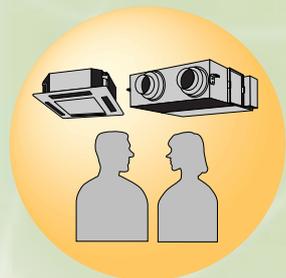




DESIGN GUIDE

intelligent **Manager**

ECO21



Part 1 1 intelligent Manager

System name	iPU	Number of units to be connected	Remark
iM128	DAM602A52×1	128	Part 2
iM192	DAM602A53×1	192	
iM256	DAM602A51×1	256	Part 1
iM512	DAM602A51×2	512	
iM768	DAM602A51×3	768	
iM1024	DAM602A51×4	1024	

1. System Overview

1.1 Overview

■ What is the intelligent Manager?

intelligent Manager is an integrated building management system that uses our independent, high-speed multi-transmission method DIII-NET that is employed on VRV for buildings.

It has a centralized controller function that can perform high-speed centralized control of our VRV for buildings.

■ Applicable Buildings

This is a VRV intelligent Manager control system that is perfect for small and medium scale buildings. Number of Management Items: Standard 256 indoor units. Expansion is possible up to a maximum of 1024 items.

- For medium and small scale individual air conditioning systems
- For existing buildings planning to update from a central air conditioning system to a decentralized air conditioning system

■ Merits

- Allows the configuration of simple systems that do not require an interface.
- Has control data application software that supports drawing up business management plans.
- Handles small to medium scale buildings.
- Can be easily operated with the ease of an office computer.

[Air-NET Service System] (Option)

“intelligent Manager” is equipped with the leading failure warning option, preventing A/C faults in advance.

(There are restrictions in applicable areas, so consult with us separately for details)

1.2 Features

■ Simple Equipment Configuration

High priced interface equipment is unnecessary between the monitoring system and the air conditioning equipment.

Particularly, if directly connected with VRV for buildings that employ our DIII-NET, special instrumentation for sensors etc are unnecessary. DIII-NET makes it possible to directly monitor abundant operating data.

■ Low Installation Work, Less Wiring

Wiring to VRV (with equipment that handles DIII-NET) for your building is extremely easy. You only need to connect to the DIII-NET terminal.

Monitoring and control are possible just by wiring (Daisy-chain method) 1 cable (non-polar, dual core) to each unit even for facility equipment.

■ User-friendly System

- Anyone can easily operate using a mouse on an ordinary use computer.
- Windows style display so that, anyone can easily manage and process data. This helps the efficient management of your building.

■ AIR NET Air Conditioning Failure Prediction Function (Optional)

Warns of air conditioner trouble in advance thereby keeping the occurrence of sudden stops to a minimum.

(As a general guide, AIR NET notifies you of the possibility of trouble that could occur within approximately 24 hours.)

This allows for the best operating condition of the equipment resulting in comfort and contributing to improved energy saving.

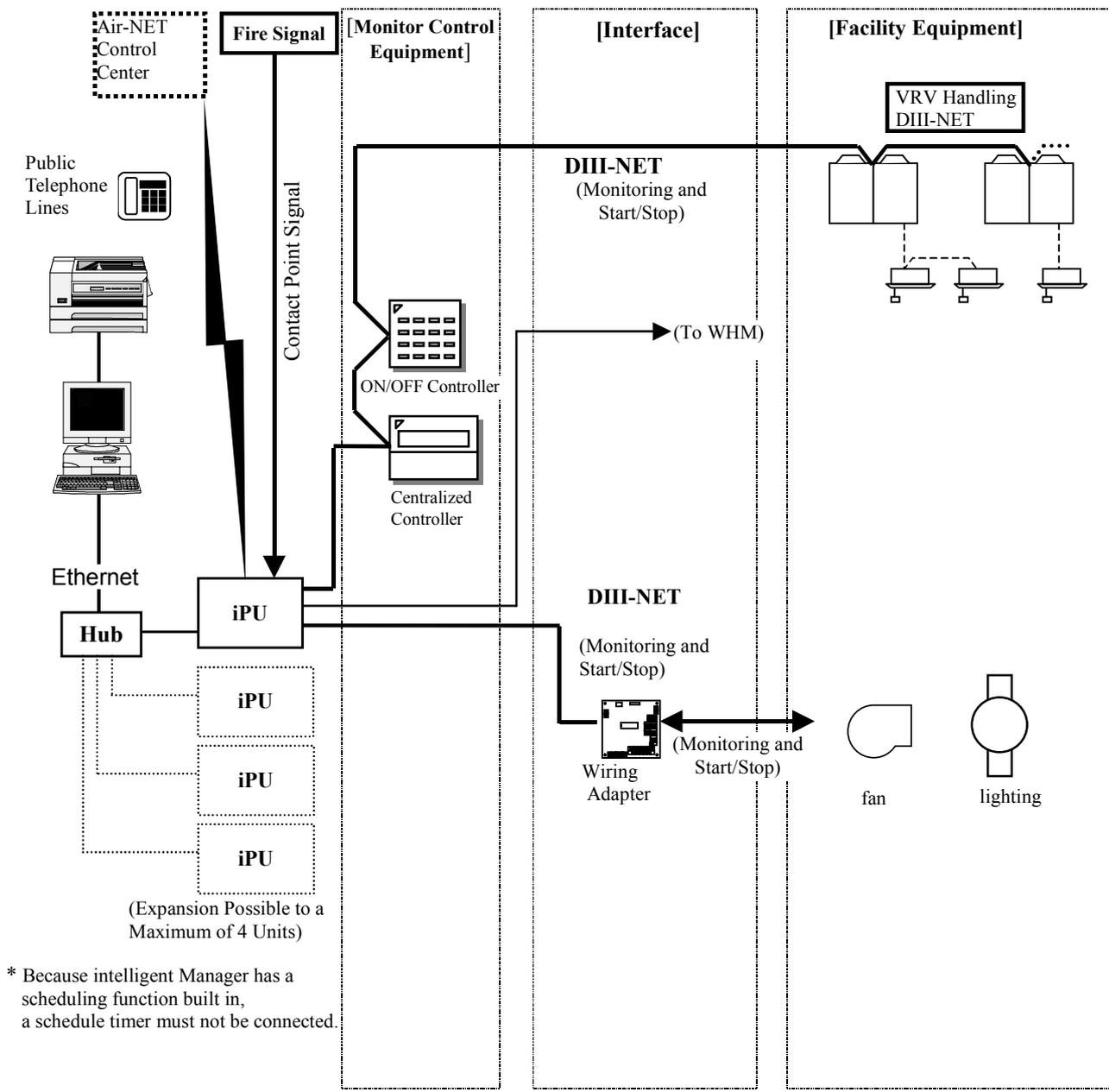
[Having a Separate Contract for the Air-NET Service System]

The Airnet Service System uses the latest advancements in data processing and communication technology to monitor the condition of your air conditioning system.

Daikin's unique On-Line Diagnostic System not only helps to prevent problems before they happen, it can also help you save energy and extend the operating life of your air conditioning system.

There are restrictions in applicable areas, so consult with us separately for details.

2. System Image



iPU: intelligent Processing Unit

3. Functions

3.1 List of Functions

3.1.1 Local Functions

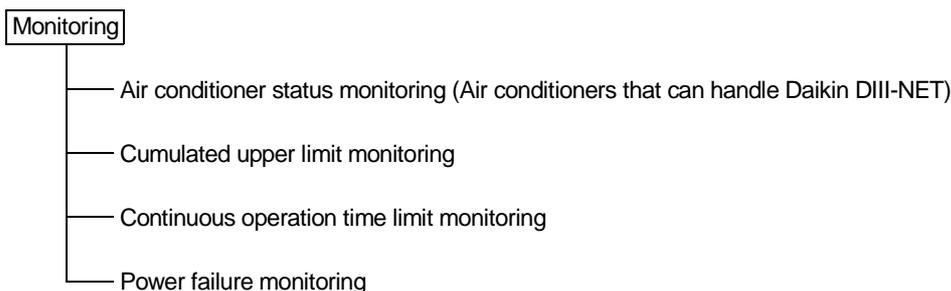
		Items	Contents
Local Functions		Monitoring	Monitoring of air conditioner status (256 units, max. 1024 units)* Cumulated value upper limit monitoring (for each item of control) Continuous operation time limit monitoring (for each item of control) Power failure monitoring
		Control/Operation/Settings	Login settings Individual control Collective starting/stopping and settings for control group (100 groups) Schedule control (128 groups) Interlocking control (100 programs) Emergency stop control for fire (32 programs) Power failure and recovery processing control (selected from 5 power recovery modes) Centralized control of air conditioners
		Display	Display of name of management item or icon display, list display Control group list display Move screen function Operating time, start/stop count integration display, history display (abnormalities, warnings, control history)
		Measuring	Operating time integration, start/stop count integration Inspection of meter (Pi port of main unit)
		Control	Operating history control Creates daily, monthly, annual reports VRV power proportional division (option consumption: 256 units)
		Memory/Recording	Print output Data memory
		Report	Emergency signal input

* iPUs can be expanded to 4 units. Shows "Maximum 1024 units," for example, for the values when expanding to the maximum, if the number of management points is increased when expanding the number of units.

- 1024 indoor units/station when 4 iPUs are connected.

3.2 Detailed Explanation of Functions

3.2.1 Monitoring



(1) Air conditioner status monitoring (Air conditioners compatible with Daikin's DIII-NET)

Allows you to know the detailed operating status such as running/stopped status, temperature setting, operating mode, the occurrence and content of errors and filter sign for each air conditioner targeted for monitoring.

The occurrences and the contents of errors are displayed in the abnormalities history area. When an error occurs on an air conditioner targeted for monitoring, the management item icon flashes and the alarm is displayed in the history. You can set a buzzer notification of the occurrences of errors and have the printer automatically printout of the contents of errors.

Management points: 1 indoor unit = 1 item

The number of management items of equipment connected to DIII-NET, with the total number of air conditioners is 256 /(per 1 iPU unit)

When expanding to the maximum number: 1024 items/(when 4 iPUs are connected)

The number of management items can be fewer than those listed above depending on the number of outdoor unit in the air conditioning system.

* Refer to our D-BACS Design Guide for details regarding the method for connecting air conditioners to DIII-NET and the restrictions on the number of units.

(2) Cumulated Value Upper Limit Monitoring

Prints a warning with the daily report of the contents when the cumulated values of the operating time and the start/stop count exceed the set upper limit values.

The Result General standards for maintenance of the facility's equipment and replacement periods are clarified, therefore allowing for planned maintenance thereby enabling you to expect a reduction of overall maintenance costs.

(3) Continuous Operating Time Limit Monitoring

Displays a fault when a single continuous operating time for the facility equipment exceeds the set upper limit. You can set the buzzer to ring and/or the printer to automatically print when an error occurs. You can set the time limit up to a range of 8 digits in one second intervals for each item to control.

