4
104104	36	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 5 Drybulb Temperature[C] for season 1
104104	37	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 5 Drybulb Temperature[C] for season 2
104104	38	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 3
104104	39	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 4
104104	40	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 6 Drybulb Temperature[C] for season 1
104104	41	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 6 Drybulb Temperature[C] for season 2
104104	42	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 3
104104	43	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 4
104104	44	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 1 VAV PID Control
104104	45	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 2 VAV PID Control
104104	46	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 3 VAV PID Control
104104	47	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 4 VAV PID Control
104104	48	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 5 VAV PID Control
104104	49	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 6 VAV PID Control
104104	50	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 1 VAV PID Control
104104	51	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 2 VAV PID Control
104104	52	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 3 VAV PID Control
104104	53	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 4 VAV PID Control
104104	54	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 5 VAV PID Control
104104	55	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 6 VAV PID Control
104104	56	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 1 VAV PID Control
104104	57	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 2 VAV PID Control
104104	58	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 3 VAV PID Control
104104	59	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 4 VAV PID Control
104104	60	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 5 VAV PID Control
104104	61	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 6 VAV PID Control
104104	62	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Drybulb Temperature[C]
104104	63	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Drybulb Temperature[C]
104104	64	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Drybulb Temperature[C]
104104	65	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Drybulb Temperature[C]
104104	66	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Drybulb Temperature[C]
104104	67	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Drybulb Temperature[C]
104104	68	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 1 Relative Humidity[%]
104104	69	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 2 Relative Humidity[%]
104104	70	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 3 Relative Humidity[%]
104104	71	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 4 Relative Humidity[%]
104104	72	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 5 Relative Humidity[%]
104104	73	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 6 Relative Humidity[%]
104104	74	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C]
104104	75	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C]
104104	76	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C]
104104	77	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C]
104104	78	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C]
104104	79	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C]