The Result Prevents idling or burnout by issuing an abnormality when the operation of facilities exceed prescribed time or normal operation.

(4) Power Failure Monitoring

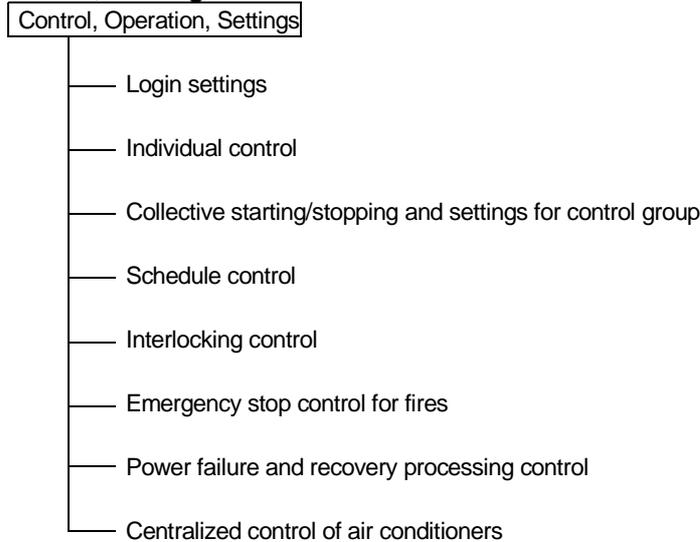
You can set the error display and/or buzzer ring for power failures.

Power failures are determined by the power failure signal from a UPS (uninterruptible power supply device.)

(A UPS is connected to the intelligent Manager monitoring system PC and the iPU.)

Operation data is automatically saved when there is a power failure. The system is automatically shutdown approximately 10 minutes later.

3.2.2 Control, Operation, Settings



(1) Login settings

Sets user operation authority to control the range of operation and view, consultation, read-change, read-only. When logging in, the users can operate the intelligent Manager within their allocated authority.

30 users can be registered and passwords can be set individually.

When unmanned, this is set to a log-off status. Settings can also be set for the log-off status.

It is possible to limit personnel who may operate intelligent Manager to prevent mis-operation or unauthorized handling.

The following shows authorization levels that can be set.

Authorization	When Authorized	When Not Authorized
Running/Stopping/Setting	Can perform run/stop/set operations	Cannot perform run/stop/set
Schedule Registration	Can inspection, register and edit schedules	Can only inspect schedule
Interlock Control Registration	Can inspection, register and edit link control	Can only inspect link operation
Emergency Stop Registration	Can inspection, register and edit emergency stop	Can only inspect emergency stop
Emergency Stop Canceling	Can cancel emergency stop	Cannot operate
Report Inspection	Can inspect reports (daily, monthly annual)	Cannot inspect
Report Registration	Can set reports (daily, monthly annual)	Cannot operate
History Operation	Can inspect and set history	Can only inspect history
System Settings	Can set system	Cannot operate
Subordinate Centralized Control Setting	Can set centralized control	Cannot operate
User Registration	Can register users and set authority	Cannot operate
Maintenance Mode	Can set maintenance mode	Cannot operate

(2) Individual Control

Allows manual, individual operation of starting and stopping of management items. Operations for starting and stopping, switching the operating mode, changing the temperature settings, switching enable/disable of individual remote controllers and for resetting of the filter sign are possible when using DIII-NET compatible air conditioners.

Items pressed later have priority with regard to management items defined by the schedule control and interlocking control.

(3) Collective starting/stopping and settings for control group

Registering a plurality of management items to a control group allows manual starting and stopping for all equipment. Operations for starting and stopping, switching the operating mode, changing the temperature settings, switching enable/disable of individual remote controllers and for resetting of the filter sign are possible when using DIII-NET air conditioners.

Items pressed later have priority with regard to management items defined by the schedule control and interlocking control.

Registers a maximum of 100 management items in one group and a maximum of 100 groups.

(4) Schedule control

Automatically performs starting and stopping of any control group and management items according to the set time schedule.

Creating and registering a year calendar and a week schedule will automatically create an execution schedule and the specified management items and control groups are controlled according to that execution schedule. Also, by editing the execution schedule, the schedule for the next coming week can be specially changed.

A maximum of 128 programs can be registered.

The year calendar, week schedule and execution schedule are in parity of 1 to 1, and schedule operations can be executed by combining each one.

Year Calendar

13 month calendar. Can set for regular days, holidays or special days for each day and allows creation of customized calendars for each tenant.

Week Schedule

Registers the times for performing control from the intelligent Manager for any control group or management item individually, for each day, holiday or special day of the week. Specify either of the instructions, run, stop, enable remote controller, disable remote controller, fan, cool, heat operation mode or set point. Registers up to 20 actions per day.

Execution Schedule

Daily schedule for the coming week. The actual schedule runs according to this. Automatically created based on year calendar and week schedule.

With the execution schedule, you can change anytime to correspond to the remaining hours to run and other specially made schedules.

(5) Interlocking control

Automatically starts and stops equipment that has been set according to the change in operating status of specified equipment or the occurrence of abnormality. There are 2 types of input conditions that can be specified: "Start/Stop Status" and "Error"

Using interlock control allows for starting and stopping sequentially. This function is available with almost connected points, ie indoor units interlock, key controls remote controllers etc.

A maximum of 50 input condition management items and a maximum of 50 start/stop output management items can be set with 1 interlock program. A maximum of 100 interlock programs can be defined.

The application of a plurality of interlock programs for input and output with the same management items is possible.

Example of Interlocking Programs

Indoor unit Link: Inputs signal from lighting equipment and turns OFF air conditioning of rooms where all lights have been turned OFF.

Key Control Link: Inputs signal from key control device and turns OFF lights and air conditioning of areas from which keys have been returned.

(6) Emergency stop control for fires

The system performs the necessary determined actions (rings buzzer, prints to printer, display fire sign, stops air conditioning equipment, etc) to notify of fires and to prevent the spread of flames when a fire signal is input. These fire related actions take priority over normal actions.

Though similar to linked operations, a major difference is that the content of the output is limited to the stop instruction. The emergency stop takes priority with regard to control.

Registering the management items to be the target of an emergency stop can be done by specifying the management items to stop or by targeting all management items for a stop and then specifying the management items that are an exceptions.

A maximum of 32 programs can be set.

The fire warning system controls smoke detectors and dampers according to fire prevention laws. Elevators, etc are controlled by a dedicated control system.

Therefore, these facilities are not targeted for control by the emergency stop program.

(7) Power failure and recovery processing control

<Power Failure>

The system enters a power failure execution after the reception of a power failure signal.

Automatically saves all operating data and control data. The system automatically shuts down approximately 10 minutes later. Status monitoring of management items is possible during the power failure processing, but control is not possible.

<Recovery>

All facilities and power supplies are restarted when commercial power is recovered.

The following 5 controls can be set for the recovery mode.

- 1) Restore to status prior to power failure: Returns each management item to its start/stop status prior to the power failure.
 - 2) Execute Scheduled run: Determines start/stop status (the status that should be for operation) of the time of the recovery according to the execution schedule and outputs a start/stop instruction.
 - 3) Force Stop: The start/stop status is "stop".
 - 4) Force Operation: The start/stop status is "start".
 - 5) Recover Remote Controller: Returns the remote controller enable/disable to the status prior to power failure. No other instructions are output.
- * **Other than 5) above, the operating mode and temperature setting output the value of the intelligent Manager setting. (Settings change when the power is restored if the equipment was running with a remote controller setting that differs to the intelligent Manager prior to the power failure.)**

Regardless of the power recovery mode, a link operation that was applied prior to the power failure will restart after power is restored (after approximately 10 minutes after power is restored).

(8) Centralized control of air conditioners

intelligent Manager allows for centralized operation of DIII-NET air conditioners.

Performs detailed control by allowing operation of start/stop, switching of the operating mode, changing of the temperature setpoint, enable/disable remote controller* operations and resetting the filter sign.

* Enable/disable remote controller operations

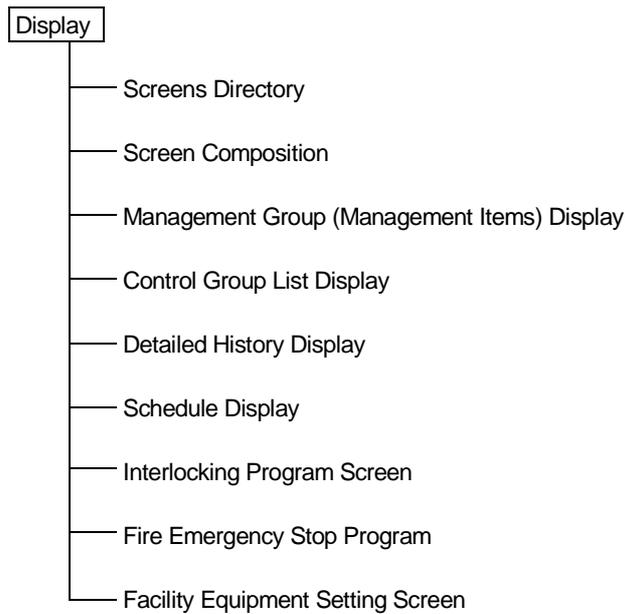
Limits operations from individual remote controllers on DIII-NET air conditioners and corresponds to various controls and operations.

[Start/Stop]: 3 settings possible: Disable remote controller/enable only remote controller stop/enable remote controller

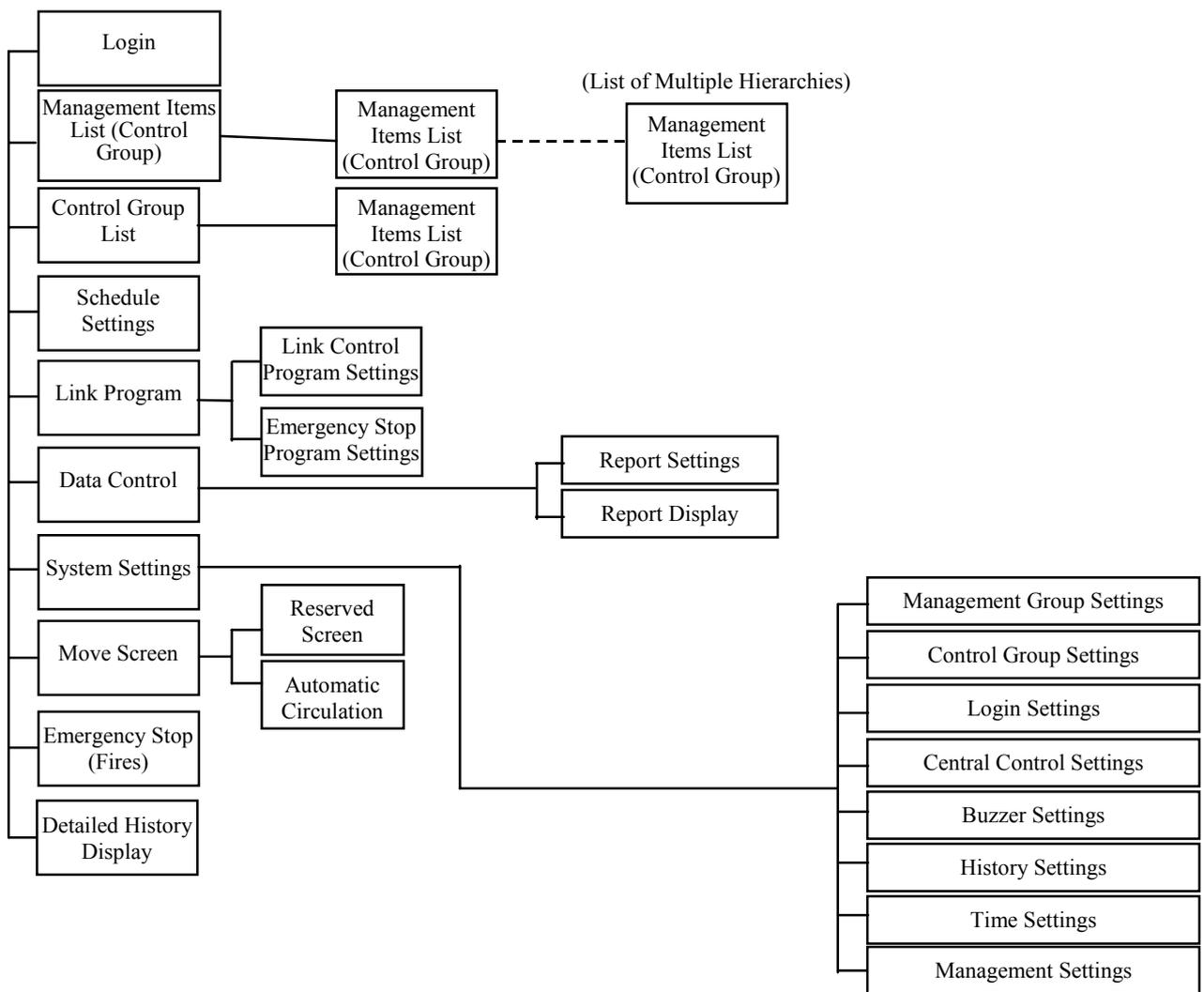
[Operating Mode]: Select either enable/disable remote controller for this operation

[Temperature Adjustment]: Select either enable/disable remote controller for this operation

3.2.3 Display



(1) Screens Directory

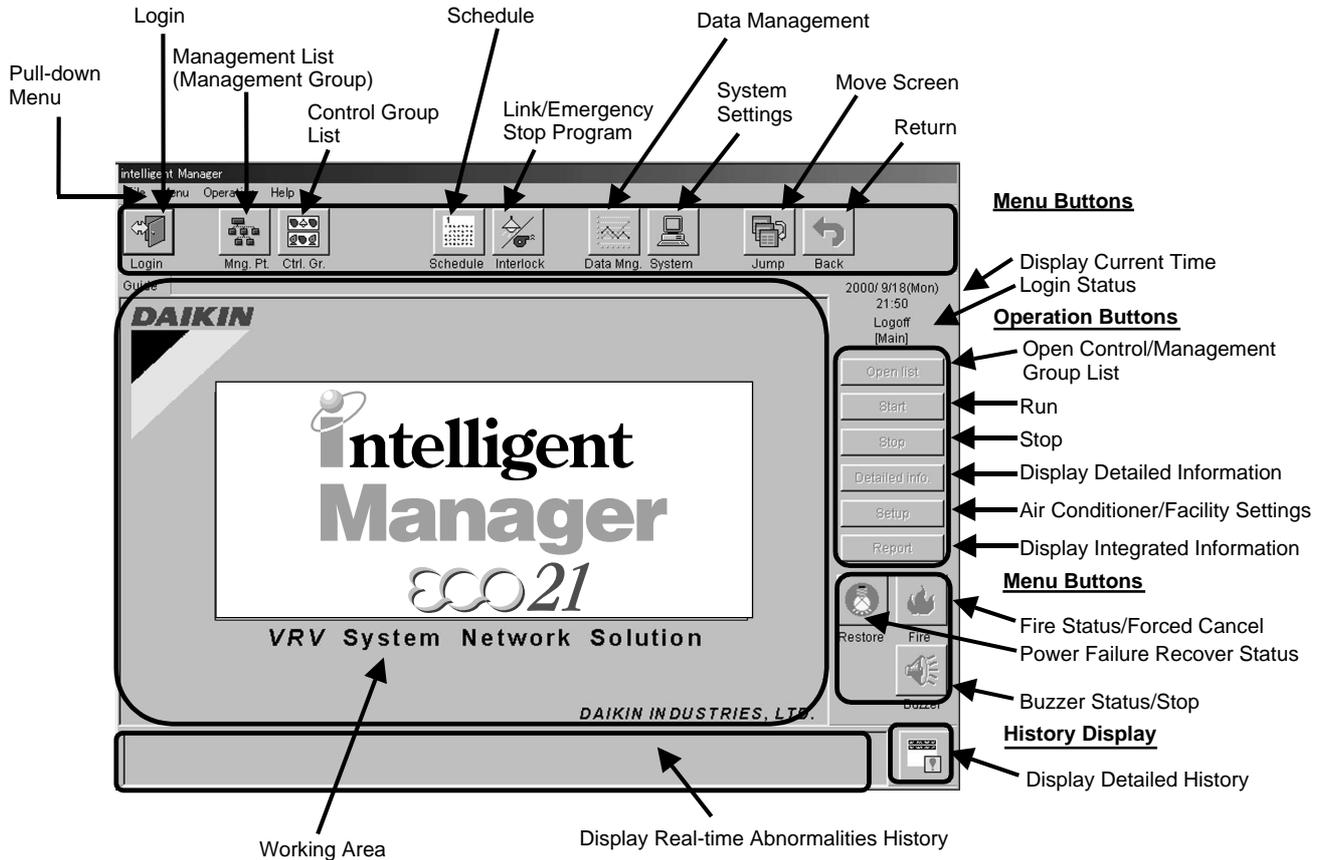


(2) Screen Composition

The screen are composed of menu buttons, operation buttons, error history real-time displays and working area.

- Menu buttons: Buttons that call up all functions. These are always operable on any menu screen.
- Operation buttons: Buttons for running and stopping the equipment, etc.
- Error history real-time display: Area displaying the error history in real-time
- Working area: Area displaying the functions called up by the menu buttons.

* The functions of the menu and operation buttons can also be executed from the pull-down menus.



(3) Management Group (Management Items) Display

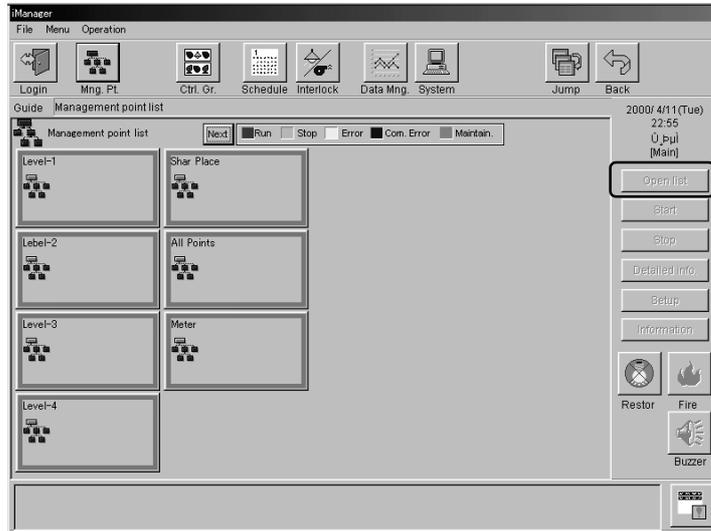
Management Group combines management items to make a group for easy management. (Controls for all of the equipment in a group are performed in control groups.)

Allows division of facilities targeted for monitoring into any group for the monitor screens.

Allows constructing multi-hierarchic configurations to any depth in the order of "Management Group List"

→ ("Management Group List" → ...) → "Management Item List."

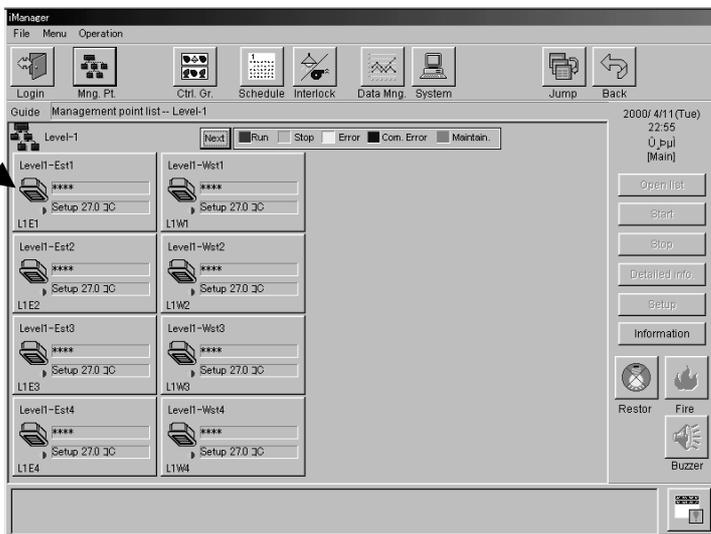
[Management Group List Screen]



Select the group and press "Open List" to shift to lower level management

[Management Item List Screen]

Color of Icon Let is You Know the Status



The color of the icon lets you know the status of the management item.

Red: Running, Green: Stopped, Green Flashing: Emergency Stopped, Yellow Flashing: Error, Blue: Communications error, Gray: Under maintenance.

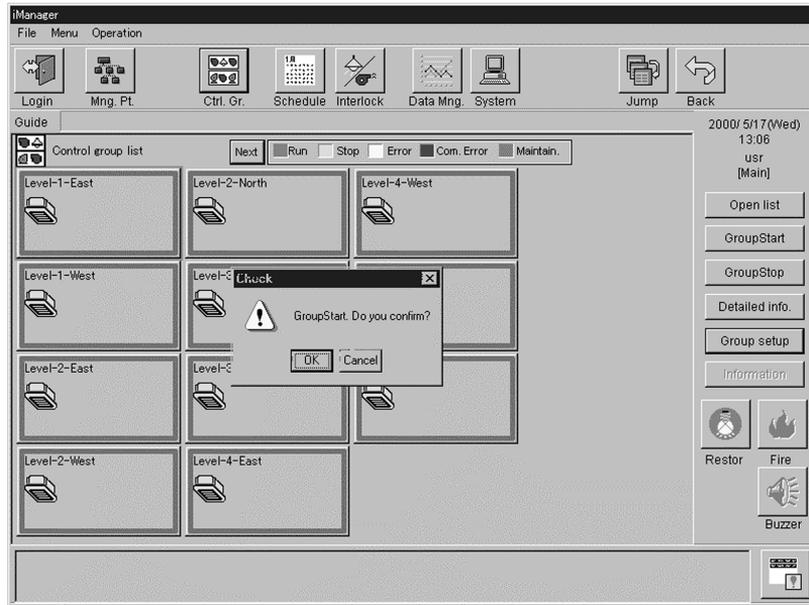
Also, the filter sign, cooling selection authorized, targeted for automatic control (link and schedule target) marks are also displayed.