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
104104	80	OBJECT_ANALOG_INPUT	DOUBLE	0.5	Rotation ratio of Supply and Return Fan[-]
104104	81	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Drybulb Temperature[C]
104104	82	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Relative Humidity[%]
104104	83	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Drybulb Temperature[C]
104104	84	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Relative Humidity[%]
104104	85	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Supply Air Drybulb Temperature Setpoint[C]
104104	86	OBJECT_ANALOG_INPUT	DOUBLE	400	CO2 level [ppm]
104104	87	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Valve lift[-]
104104	88	OBJECT_BINARY_INPUT	ENUMERATED	0	Is AHU Operating or not.
104104	89	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 1 VAV
104104	90	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 2 VAV
104104	91	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 3 VAV
104104	92	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 4 VAV
104104	93	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 5 VAV
104104	94	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 6 VAV
104104	95	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Radiative Temperature[C]
104104	96	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Radiative Temperature[C]
104104	97	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Radiative Temperature[C]
104104	98	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Radiative Temperature[C]
104104	99	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Radiative Temperature[C]
104104	100	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Radiative Temperature[C]
104104	101	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Bypass total heat exchanger or not.
104105	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
104105	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
104105	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
104105	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
104105	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104105	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104105	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104105	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Ventilation; 2:Cooling; 3:Heating)
104105	8	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Load reset control is enabled or not
104105	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of OA Damper [-]
104105	10	OBJECT_ANALOG_OUTPUT	DOUBLE	30	Outdoor air-cutting minutes during precooling or preheating [min]
104105	11	OBJECT_SCHEDULE	DOUBLE	28.5	Setpoint of Supply Air Drybulb Temperature[C] for season 1
104105	12	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 2
104105	13	OBJECT_SCHEDULE	DOUBLE	16.5	Setpoint of Supply Air Drybulb Temperature[C] for season 3
104105	14	OBJECT_SCHEDULE	DOUBLE	26.5	Setpoint of Supply Air Drybulb Temperature[C] for season 4
104105	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.05	Proportial gain for supply air temperature control
104105	16	OBJECT_ANALOG_OUTPUT	DOUBLE	1680	Integral time for supply air temperature control
104105	17	OBJECT_ANALOG_OUTPUT	DOUBLE	0	Derivative time for supply air temperature control
104105	18	OBJECT_ANALOG_OUTPUT	DOUBLE	40	SetPoint of Return Air Relative Humidity[%]
104105	19	OBJECT_ANALOG_OUTPUT	DOUBLE	10	On/Off band of Relative Humidity control[%]
104105	20	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 1 Drybulb Temperature[C] for season 1
104105	21	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 1 Drybulb Temperature[C] for season 2
104105	22	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 3
104105	23	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C] for season 4
104105	24	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 2 Drybulb Temperature[C] for season 1
104105	25	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 2 Drybulb Temperature[C] for season 2
104105	26	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 3
104105	27	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C] for season 4
104105	28	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 3 Drybulb Temperature[C] for season 1
104105	29	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 3 Drybulb Temperature[C] for season 2
104105	30	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 3
104105	31	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C] for season 4
104105	32	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 4 Drybulb Temperature[C] for season 1
104105	33	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 4 Drybulb Temperature[C] for season 2
104105	34	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 3
104105	35	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C] for season 4
104105	36	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 5 Drybulb Temperature[C] for season 1
104105	37	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 5 Drybulb Temperature[C] for season 2
104105	38	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 3
104105	39	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C] for season 4
104105	40	OBJECT_ANALOG_OUTPUT	DOUBLE	23	Setpoint of Zone 6 Drybulb Temperature[C] for season 1
104105	41	OBJECT_ANALOG_OUTPUT	DOUBLE	25	Setpoint of Zone 6 Drybulb Temperature[C] for season 2
104105	42	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 3
104105	43	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C] for season 4
104105	44	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 1 VAV PID Control
104105	45	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 2 VAV PID Control
104105	46	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 3 VAV PID Control
104105	47	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 4 VAV PID Control
104105	48	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 5 VAV PID Control
104105	49	OBJECT_ANALOG_OUTPUT	DOUBLE	0.3	P value of Zone 6 VAV PID Control
104105	50	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 1 VAV PID Control
104105	51	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 2 VAV PID Control
104105	52	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 3 VAV PID Control
104105	53	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 4 VAV PID Control
104105	54	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 5 VAV PID Control
104105	55	OBJECT_ANALOG_OUTPUT	DOUBLE	4140	I value of Zone 6 VAV PID Control
104105	56	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 1 VAV PID Control
104105	57	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 2 VAV PID Control
104105	58	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 3 VAV PID Control
104105	59	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 4 VAV PID Control
104105	60	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 5 VAV PID Control
104105	61	OBJECT_ANALOG_OUTPUT	DOUBLE	0	D Value of Zone 6 VAV PID Control
104105	62	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Drybulb Temperature[C]
104105	63	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Drybulb Temperature[C]
104105	64	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Drybulb Temperature[C]
104105	65	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Drybulb Temperature[C]
104105	66	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Drybulb Temperature[C]
104105	67	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Drybulb Temperature[C]
104105	68	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 1 Relative Humidity[%]
104105	69	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 2 Relative Humidity[%]
104105	70	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 3 Relative Humidity[%]
104105	71	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 4 Relative Humidity[%]
104105	72	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 5 Relative Humidity[%]
104105	73	OBJECT_ANALOG_INPUT	DOUBLE	50	Zone 6 Relative Humidity[%]
104105	74	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 1 Drybulb Temperature[C]
104105	75	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 2 Drybulb Temperature[C]
104105	76	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 3 Drybulb Temperature[C]
104105	77	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 4 Drybulb Temperature[C]
104105	78	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 5 Drybulb Temperature[C]
104105	79	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of Zone 6 Drybulb Temperature[C]
104105	80	OBJECT_ANALOG_INPUT	DOUBLE	0.5	Rotation ratio of Supply and Return Fan[-]
104105	81	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Drybulb Temperature[C]
104105	82	OBJECT_ANALOG_INPUT	DOUBLE	24	Return Air Relative Humidity[%]
104105	83	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Drybulb Temperature[C]
104105	84	OBJECT_ANALOG_INPUT	DOUBLE	24	Supply Air Relative Humidity[%]
104105	85	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Supply Air Drybulb Temperature Setpoint[C]
104105	86	OBJECT_ANALOG_INPUT	DOUBLE	400	CO2 level [ppm]
104105	87	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Valve lift[-]
104105	88	OBJECT_BINARY_INPUT	ENUMERATED	0	Is AHU Operating or not.
104105	89	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 1 VAV
104105	90	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 2 VAV
104105	91	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 3 VAV
104105	92	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 4 VAV
104105	93	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 5 VAV
104105	94	OBJECT_ANALOG_OUTPUT	DOUBLE	1	Opening rate of Zone 6 VAV
104105	95	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 1 Radiative Temperature[C]
104105	96	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 2 Radiative Temperature[C]
104105	97	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 3 Radiative Temperature[C]
104105	98	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 4 Radiative Temperature[C]
104105	99	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 5 Radiative Temperature[C]
104105	100	OBJECT_ANALOG_INPUT	DOUBLE	24	Zone 6 Radiative Temperature[C]
104105	101	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Bypass total heat exchanger or not.
"104201-104204"~"104701-104704" are similar to "104101-104104"					
105100	0	OBJECT_ANALOG_OUTPUT	SIGNED_INT	2	Calendar number of schedule 1
105100	1	OBJECT_ANALOG_OUTPUT	SIGNED_INT	3	Calendar number of schedule 2
105100	2	OBJECT_ANALOG_OUTPUT	SIGNED_INT	4	Calendar number of schedule 3
105100	3	OBJECT_ANALOG_OUTPUT	SIGNED_INT	5	Calendar number of schedule 4
105100	4	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 1(0:Shutoff; 1:Blow; 2:Cooling; 3:Heating)
105100	5	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 2(0:Shutoff; 1:Blow; 2:Cooling; 3:Heating)
105100	6	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 3(0:Shutoff; 1:Blow; 2:Cooling; 3:Heating)
105100	7	OBJECT_SCHEDULE	SIGNED_INT	0	Operation Schedule 4(0:Shutoff; 1:Blow; 2:Cooling; 3:Heating)
105100	8	OBJECT_ANALOG_OUTPUT	DOUBLE	22	Setpoint of EV Hall Temperature[C] for season 1
105100	9	OBJECT_ANALOG_OUTPUT	DOUBLE	26	Setpoint of EV Hall Temperature[C] for season 2
105100	10	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of EV Hall Temperature[C] for season 3
105100	11	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of EV Hall Temperature[C] for season 4
105100	12	OBJECT_ANALOG_OUTPUT	DOUBLE	2	On/Off band of EV Hall Temperature control for season 4
105100	13	OBJECT_ANALOG_OUTPUT	DOUBLE	22	Setpoint of WC Temperature[C] for season 1
105100	14	OBJECT_ANALOG_OUTPUT	DOUBLE	26	Setpoint of WC Temperature[C] for season 2
105100	15	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of WC Temperature[C] for season 3
105100	16	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of WC Temperature[C] for season 4
105100	17	OBJECT_ANALOG_OUTPUT	DOUBLE	2	On/Off band of WC Temperature control for season 4
105100	18	OBJECT_BINARY_INPUT	ENUMERATED	0	Is EV Hall FCU Operating
105100	19	OBJECT_ANALOG_INPUT	DOUBLE	24	EV Hall Drybulb Temperature [C]
105100	20	OBJECT_ANALOG_INPUT	DOUBLE	50	EV Hall Relative Humidity [%]
105100	21	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of EV Hall Temperature[C]
105100	22	OBJECT_BINARY_INPUT	ENUMERATED	0	Is WC FCU Operating
105100	23	OBJECT_ANALOG_INPUT	DOUBLE	24	WC Drybulb Temperature [C]
105100	24	OBJECT_ANALOG_INPUT	DOUBLE	50	WC Relative Humidity [%]
105100	25	OBJECT_ANALOG_OUTPUT	DOUBLE	24	Setpoint of WC Temperature[C]
"105200"~"105200" are similar to "105100"					
106100	0	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	1	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	2	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	3	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	4	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	5	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description
106100	6	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	7	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106100	8	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	10	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	11	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	12	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	13	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	14	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106100	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	0	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	1	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	2	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	3	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	4	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	5	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	6	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	7	OBJECT_BINARY_OUTPUT	ENUMERATED	1	Venetian Blind State (false:Open; true:Close)
106101	8	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	9	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	10	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	11	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	12	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	13	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	14	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
106101	15	OBJECT_ANALOG_OUTPUT	DOUBLE	1.221730476	Venetian Slat Angle(0:Flat; 90:Pi; -90:-Pi)
"106200, 106201"~"106700, 106701" are similar to "106100, 106101"					
107101	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (1F)
107201	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (2F)
107301	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (3F)
107401	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (4F)
107501	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (5F)
107601	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (6F)
107701	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Clo value (7F)
107102	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (1F)
107202	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (2F)
107302	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (3F)
107402	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (4F)
107502	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (5F)
107602	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (6F)
107702	1~200	OBJECT_ANALOG_INPUT	DOUBLE	-	Occupancy Information Thermal Sensation (7F)
107103	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (1F)
107203	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (2F)
107303	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (3F)
107403	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (4F)
107503	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (5F)
107603	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (6F)
107703	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Stay at Desk (7F)
107104	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (1F)
107204	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (2F)
107304	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (3F)
107404	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (4F)
107504	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (5F)
107604	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (6F)
107704	1~200	OBJECT_ANALOG_INPUT	SIGNED_INT	-	Occupancy Information Stay Zone Number (7F)
107105	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (1F)
107205	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (2F)
107305	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (3F)
107405	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (4F)
107505	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (5F)
107605	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (6F)
107705	1~200	OBJECT_BINARY_INPUT	ENUMERATED	-	Occupancy Information Dissatisfied (7F)
199999	0	OBJECT_ANALOG_OUTPUT	UNSIGNED_INT	60	AccerarationRate
199999	1	OBJECT_ANALOG_INPUT	UNSIGNED_INT	0	Stay Number
199999	2	OBJECT_ANALOG_INPUT	UNSIGNED_INT	0	Dissatisfied Number
199999	3	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Control calculation speed or not
199999	4	OBJECT_ANALOG_INPUT	DOUBLE	0	Effective Energy Reduction Rate
199999	5	OBJECT_ANALOG_INPUT	DOUBLE	0	Energy Reduction Rate
199999	6	OBJECT_ANALOG_INPUT	DOUBLE	0	Dissatisfied Occupant Reduction Rate
199999	7	OBJECT_BINARY_OUTPUT	ENUMERATED	0	Flag of making backup data
199999	8	OBJECT_ANALOG_INPUT	DOUBLE	0	Energy Reduction Rate (instantaneous value)
199999	9	OBJECT_ANALOG_INPUT	DOUBLE	0	Dissatisfied Occupant Reduction Rate (instantaneous value)