(4) Control Group List Display

The Control Group binds the management items for batch control.

Select the control group and press the "Run All" or "Stop All" button to control the starting and stopping in control group units. A maximum of 100 management items can be registered in one group and a maximum of 100 groups can be registered.

Also, operations for switching the operating mode, changing temperature settings or enabling/disabling the remote controller are possible when the management items in the control group are DIII-NET compatible air conditioners

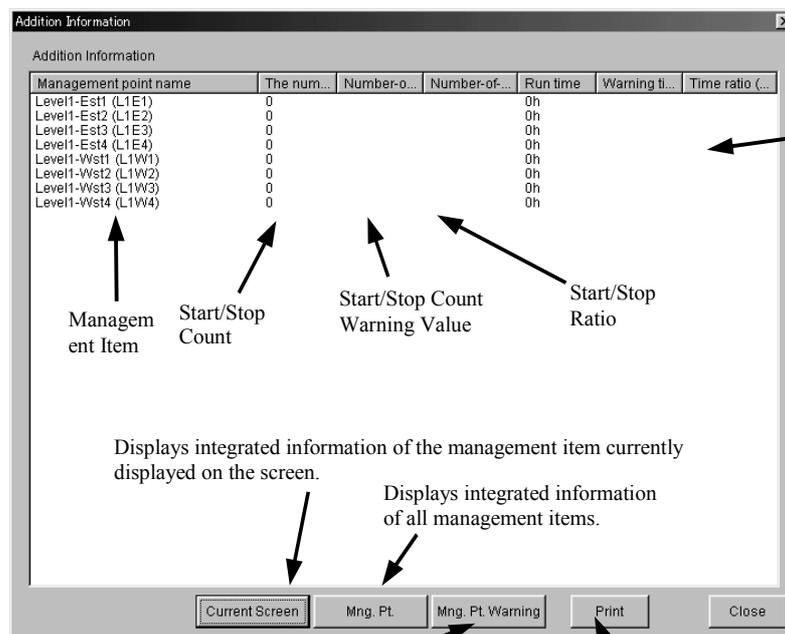


(5) Operating Time and Start/Stop Cumulated Count Display

The following data can be confirmed as the cumulated information display.

- Start/stop count
- Start/stop count upper limit value (warning value)
- Operating time cumulated
- Operating time upper limit value (warning value)

[Cumulated Information Display]



Displayed in red when a warning has been issued.

Displays integrated information of only warning management items.

Prints integrated information that is displayed.

(6) Detailed History Display

Allows management of history items such as starting the control of management error occurrence/recovery, status changes (run/stop etc) and schedules.

You can select to display the information displayed on the Detailed Screen in real-time or to display data saved to a file on the hard disk.

* Data saved to a file is called saved data.

100 items of information can be displayed on the History Details Screen at a time if using real-time and you can search from 500,000 occurrences of saved data and display.

[History Details Screen]

The screenshot shows the 'History' window in the iManager software. It features a table with columns for Time, Name, ID, PORT/ADDR, Contents, and CODE. Below the table are controls for 'Data Type' (Real-time Data, Saved Data), 'Classification' (Error, Alarm, Control, Status), and 'Period' (From/To date range). Action buttons like Confirm, Cancel, Jump, and Print are also visible. Annotations on the left and right sides describe these features.

Annotations:

- Confirms/Deletes History (Can cancel confirm status)
- Specifies Displayed Data - Maximum of 100 cases - 10,000 cases on hard disk
- Specifies Type to be displayed
- Displays Real-time History
- Specifies Period - Specify period, press "Update" to search (function dedicated for save data)
- Color Coded Display of History Type
- Print
- Detailed History Screen Menu Button
- Switches screen to the one displaying the targeted management items.

Message display colors differ according to the type of history.

- Error Red (Purple)
- Warning Blue (Gray)
- Cancel Green
- Other Black

* The colors indicated in the parentheses are the colors of confirmed messages.

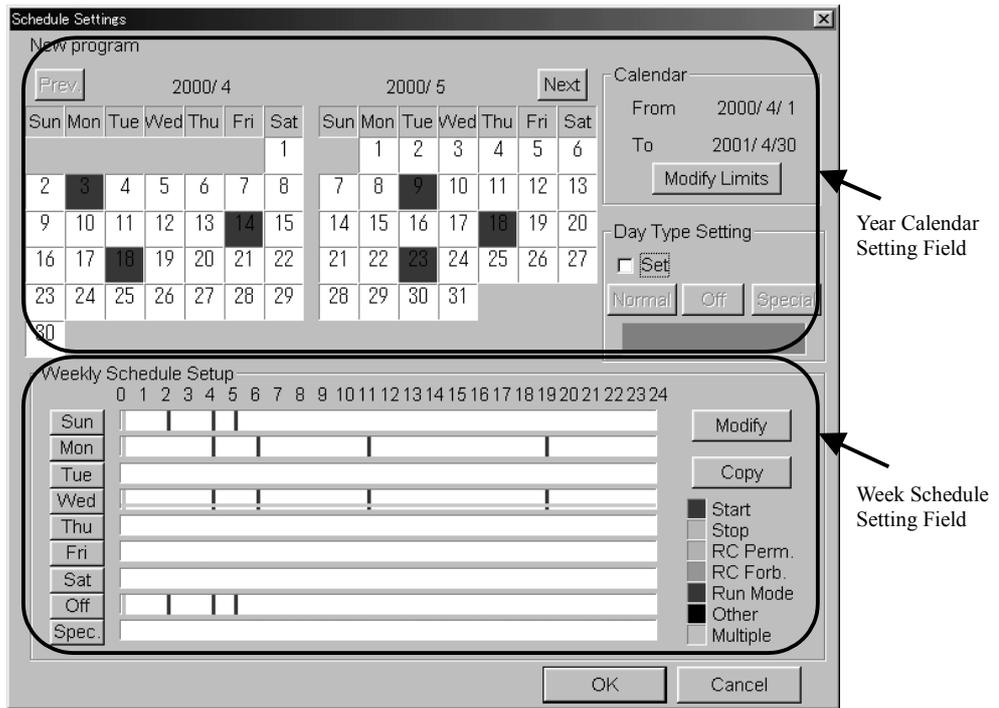
(7) Schedule Display

Automatically performs facility start/stop control, switching of the operating mode, setting of temperatures and enabling/disabling of the remote controller according to the preset time schedule. Register 1 week's cycle schedule program and specify what operations to perform on each day. Also, you can specify holidays or special days throughout one year (13 months) and specify the method of operation for holidays or special days in the same way as the daily operating schedule when using the schedule program.

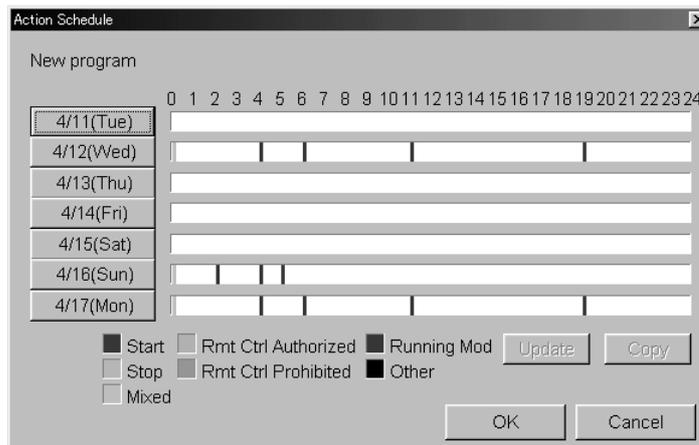
One system can register up to 128 schedule programs.

When the schedule operation is executed, those operations are recorded in the history.

[Schedule Setting Screen]



[Execution Schedule Screen]



You can view this screen if you need to confirm the actual schedule control. Also, special schedule changes within one week change on execution schedule screen.

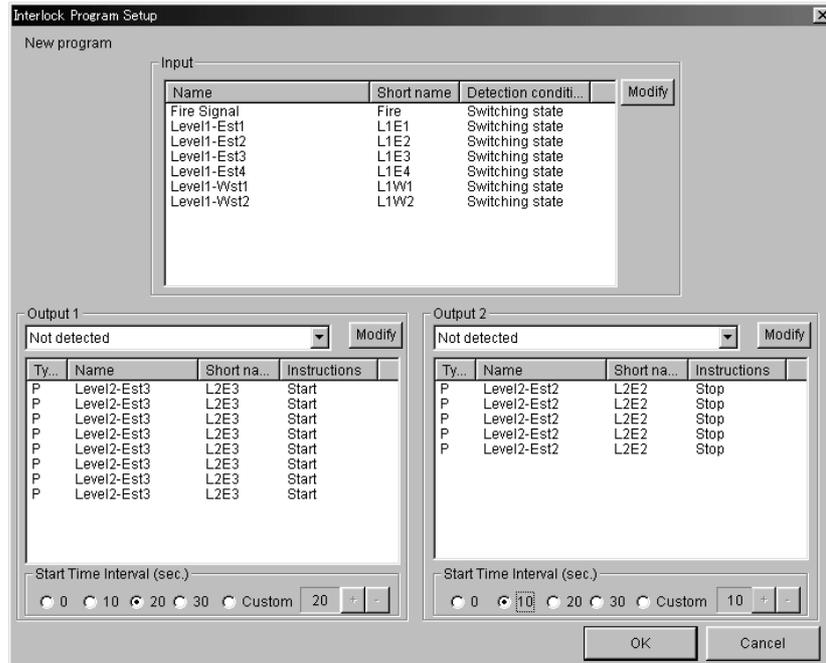
(8) Interlocking Program Screen

Automatically starts and stops equipment that was set, in response to changes in the operating status of the facilities or the occurrence of errors. 8 types of input conditions can be specified.

Using this enables the interlocking of starting and stopping of a plurality of facilities (operation in order etc) indoor/outdoor link, key management link and reporting.

1 link program can set a maximum of 50 input condition management items and a maximum of 50 start/stop output management items. A maximum of 100 link programs can be defined. A plurality of link programs can be applied for input and output of the same management items.

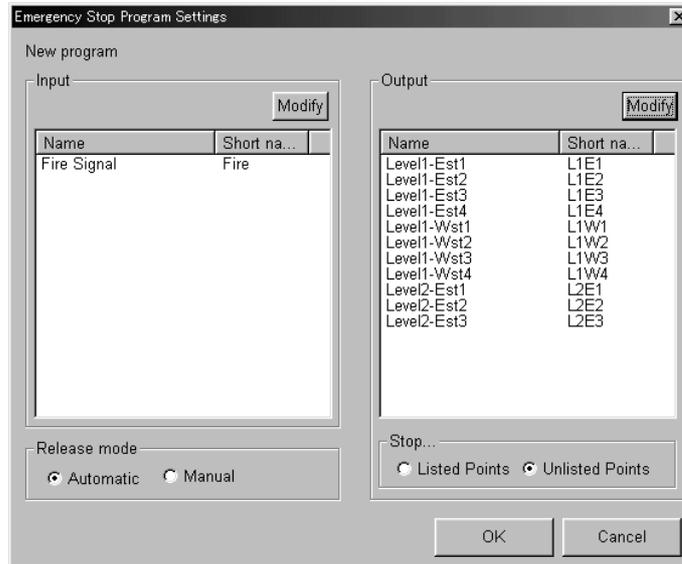
[Interlocking Program Screen]



The figure above is an example of a link program that is running air conditioners in common areas along with the air conditioners that are running for certain tenants.

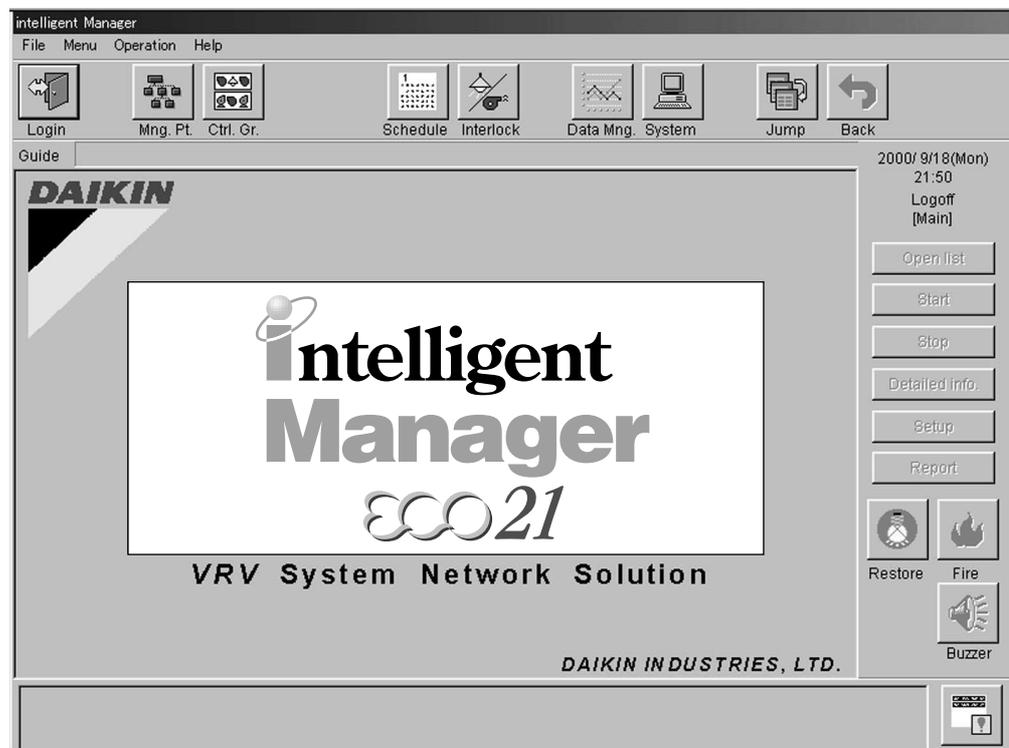
(9) Fire Emergency Stop Program

[Emergency Stop Program Screen]



The registration of management items to be targeted for emergency stop can be performed using either method of specifying the management item to stop or of making all management items targets for stopping and then specifying the management item that is out of range.
 (Facilities that are conformed to fire safety laws are exceptions.)
 This example figure shows the specification of management items (not to stop when there is a fire) that are not targeted for emergency stops.

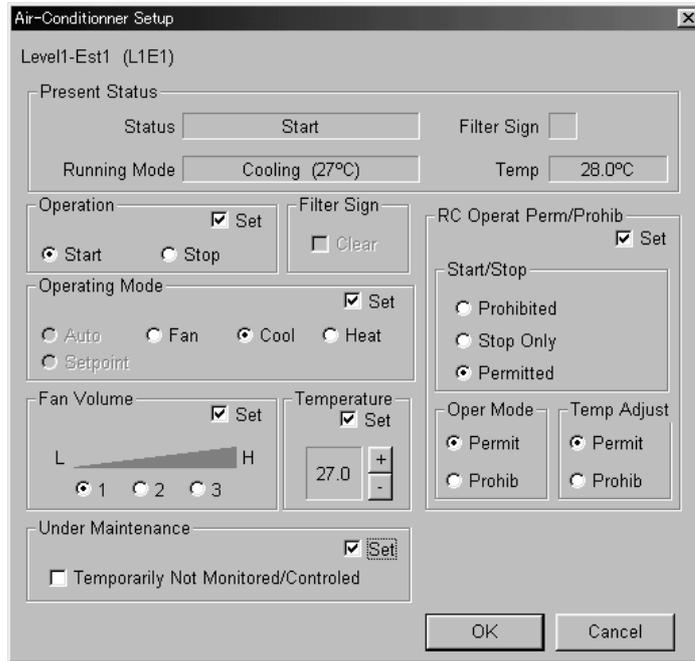
[Fire Occurrence Screen]



The fire icon on the bottom right-hand side of the screen will change to red when the emergency stop signal is input. (Normally, the report signal is input from the fire system)
 (intelligent Manager is not a fire prevention certified product.)

(10) Facility Equipment Setting Screen

[DIII-NET Air Conditioner Setting Screen]



Each of the operations of start/stop, switching of operating mode, changing of temperature settings, switching of enable/disable of individual remote controllers, resetting of the filter sign, clearing of the failure warning and settings for being under maintenance are possible when using our DIII-NET compatible air conditioners.

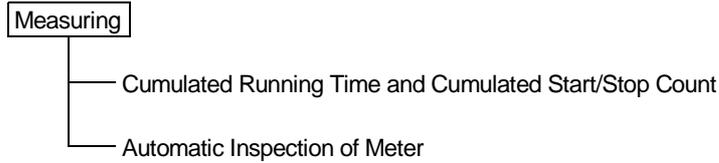
Items pressed later have priority with regard to management items defined by the schedule control and link control.

[Setting Screen for Other Facility Equipment that can be Started and Stopped]



In addition to start/stop operation, supported by all facility equipment, our DIII-NET air conditioners, can be started and stopped with the repeat mode. In this case the outputs start and stop instructions in determined time intervals to make the starting and stopping states of the facility obey the intelligent Manager instructions, regardless of the local operation.

3.2.4 Measuring



(1) Cumulated Running Time and Cumulated Start/Stop Count

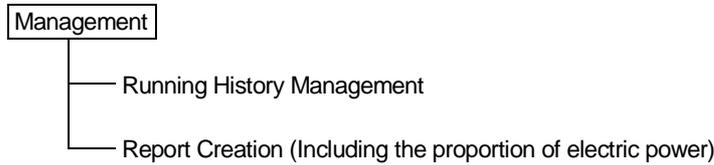
Cumulated running time and cumulated start/stop count are possible on all facility equipment that should be monitored. This is a standard for equipment maintenance. Can set as data for calculating electrical costs according to the use of the equipment.

(2) Automatic Inspection of Meter

Automatically cumulates pulses of electrical power meters, water amount totals and gas meter. Data that is inspected is reflected in the tenant's monthly cost calculations (optional). (A measuring instrument with a pulse generator of a minimum of 100 ms pulse width is necessary.)

Number of management items: 1 meter = 1 item
Meters can be connected to the Pi port on the main unit.

3.2.5 Management



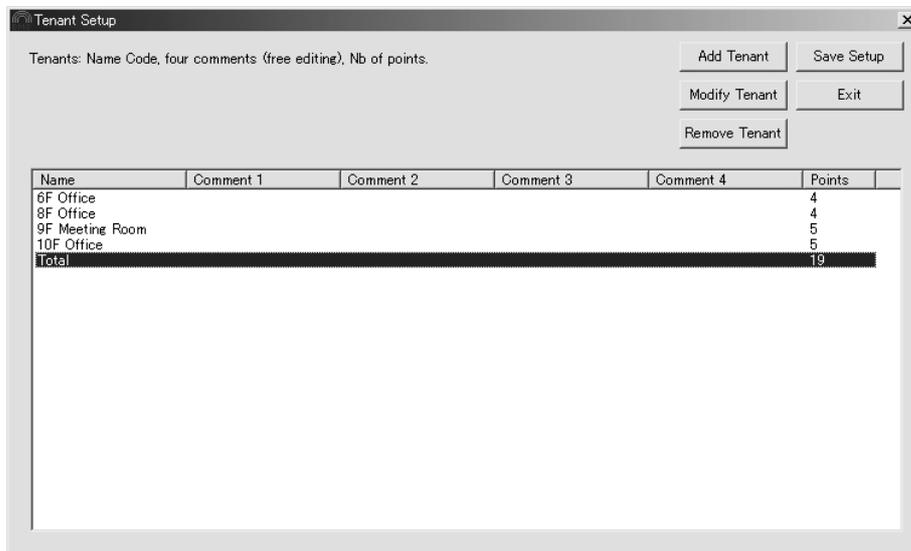
(1) Running History Management

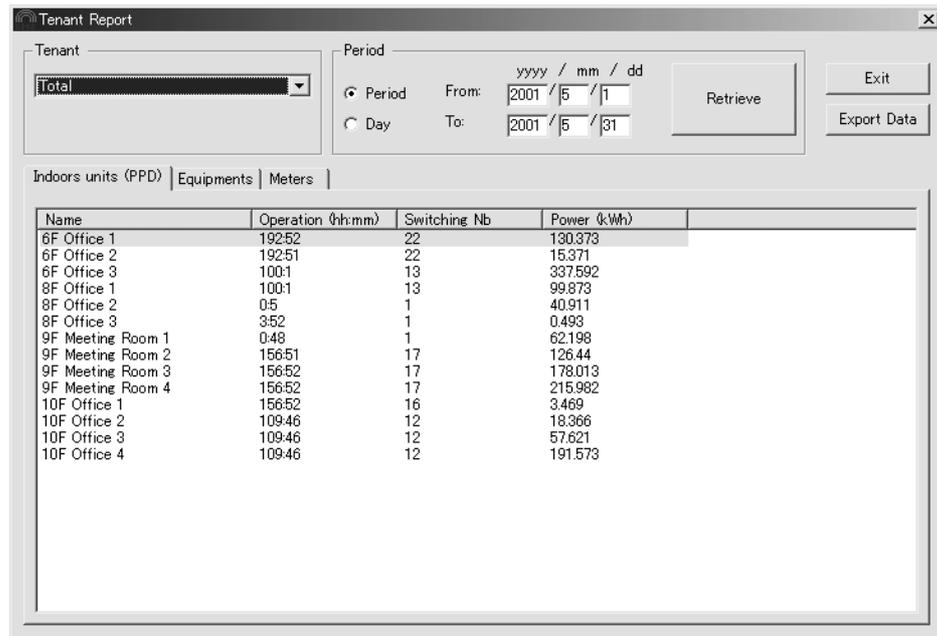
You can print the changes in the status of the equipment (start/stop). (See the section on Detailed History Display on page 13.) Stores up to 10,000 items of error history data of the equipment (occurrence of errors and recovery) in memory. Allows you to display and to print the error history for each specific management item and to display and to print the histories of all management items. Also, you can set the period targeted for display (or printing) for each and set whether to display or print the errors and recoveries.