Device ID	Instance Number	Object Type	Application Tag	Default Value	Description

Appendix 6   Analysis of HVAC operation data

1. はじめに

本資料では、エミュレータシステムで生成した BEMS データの分析結果を示す。

2. 熱源システム

システムの月別の熱負荷と一次エネルギー消費量および COP を Fig.1 に示す。熱負荷はヘッダでの往還温度差計測値から計算した値である。消費電力量は一次側熱源システムと二次側空調システムの合算値である。インテリア系統の AHU は年間冷房、ペリメータ系統の AHU は 12~3 月のみ暖房で運転している。年間の暖房負荷は 743 GJ、冷房負荷は 1,223 GJ であり、延床面積あたりでは 74 MJ/m² と 122 MJ/m² である。年間の一次 COP は 0.49 となった。COP は冬季に悪く、極低負荷の冷房需要が非効率な運転の原因となっている可能性がある。

熱源別の熱製造割合を Fig.2 に示す。半分以上は蓄熱槽の放熱運転によってまかなわれることがわかる。直焚吸収冷温水器が 1 段目に動作するが、冬季に関しては冷房運転に対応するため、空気熱源の方が比率が大きくなっている。

年間の負荷デュレーションカーブを Fig.3 に示す。
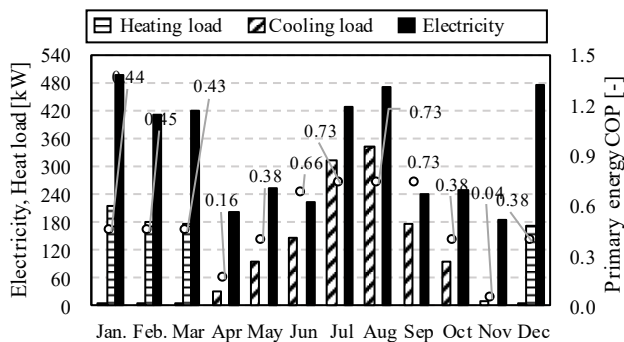
Fig.1 Trends of electricity, heat load and COP
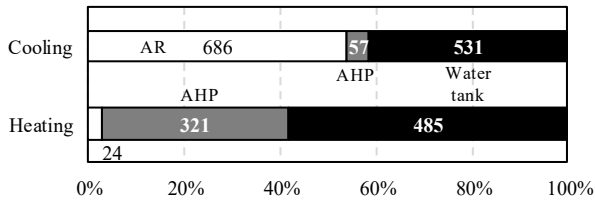
Fig.2 Heat generation rate
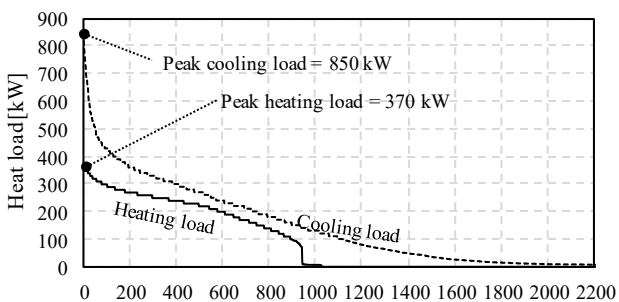
Fig.3 Duration curve of heat load

一次エネルギー消費の内訳を Fig.4 に示す。VAV を導入している割には空気搬送のエネルギー消費が大きい。VAV 制御の不良が示唆される。

システムの負荷率と一次 COP の関係を暖房冷房別に Fig.5 に示す。ただし、負荷率は設計能力を最大値として計算した。暖房運転時に

は 50%を超える負荷率での運転は無かった。本計画では水蓄熱システムが導入されているため、熱源の稼働時刻と負荷発生時とがずれる。やや低めの負荷で極端に大きなシステム COP が表れるが、これは水蓄熱槽の放熱運転によりポンプ動力のみが計上されているためである。Fig.6 は、この影響を取り除くために日積算の負荷と日積算の一次 COP の関係を示したものである。空気熱源ヒートポンプはインバータ式のため、冷房運転時は負荷率の低下よって COP が上昇するが、補機類や二次側システムのエネルギー消費の影響があるため、システム全体としては負荷率の低下とともに COP が低下する傾向となる。特に暖房負荷率は小さいため、かなり低い COP での運用となっている。負荷率の低い状態での運転をどのように改善するかが課題である。
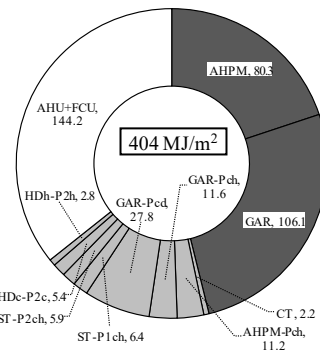
Fig.4 Primary energy use
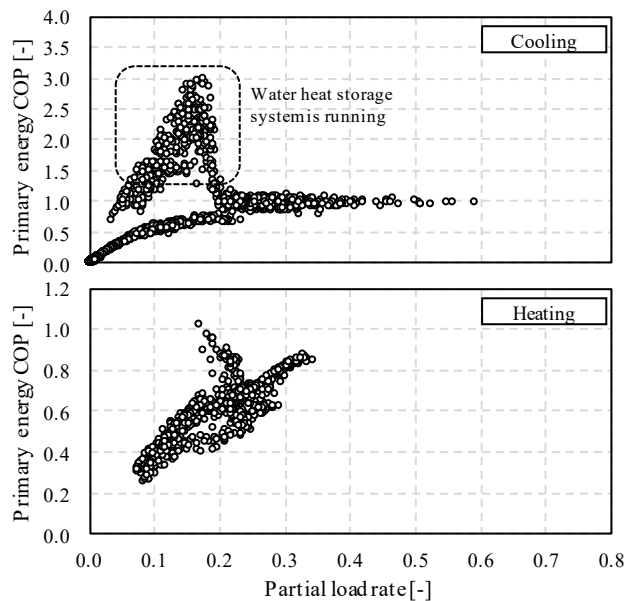
Fig.5 Partial load rate and primary energy COP of system
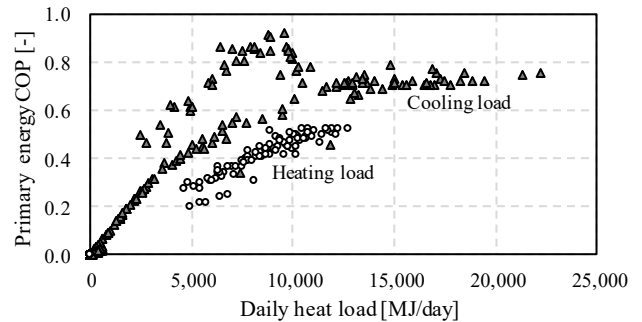
Fig.6 Daily heat load and primary energy COP