(2) Report Creation

Accumulates and manages the data for integration (running time of equipment, start/stop count), meters (pulse integration by the Pi on the main unit) and the power consumption amount (in units of indoor equipment) by the proportion of electrical power of the VRV. It can also be searched and displayed using Excel software.

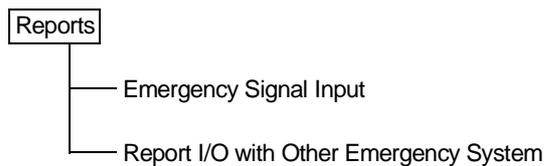
*Customers can freely change their department charges and accounting books (under their own responsibility).





Name	Operation (hh:mm)	Switching Nb	Power (kWh)
6F Office 1	192:52	22	130.373
6F Office 2	192:51	22	15.371
6F Office 3	100:1	13	337.592
8F Office 1	100:1	13	99.873
8F Office 2	0:5	1	40.911
8F Office 3	3:52	1	0.493
9F Meeting Room 1	0:48	1	62.198
9F Meeting Room 2	15:51	17	126.44
9F Meeting Room 3	15:52	17	178.013
9F Meeting Room 4	15:52	17	215.982
10F Office 1	15:52	16	3.469
10F Office 2	109:46	12	18.366
10F Office 3	109:46	12	57.621
10F Office 4	109:46	12	191.573

3.2.6 Reports



(1) Emergency Signal Input

Allocates a dedicated input board for fire signal input. (Di on iPU main unit)

The emergency stop program using this as the input signal function has priority over other controls.

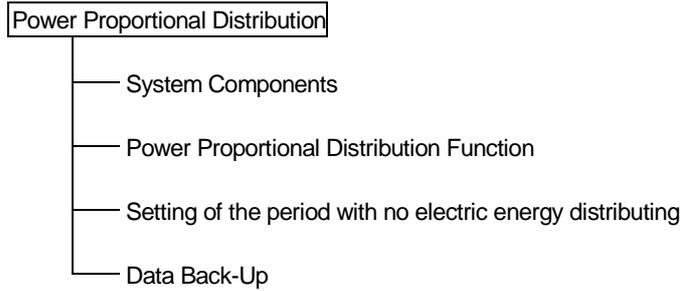
(See Fire emergency stop control.)

(2) Report I/O with Other Emergency System

The application of link control enables key management control that uses the input of a signal from the key management device and the notification to warning devices in security companies when errors in the facilities are detected, such as filled head water tanks, elevator error signals and fire warning systems. It also controls the input and output of a variety of reports.

(However, the status of the proportion of the output of reports does not change for approximately 10 minutes after recovery from a power failure.)

3.2.7 Power Proportional Distribution



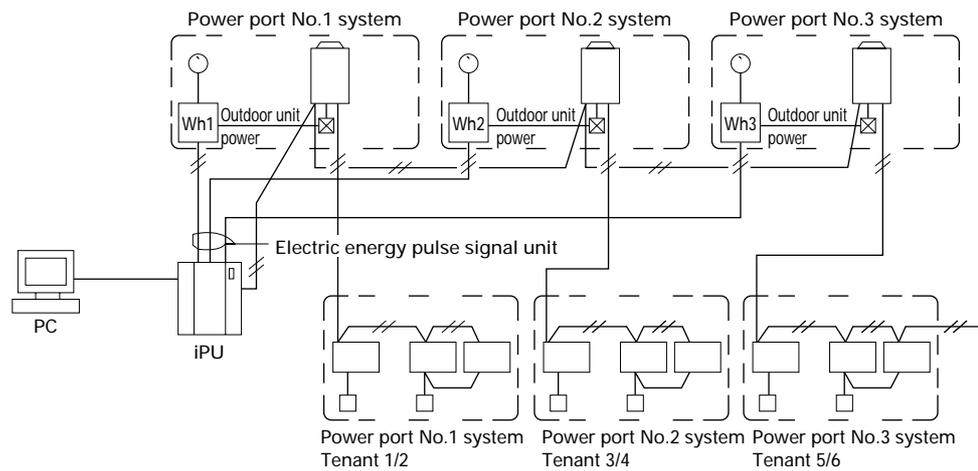
(1) System Components

- ◆ Option setting for use of many watt hour meters (“Grouping of electric power port” to be specified)
 18 units (Max.) of watt hour meter for one iPU (the 1st one) and 19 units (Max.) of that for each iPU among several iPUs (the 2nd or more one) can be connected. Therefore, when 4 units of iPU are used, 75 units (Max.) of watt hour meter can be connected. (It is not recommended to install too many watt hour meters.)

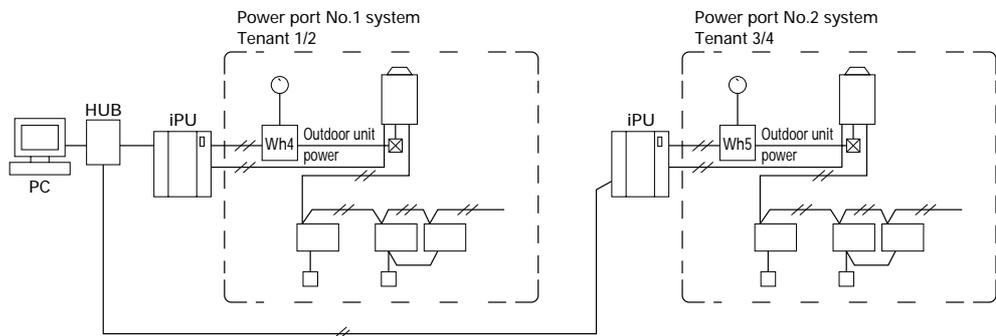
In this case, it is also allowed to specify the option of “Grouping of electric power port”.

Normally, it is not necessary to specify it. The system connection example is as shown below. For both Pattern 1 and Pattern 2, the calculation method, if specified, is the same.

Pattern 1 Three watt hour meters to be connected to one iPU:



Pattern 2 Two watt hour meters to be used with two units of iPU:



Item	Power port not specified (Normal)	Power port specified
Design precautions	Standard design without major conditions	Required to allow each of indoor/outdoor units and watthour meter to correspond.
Test run date	Preparation of address table	Required to prepare the address table and enter the port No.
Relation between the indicated value of watthour meter and the total value of calculation results	The total value of calculation results of electric energy distribution is almost the same as the one of the indicated value of watthour meter. Because the calculation method has a treatment of counting fractions as one, it never becomes smaller than the indicated value of the watthour meter. (*)	
Relation between the distribution calculated value and the watthour meter indicated value	There is a case of no conformance between each watthour meter indicated value and the calculation result of corresponding air-conditioner.	Each watthour meter indicated value almost conforms to the calculation result of corresponding air-conditioner.

Note: *-mark: If many watthour meters (more than two) are installed, it is required to make group setting every watthour meter. If the group setting is not made, the error may become large in the total of each calculation result of the indoor unit corresponding with each watthour meter, though the total of the indicated value of watthour meter almost conforms to the total of calculation result.

Pattern 3 SkyAir distribution of electric energy
Refer to Item 7 "Design precautions".

(2) Power Proportional Distribution Function

Because the JIS calculation is not based on the Weighing Law, it cannot be used for any official business transaction.

(2-1) Power proportional distribution function

The power proportional distribution and determination method is as listed below.

① Power Proportional Distribution as a calculation standard	The power consumption of outdoor unit is counted in 1kWh unit. (To be inputted through integrating watthour meter with pulse oscillator) This value is a standard for determination, therefore, if the watthour meter has a wrong specification, the determined electric energy used is a wrong value.
② Calculation of operating load state every indoor unit (1 unit) (Load every indoor unit to be supposed)	Every 20 sec., the connected indoor unit operating state is received and collected as a communication data, and the tabulation (summing-up) for an hour shall be a "temporary load".
③ Calculation of distribution ratio	In order to determine the power consumption of some air-conditioner A, it is required to determine the temporary load ratio (distribution ratio) of air-conditioner A to the total temporary load of all the connected air-conditioners. However, the value to be determined here is a ratio and not the power consumption. Distribution ratio of indoor unit A t $\frac{\text{Temporary load of air-conditioner A}}{\text{Sum total of temporary load of all air-conditioners}}$
④ Electric energy used from distribution calculation of air-conditioner A	If the electric energy pulse [1kWh/pulse] inputted for an hour from the formal time is multiplied by the distribution ratio every indoor unit, the actual electric energy used can be determined. Electric energy used of air-conditioner A (Distribution calculation) = Distribution ratio of indoor unit A × Number of pulses for 1 hour With this formula, the electric energy used for an hour of air-conditioner A can be calculated and determined. Then, if the same calculation is made for all the air-conditioners, the distribution value for an hour of each air-conditioner can be determined.
⑤ Determination of electric energy distribution value in 1-day unit	For 1-day used power distribution value, the calculation result every hour (1 hour) in ④ is summed up. For end of one day, 12:00 am (mid-night) is fixed. [Rate calculation] One day to be set in a menu is from 12:00 am to 11:59 pm.

The calculation result of the power proportional distribution function is made using the original method of Daikin and is not under law.

Collected data are saved in s daily report around midnight.

(2-2) Basic functions

- ◆ The system is that the rate of use every each indoor unit is calculated and determined from the electric energy used of the outdoor unit.
- ◆ For calculation, the power consumption of the outdoor unit is counted as a pules signal, and this value is distributed depending on the load situation of the indoor unit. (Mentioned later)

Supplement:

Pattern 1: System of connecting three watthour meters to one iPU

If three watthour meters are connected with one iPU, the electric power port is to be specified individually.

Pattern 2: System of using some/many watthour meters with some/many units of iPU

By specifying of power ports, it is also allowed to collectively specify of some/many units.

Example: Of the four iPU, two units are group-specified with one watthour meter, and the remaining two units are group-specified with each unit individually.

Pattern 3: Combinations as above

As a combination system, some/many watt-hour meters can be connected to one iPU for use of some/many units. The precautions and the relation between the calculated value and the indicated value of watt-hour meter are the same as those in Pattern 1 and Pattern 2.

◆ Number of integrating watt-hour meter with pulse oscillator

As a standard system, one integrating watt-hour meter with pulse oscillator (abbreviated "Watt-hour meter" hereafter) is to be provided.

If more than 19 units are connected, the following method (two ways) are effective.

- 1) The mounting position of watt-hour meter is to be changed:

In most cases, if watt-hour meter mounting position is changed to the main body side (toward near cubicle) of the receiving equipment, the number of watt-hour meter can be set within 12 units. If the number of units is increased, these equipment cost will be increased by more than hundreds of thousands yen.
- 2) The specification of watt-hour meter is to be changed, together with use of pulse output:

In this case, because some/many watt-hour meters to pulse synthesizer are used, the cost goes up. For this reason, it is basically not recommended. However, if more than 19 units are connected by all means, the pulse synthesizer should be used and the specification of watt-hour meter should also be different from the standard one. For more detail, you can consult with our Technical Sales Section.

(3) Setting of the period with no electric energy distributing

- ◆ For period of electric energy distributing, the usual (continuous) calculating system is normally adopted, but it is also allowed to set the time zone and days of the week in which no rate calculation is made. For setting, specifying collectively is done, therefore, it is not possible to set the time zone every each tenant.
- ◆ Within the period of no electric energy distributing, the calculation result is 0 kWh. If the electric power is used with the outdoor unit in no-calculation time zone, the calculation result, by this electric energy rate, is less than the meter reading.
- ◆ As an example, the above is used in the following case:

In ordinary regular time, the flat rate (fixed rate) is collected from the tenants, and only in other time, the electric energy distributing is made as an overtime and holiday rate.
- ◆ The no-calculation period can be set by combining the following. (Tenants individual not allowed)
 - Optional start to end time (1 min. unit)
 - Optional day of the week (Unit of day of the week)
- ◆ Reversely, if the optional date (month/day) is specified, the rate can forcibly be calculated with 1-day unit.

Regardless of specifying of no-calculation period, the rate calculation is made. (Tenants individual not allowed)

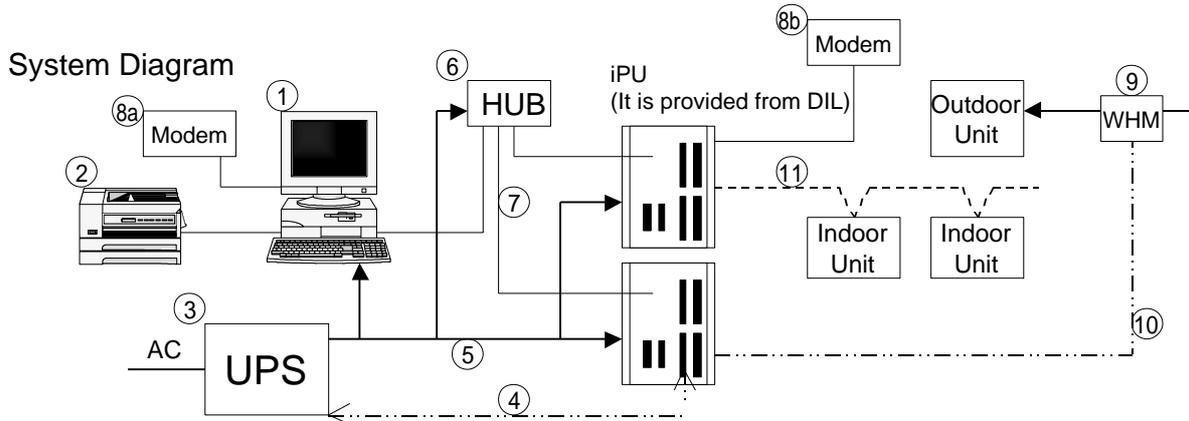
 - Optional date (month/day) with 1-day unit (1 year)

(4) Data Back-Up

- ◆ The set data in the dues control unit is not deleted even if the electric power is turned off, because the data is stored in the non-volatile (flash) memory.

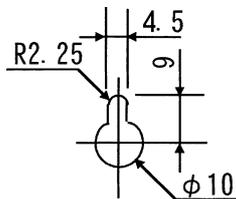
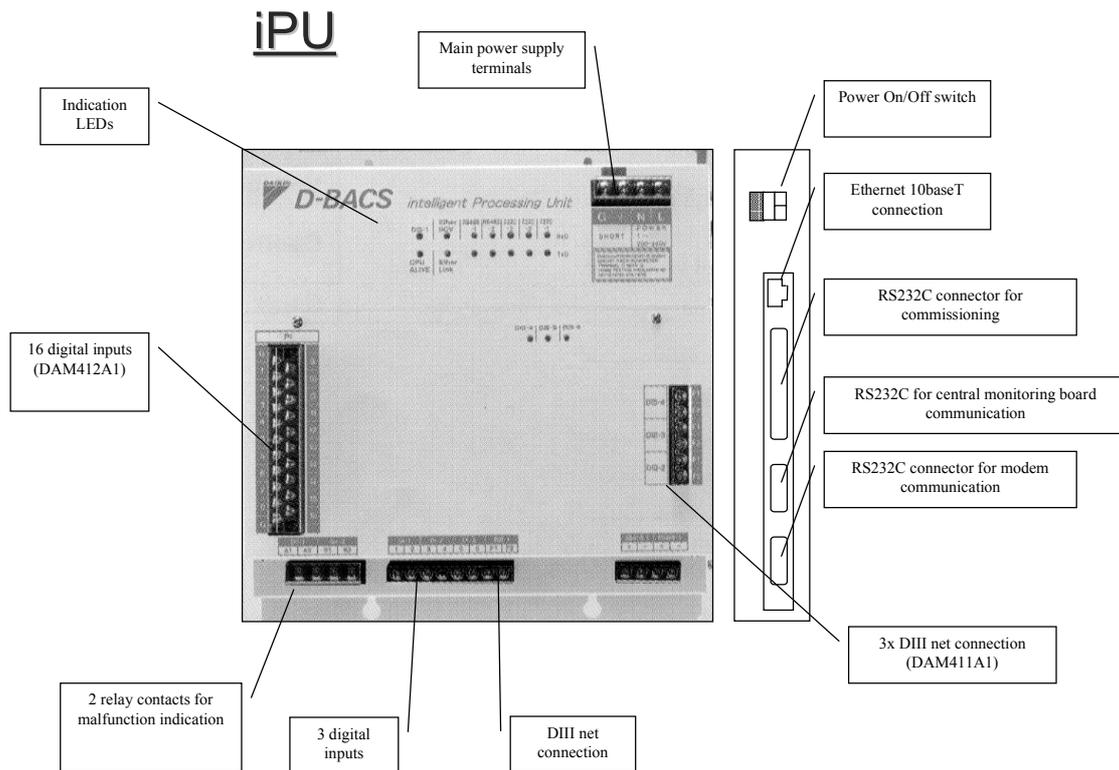
4. System Architecture

4.1 Requirement spec and the recommendation of other equipment



	Requirement Specifications	Recommendations	Remarks
PC	<p>① [Hardware] CPU : Pentium 300MHz minimum, 500MHz or above recommended Memory : 64MB or above HDD : 4GB minimum, 8GB or above Keyboard/Mouse Network : 10Base/T SVGA (800x600) Monitor (15', 17') Sound & Speaker</p> <p>[Software] Windows NT 4.0 (SP4) Windows 2000</p> <p>[Other equip.] LBP (not indispensable.)</p> <p>② - It must be supported by WindowsNT. - Require A4 size paper</p>	<p>We recommend makers such as IBM, Compaq or Dell, etc.</p> <p>We recommend makers such as HP, Canon, etc.</p>	<p>In the case of an alternative maker, correct operation should be checked before shipment.</p>
UPS	<p>③ Capacity : 200-250W / 20min Voltage : as required on the field</p> <p>④ Control Signals - Power failure signal (from UPS) - UPS shutdown signal (to UPS)</p> <p>⑤ AC power lines</p>	<p>APC SU700, SU1000 Series + Relay I/O module(AP9610)</p>	
Network Equip.	<p>⑥ Multi-port HUB (4 or more ports) 10Base/T cables (category 5)</p> <p>⑦ A required distance and a number</p>	<p>We recommend makers such as 3com, etc.</p> <p>The cable for networks is required.</p>	<p>Hub should be used even when one iPU is connected to PC.</p>
Modem	<p>⑧a 33.6kbps communication speed and reception function are required.</p> <p>⑧b For Air-Net use</p>	<p>We recommend makers such as 3com, etc.</p>	<p>Required for remote monitoring. However, we recommend it to be included as a standard.</p>
WHM	<p>⑨ 1pulse / 1kWh output is required.</p> <p>⑩ WHM - iPU connection cable</p>	<p>As specified in the D-BACS system design guide.</p>	<p>Required for power-proportional-division.</p>
other	<p>⑪ D3network cables</p>	<p>As specified in the D-BACS system design guide.</p>	

<iPU External View>



Detailed View of Attachment Hole

(1) Electrical rating

- 1) Rated voltage: Single phase AC 200 to 240 V 50/60 Hz
- 2) Power consumption: Max. 20 W

(2) Conditions of Use

- 1) Power voltage variation: $\pm 10\%$ of rated value
- 2) Ambient temperature of use: -10 to 50°C
- 3) Ambient humidity of use: 0 to 98% (However, there must be no humidity.)
- 4) Storage temperature: -20 to 60°C

(3) Performance : Insulation resistance: Min. $50 \text{ M}\Omega$ at DC 500 V M

(4) Mass : 3.5 kg

(5) Painting color : light ivory

UPS UPS (e.g.APC SU700, 1000 series)

Item		Requirement Specification
UPS	Capacity	200-250 W/20min
	Voltage	As required on the field
	Control signals	Power failure signal (from UPS) UPS shut down signal (to UPS)
	Relay	I/O module (AP9610)

<http://www.apcc.com/products/smart-ups/index.cfm>

Smart-UPS 1000**Part Number:** SU1000INET

Availability: Latin America , Eastern Europe : Middle East : Africa , Western Europe , Asia : Australia : South Pacific

**230V Output / 230V Input****

Technical Specifications	Part Number	Availability*	Estimated Runtime (hrs:mins)
 Smart-UPS 1000	SU1000INET	Latin America, Eastern Europe : Middle East : Africa, Western Europe, Asia : Australia : South Pacific	3:54