熱源別の負荷率と一次COPの関係をFig.7に示す。吸収式冷凍機は殆どの時間で70%を下回る負荷率で運転している。空気熱源ヒートポンプはインバータ式のため、負荷率の低下とともにCOPが向上するが、50%程度で極大値を示した後にやや低下に転じる。
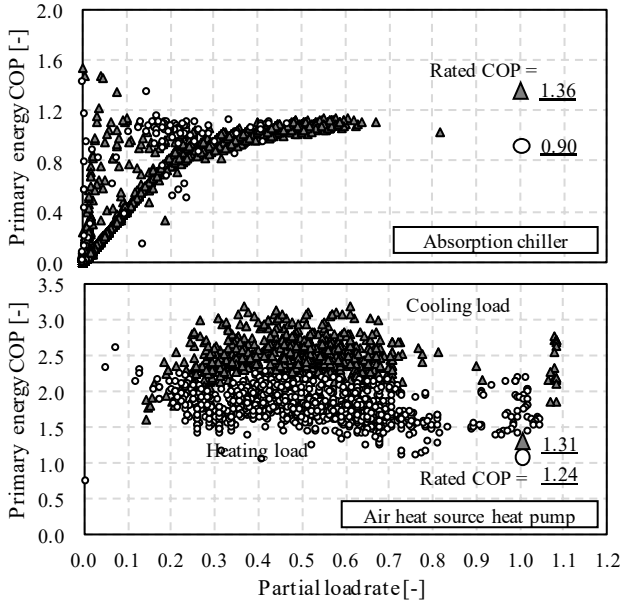
Fig.7 Partial load rate and primary energy COP of heat sources

二次側往還温度差と二次ポンプの水搬送効率（WTF: Water transfer factor）の関係をFig.8に示す。往還温度差の低下とともに効率が低下する傾向が確認できる。冷水搬送に関しては非常にWTFの小さい範囲に広がる点がある。これは中間期および冬季の極低負荷時の冷房運転である。標準では年間冷房運転としているが、不要な冷房運転を停止するなどの運用改善が必要である。
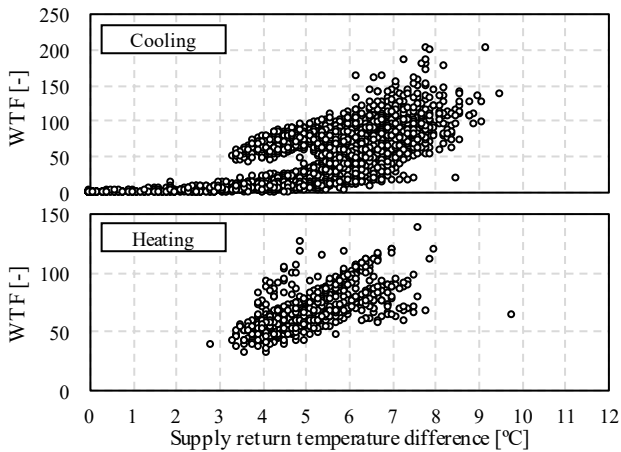
Fig.8 Supply return temperature and WTF of secondary pump

冷温水負荷率と二次ポンプの消費電力および運転台数の関係をFig.9に示す。負荷率の低下とともに消費電力と運転台数が低下しており、インバータによる回転数制御と台数制御が機能していることが確認できる。ただし、50%程度で3台運転に到達している点に注意が必要である。運転台数は水量と負荷率で決まるが、二次側で設計値よりも温度差が取れないため、冷温水負荷率としては低い値で増段したと考えらえる。
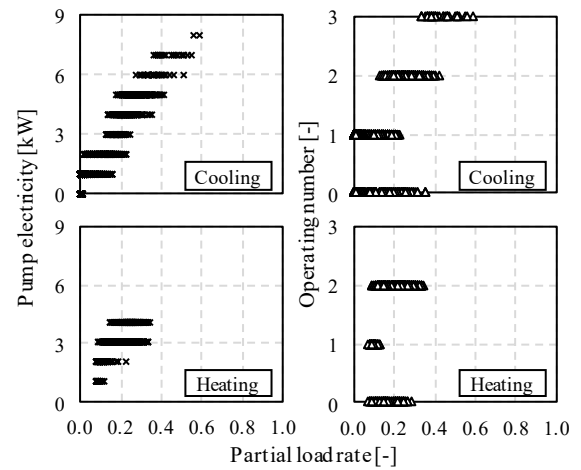
Fig.9 Partial load rate and pump electricity

Fig.10に代表日における蓄熱槽の温度プロフィールを示す。やや熱が使い切れておらず、日中の追い掛け運転（増段判定が早すぎる可能性がある。
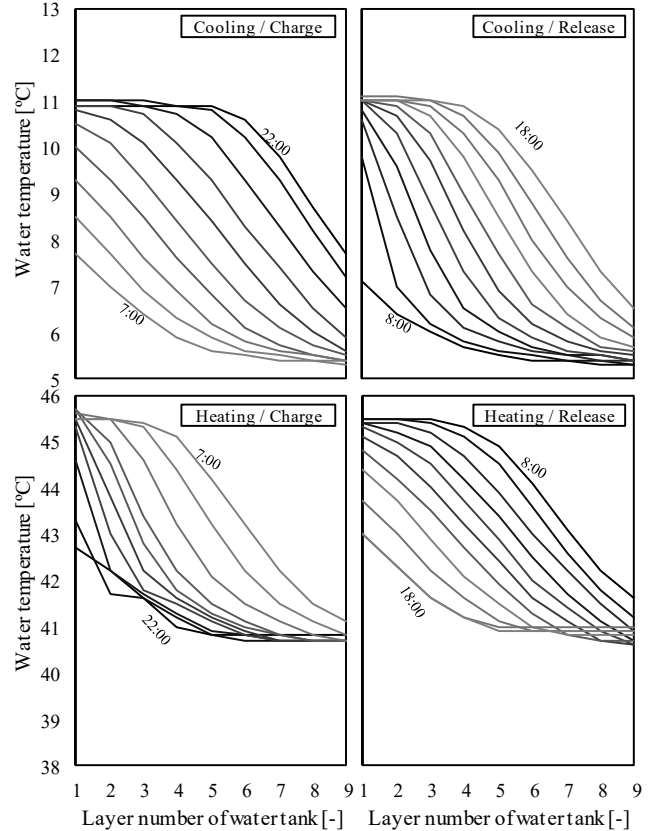
Fig.10 Water temperature profile of storage tank

Fig.11に冷温水負荷率と熱源の運転台数の関係を示す。運転台数は負荷流量と供給温度によって制御をしており、負荷率の上昇に伴って運転台数が増える様子が確認できる。ただし暖房運転時は低負荷で2台運転が行われている場合がある。冬季は外気処理を行うために二次側で大きな温度差が取れ、供給温度が低下することで増段の判定がなされた可能性がある。
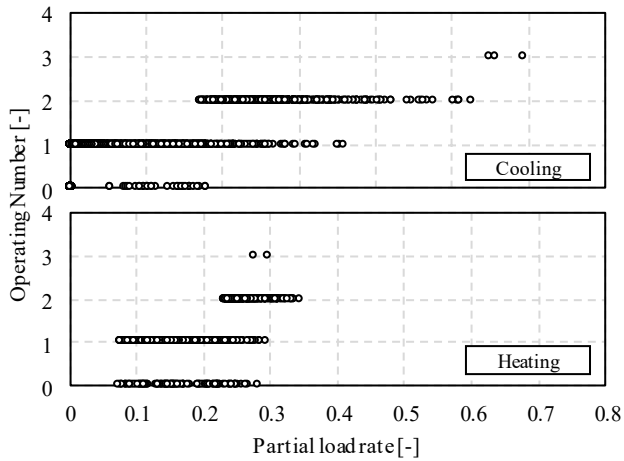
Fig.11 Operating number of heat source

Fig.13 Average outdoor air state

熱源起動時の給水温度の推移を Fig.12 に示す。上は暖房時の温水供給温度、下は冷房時の冷水供給温度である。いずれも蓄熱負荷が大きいと予想される月曜日朝のデータである。本施設では 7 時より熱源の予冷予熱運転を開始し、8:00 から二次側空調機の予冷予熱運転を開始している。配管系や熱源機自体の蓄熱負荷により、熱源起動時刻からしばらくして設定温度に達することがわかる。空調機が起動すると還温度が大きく変化し、熱源が過負荷となる結果、供給温度も設定値に維持できなくなるが、ほどなく、概ね供給温度設定値まで回復できることがわかる。

Fig.12 Startup trend of supply water temperature

各月の平均外気状態を Fig.13 に示す。湿球温度は平均的には、冬季が 6 ℃ 未満、中間期が 15 ℃ 未満となっている。標準設定では冷却水温度は一定となっているが、外気湿球温度に応じた設定値とすることで効率向上を図る必要がある。

3. 空調システム

　北側と南側の執務室の CO2 濃度の推移を Fig.14 に示す。両ゾーンともに 1,000ppm を下回っていることが確認できる。本施設では土日には AHU を完全に停止して換気も行わないが、気積が充分であるため、休日出勤者がいる場合にも 1,000ppm までは上昇しない。本例では土曜日に北側事務室の出勤者が多かったようである。
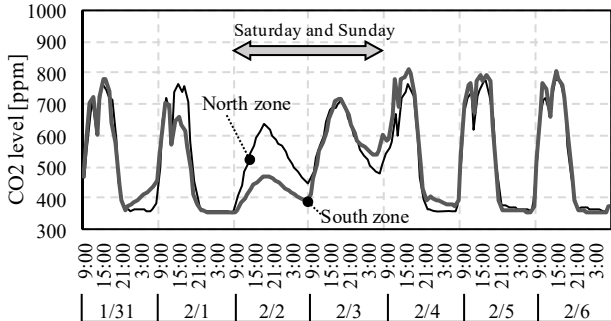
Fig.14 CO2 level of 4th floor

　各階の CO2 濃度の頻度分布を Fig.16 に示す。いずれの階も 1000ppm よりもやや低く分布が形成されており、外気ダンパをもう少し絞ることも可能と推測できる。ただし、外気温度によっては外気を積極的に取り入れた方が良い可能性もあることには注意する必要がある。室ごとの平均 CO2 濃度の推移を Fig.17 に示す。図中の矢印は当該フロアのテナントの営業時間を表している。テナントによって人員密度や残業や休日出勤の頻度が異なるため、CO2 濃度は全く同じとはならない。標準の運用では空調機の稼働時間はテナントによらず 8:00~22:00（8:00~9:00 は外気カット）であるが、平均的にはいずれの時刻でも CO2 は 1000ppm を上回らない。ただし、更なる省エネルギー化を狙うのであれば、テナント別の起動時刻の適正化が必要となるであろう。

　AHU4-1 の空調ゾーン VAV-1 の温湿度を Fig.15 に示す。ただし、営業時間帯である 9:00~19:00 のみのデータを抽出した。
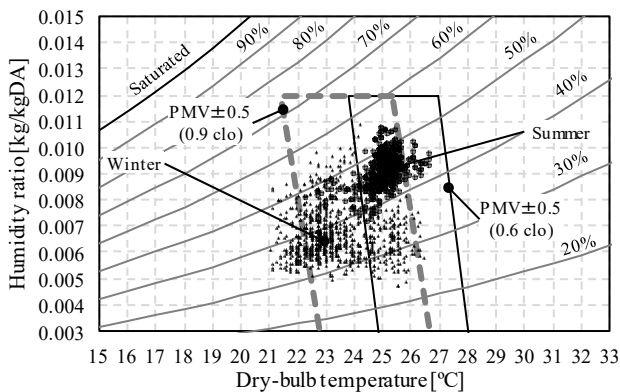
Fig.15 Indoor air state of AHU-4-1, VAV zone 1

　破線と実線の枠は PMV が±0.5 の範囲である。概ね、範囲内に収まっていることがわかる。乾球温度の設定値は各ゾーンとも夏季が 25 ℃、冬季が 23℃ である。夏季に比較するとやや冬季の方が温度のばらつきが大きい。
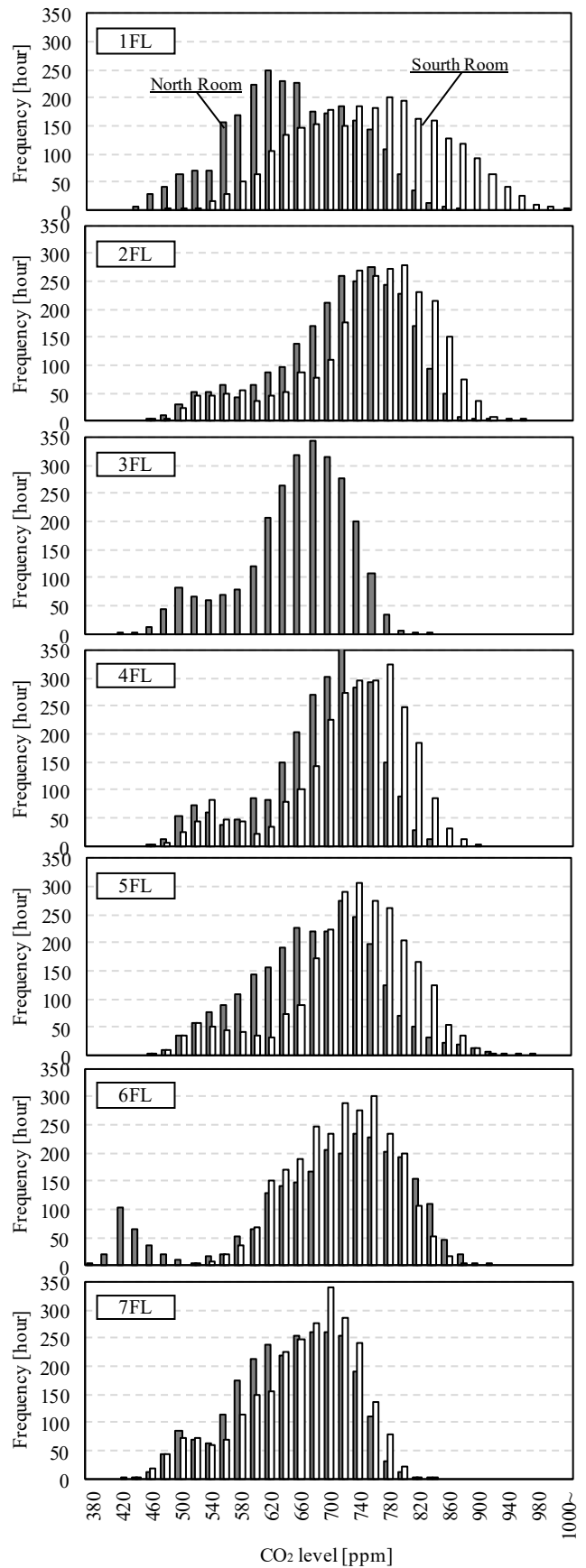
Fig.16 Frequent distribution of CO2 level
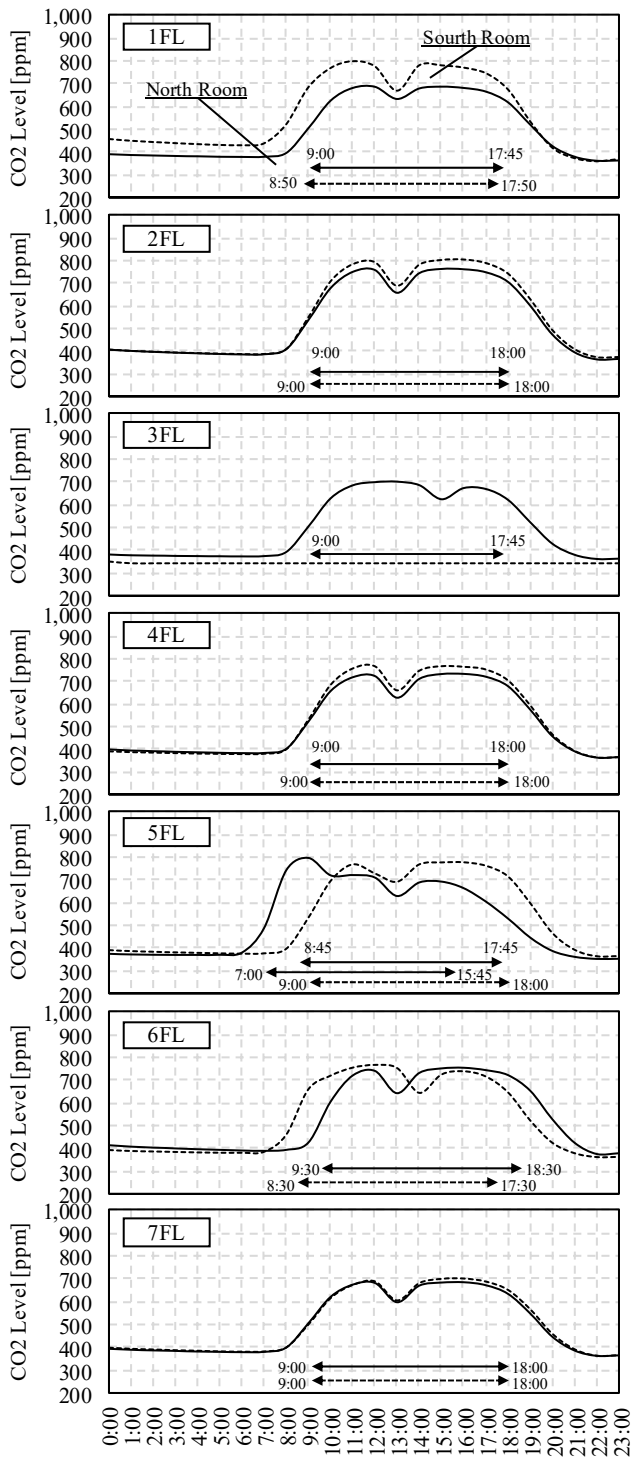
Fig.17 CO2 level trend of each room

(Left figure panels labeled 1FL through 7FL, with "Sourth Room", "North Room", CO2 Level [ppm], time annotations)

Fig.18 Hourly average temperature

夏季と冬季の代表 3 日間の室温変動を Fig.19 に示す。1 日目は休み明けの月曜日であるが、蓄熱負荷の影響により、夏季冬季ともにややオーバーシュートが大きい。特に冬期は室温設定値である 23 ℃を大きく超えて一時は 26 ℃ まで達している。火曜日と水曜日も冬季はオーバーシュートがあり、やや積分時間が長い可能性がある。
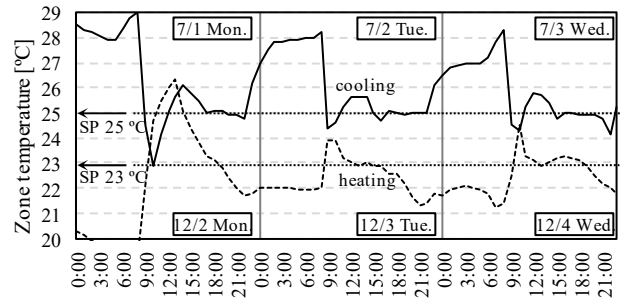
Fig.19 Dry-bulb temperature of AHU-4-1, VAV zone 1

Fig.20 に AHU-4-1 の温水コイルと冷水コイルの二方弁開度と水量の関係を示す。開度を広げると流量も大きくなる関係となるが、他の二方弁の状態にも影響されるため、完全な正相関とはならない。
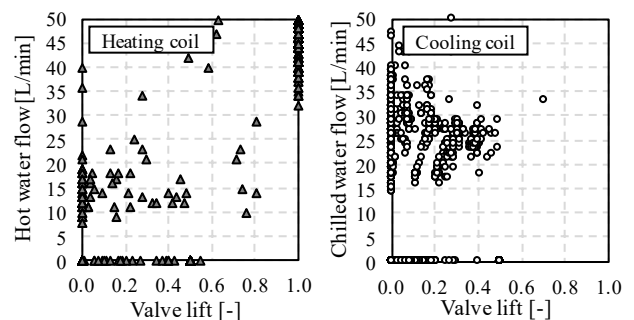
Fig.20 Valve lift and water flow rate of AHU coils

月別の平均的な温冷感申告値の推移を Fig.21 に示す。夏季はやや暑い側の申告が多く、冬季は寒い側の申告が多い。標準の室温設定は夏季が 25 ℃、冬季が 23 ℃ であるが、24 ℃ に近づければもう少し不満が減少することが期待できる。また、標準の運用では、12 月~3 月が暖房運転、その他の月が冷房運転となっているが、4 月と 11 月には寒い側の申告が表れているため、暖房運転の期間を延長する

1 月と 7 月の 24 時間の平均室温の変動を Fig.18 に示す。ペリメータは AHU4-1、インテリアは AHU4-2 である。夏季は空調開始後 1 時間で室温設定値である 25 ℃にほぼ到達し、その後は安定する。一方、冬季は蓄熱負荷の影響により、設定値になるまで 2 時間程度が必要である。また、日射の影響により設定値よりも室温が上昇し、その後は夕方まで設定値を上回る温度で推移する。多くのテナントは朝 9:00 前後に業務を開始するため、冬季に関しては空調機の運転開始時刻を早める必要がありそうである。

必要がありそうである。
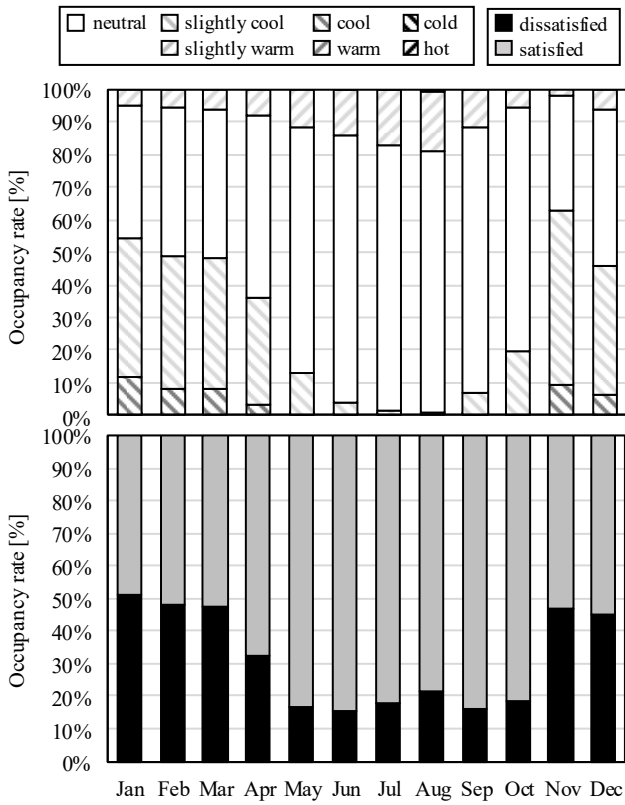
Fig.21 Result of thermal sensation vote (Monthly average)

Fig.22 に時刻別の平均的な温冷感申告値の推移を月別に示す。いずれの月においても、立ち上がりの朝 7 時と 8 時頃に熱的中立から外れた申告が多く表れる。この時間帯は多くのテナントが営業時間帯外であるが、Fig.17 の CO_2 濃度の推移からは早朝出勤の執務者も多いと推察されるため、快適な温熱環境とする必要がある。Fig.18 に示したように立ち上がり時はオーバーシュートなどで空調制御が不安定になりがちであることに加え、空気温度と放射温度の差が大きいと予想されるため、不満足者率が高くなると予想できる。逆に昼を過ぎて一旦安定してしまえば、熱的中立となる執務者が多くなる。従って、特に冬季には空調開始時刻の前倒し、または PID パラメータの適正化などを検討する必要がある。
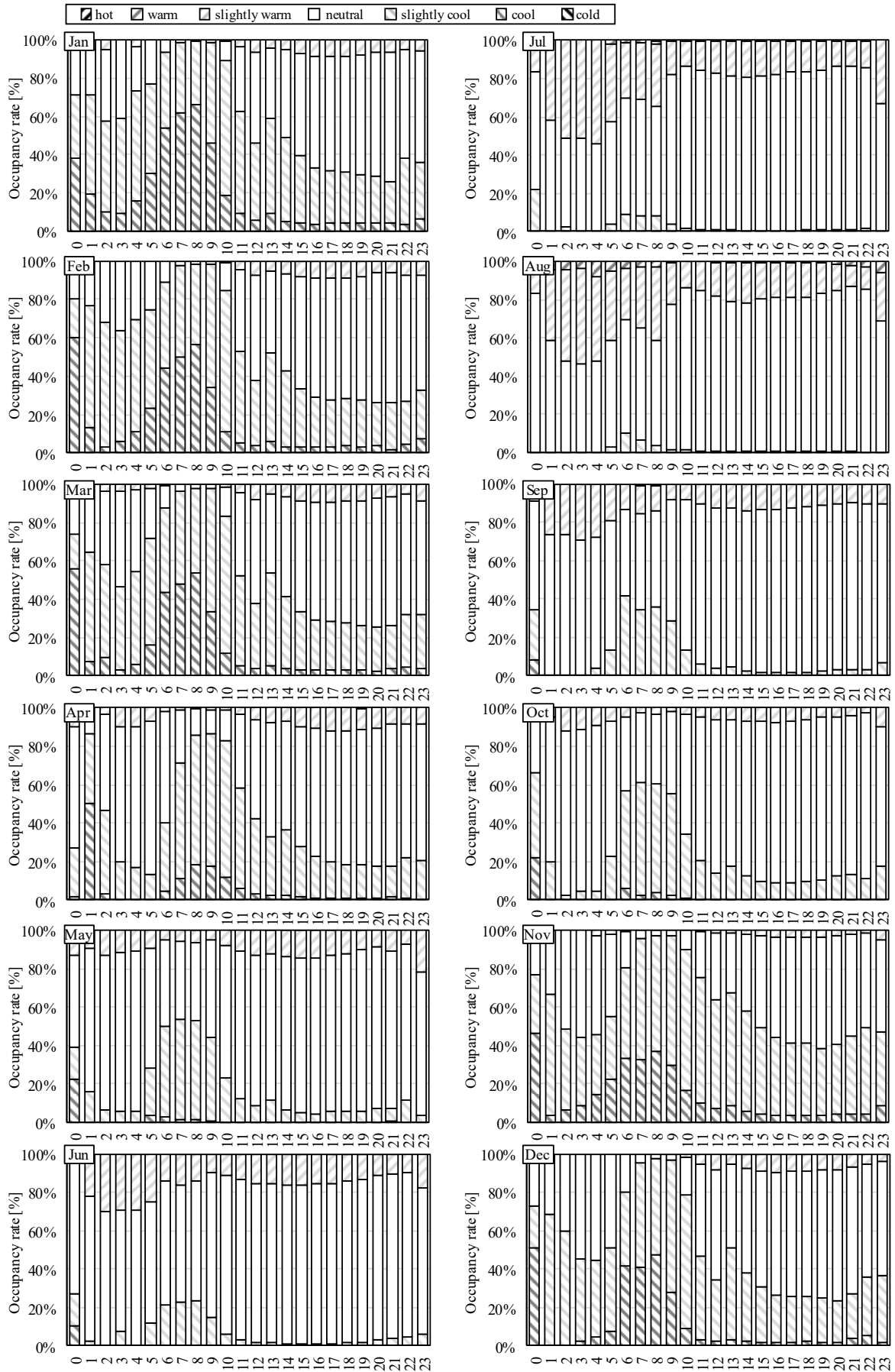
Fig.22 Hourly average thermal sensation vote

Appendix 7   Calculation of energy and dissatisfaction

1. Method of calculating primary energy

The target of calculation of primary energy consumption is <u>electricity, gas and water supply</u>. The power conversion factor follows the law of energy conservation in Japan. That is, <u>9.97 MJ/kWh</u> for day from 8:00 to 22:00 and <u>9.28 MJ/kWh</u> for night from 22:00 to 8:00. Gas conversion factor is <u>45 MJ/Nm^3</u> on the premise of city gas 13 A. The conversion factor of clean water is <u>8.5 MJ/m^3</u>.

Not only electricity consumption of air conditioning heat source equipment, but the electricity consumption by tenant's outlet and lighting energy consumption are calculated. Power consumption by outlets is stochastically determined by the behavior of the office workers and cannot be changed by the operation of facilities. For lighting, set the standard energy consumption to 12 W/m2 ($=750 / (120\cdot0.9\cdot0.6)$) with an illuminance of 750 lx, a maintenance rate of 0.9, an illumination rate of 0.6, and a luminous efficiency of 120 lm/ W. When there is a change in the amount of daylight introduced by the slat angle control of the blind, it is considered that the lighting fixture is turned on or off by the change from the reference illuminance of 750 lx, and the energy consumption of the light is increased or decreased. It is necessary to pay attention to the fact that when solar radiation enters directly, dissatisfaction occurs because the visual environment deteriorates, so that the operation is not improved merely by opening the blind. The shape of the blind is as follows. By default, it is fixed at 60° all year round, as shown on the right side of the figure.

Shape of blinds
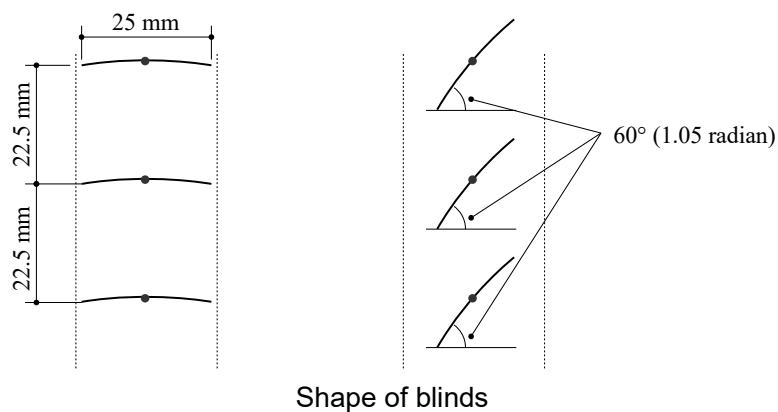
Blinds can be controlled for each zone, and the ID and object number of the BACnet Device are as shown below.
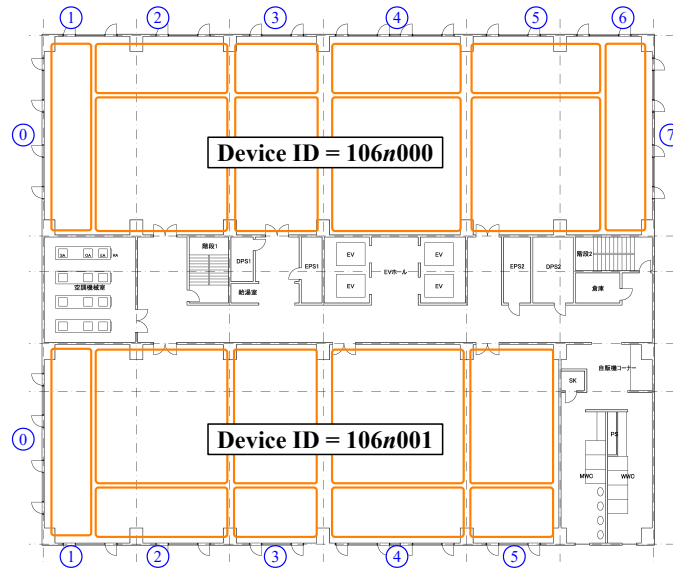
BACnet Device ID and object number of blind controller

2. Calculation method of dissatisfaction

The occurrence of dissatisfaction is stochastically calculated from three factors: thermal environment, air quality (CO2 concentration), and visual environment. When the maximum value of dissatisfaction probability ($PPD_{thermal}$, PPD_{CO2}, PPD_{light}) based on each environment is larger than the uniform random number U_{rnd}, dissatisfaction occurs.

$$D = U_{rnd} < Max\left(PPD_{thermal}, PPD_{CO2,} PPD_{light}\right) \tag{A.1}$$

First, estimate the thermal sensation of the occupant using a model by Takada, and apply the PPD formula by Fanger. Skin temperature required to apply the Takada model is calculated using the TwoNode model. Calculation is performed using the height and weight that are stochastically generated based on the age and sex of the worker (Appendix 3), without assuming the standard body. In addition, adding the normal random number N (0,0.64) expresses the thermal preference (hot and cold) for each office worker. The TwoNode model is calculated using the dry bulb temperature, relative humidity, and mean radiant temperature of the zone in which the worker stays. Relative air velocity is 0.1 m/s, and metabolic rate is a fixed value for office workers. The amount of clothes shall be adjusted within the range of 0.5 to 1.0 by the office worker[24].

露と落ち 露と消えにし 我が身かな 浪速のことも 夢のまた夢

胡蝶の夢や太閤秀吉の辞世の句に表れているように、
東洋には、この世も一つの虚構とみる世界観があるように思います

リアリティを追求しつくすことを試みたエミュレータ世界に、
Second Life のように技術のもたらす楽観的な未来性ではなく、
一雫の朝露のような儚さを感じてもらえれば面白いと思いました