● Product Overview

Description	APC Smart-UPS, 1000VA/670W, Input 230V/Output 230V
General Features	Hot Swap Batteries , Intelligent Battery Management , Overload Indicator , Replace Batt Indicator , SmartSlot , Software , Automatic Voltage Regulation (AVR) , User replaceable batteries
Includes	User Manual , Smart UPS signalling RS-232 cable , CD with software
Documentation	User Manual

● Technical Specifications**Output**

Rated Power	1,000 VA
Output power capacity	670 Watts
Nominal output voltage	230 V
Output Voltage Note	Configurable for 220 : 230 or 240 nominal output voltage
Output Connections	(4)IEC 320 C13 
Waveform type	Sinewave

*"Smart-UPS" is registered trademark of APC

Input

Nominal input voltage	230 V
Input frequency	50/60 Hz +/- 3 Hz (auto sensing)
Input Connection Type	IEC-320-C14 inlet
Input voltage range for main operations	174 - 286 V
Input voltage adjustable range for main operations	168 - 302 V

Batteries

Typical backup time at half load	20.1 minutes
Battery type	Maintenance-free sealed Lead-Acid battery with suspended electrolyte : leakproof
Typical recharge time	3 hour(s)
Replacement battery cartridge	(1) RBC6

Surge Protection and Filtering

Surge energy rating	320 Joules
Filtering	Full time multi-pole noise filtering : 0.3% IEEE surge let-through : zero clamping response time : meets UL 1449

Physical

Maximum height dimensions	8.50 inches (21.59 cm)
Maximum width dimensions	6.70 inches (17.02 cm)
Maximum depth dimensions	17.30 inches (43.94 cm)
Net weight	41.50 lbs (18.86 kg)
Shipping weight	46.00 lbs (20.91 kg)
Color	Beige

Environmental

Operating Temperature	0 - 40 °C (32 - 104°F)
Operating Relative Humidity	0 - 95%
Operating Elevation	0-10000 feet (0-3000 m)
Storage Temperature	-15 - 45 °C (5 - 113°F)
Storage Relative Humidity	0 - 95%
Storage Elevation	0-50000 feet (0-15000 m)
Audible noise at 1 meter from surface of unit	41 dBA
Online thermal dissipation	100 BTU/hr

4.2 Confirmation of Watthour Meter

For distribution of electric energy, the integrating watthour meter with pulse transmitter is required. It is important to confirm that the specifications coincide with each other, and also to confirm with the division in charge (normally, electrical work division, not air-conditioning div.).

4.2.1 Specifications of watthour meter to be connected to intelligent Manager

- a) To be an integrating watthour meter with pulse transmitter.
- b) The output pulse unit (pulse weight) is to be 1 pulse to 1kWh (1Wh/pulse).
- c) The pulse width is to be within 40 to 400 milli-sec.
- d) The mercury relay is to be used for pulse output, and it to be no-voltage output.
- e) If even any of the mechanical or electrical type conforms to the above "a)" to "d)", it can be used.

If the specifications are not coincident, there is a possibility that the following imperfections are caused:

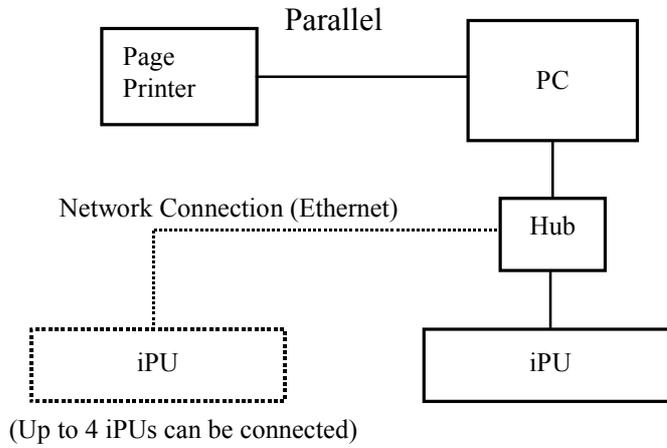
- ◆ If the output pulse unit is not 1kWh/pulse.
It results a large difference between the reading (value) of watthour meter and the total value of distribution of electric energy.
For the charge calculation, the number of pulse input is counted and the power consumption of the outdoor unit is monitored, therefore, for example, if the large value, 10kWh/pulse, is inputted, the electric energy calculated is the value of one tenth (1/10) times.
- ◆ If the pulse width is not within 40 to 400 milli-sec.
If it is less than 40 milli-sec., the pulse input cannot be detected, and the result of calculation is smaller than the real value.
In addition, if more than 400 milli-sec., more than 2 pulses is detected for 1-pulse input, and the result of calculation is large than the real value.
- ◆ If use of contact other than mercury relay
If it is a general relay, the pulse may not accurately be detected due to relay chattering.

Confirm the following items for the construction process.

- ◆ Construction of pulse signal line is kept away from power cables
For this pulse signal line, the voltage DC24V should be applied from the intelligent Manager side. It should be constructed separating from the power cables.
- ◆ Max. distance to be 200 m
Confirm that the distance with the watthour meter~intelligent Manager is within 200 m.

5. Wiring Image

5.1 System Connection



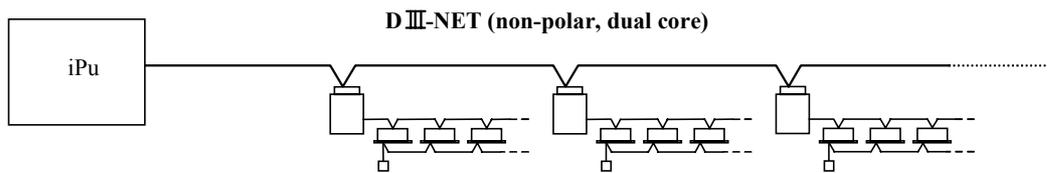
<Use of Printers>

1. Standard Setting: With only the page printer: Parallel port connection
 - Printing of daily, monthly, annual reports and cost calculations: Automatically prints at the set time
 - Display of errors and changes of states etc: Printer at error or at determined build up of data, or freely.
2. 2Units of Page Printer and Line Printer (Optional)
 - * Page printer: Network connection
 - Daily, monthly, annual reports: Automatically prints at the set time
 - Cost calculation

Connecting to iPU

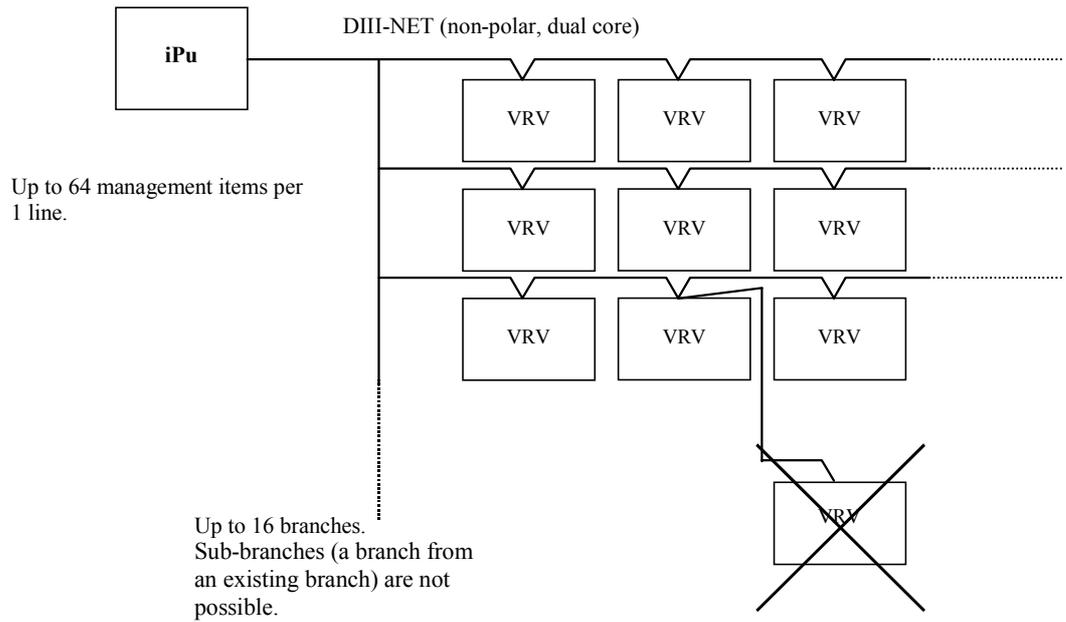
Wiring varies according to the equipment to be connected, as shown below.

* DIII-NET Compatible Air Conditioners

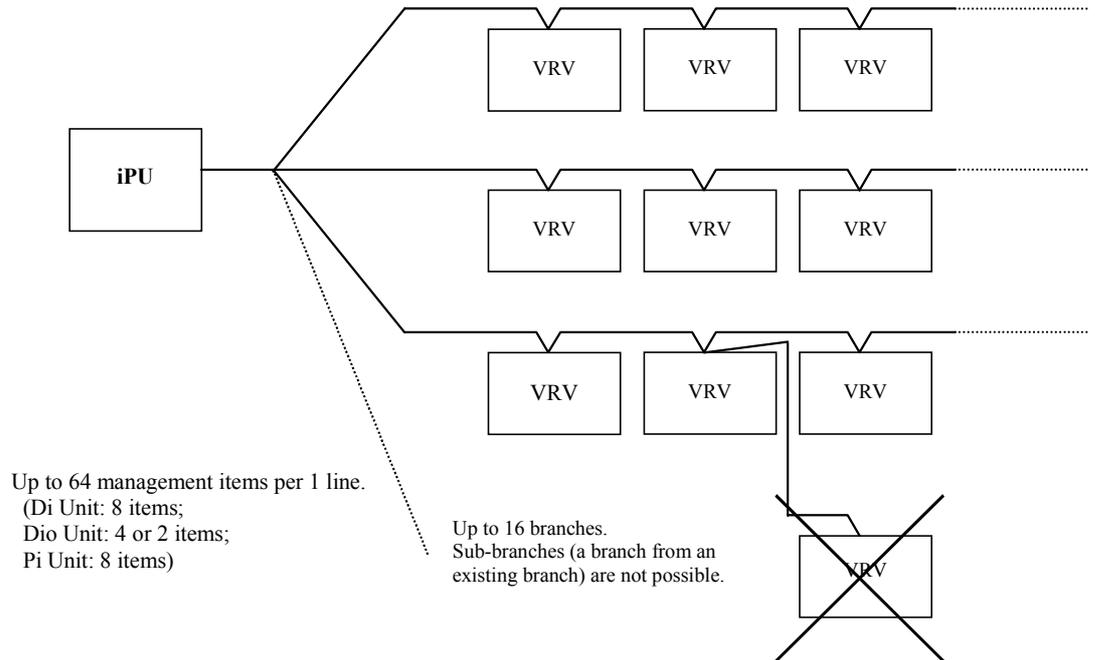


Per 1 DIII-NET line:
 Up to 10 outdoor units
 Up to 64 indoor units

(1) Bus Method

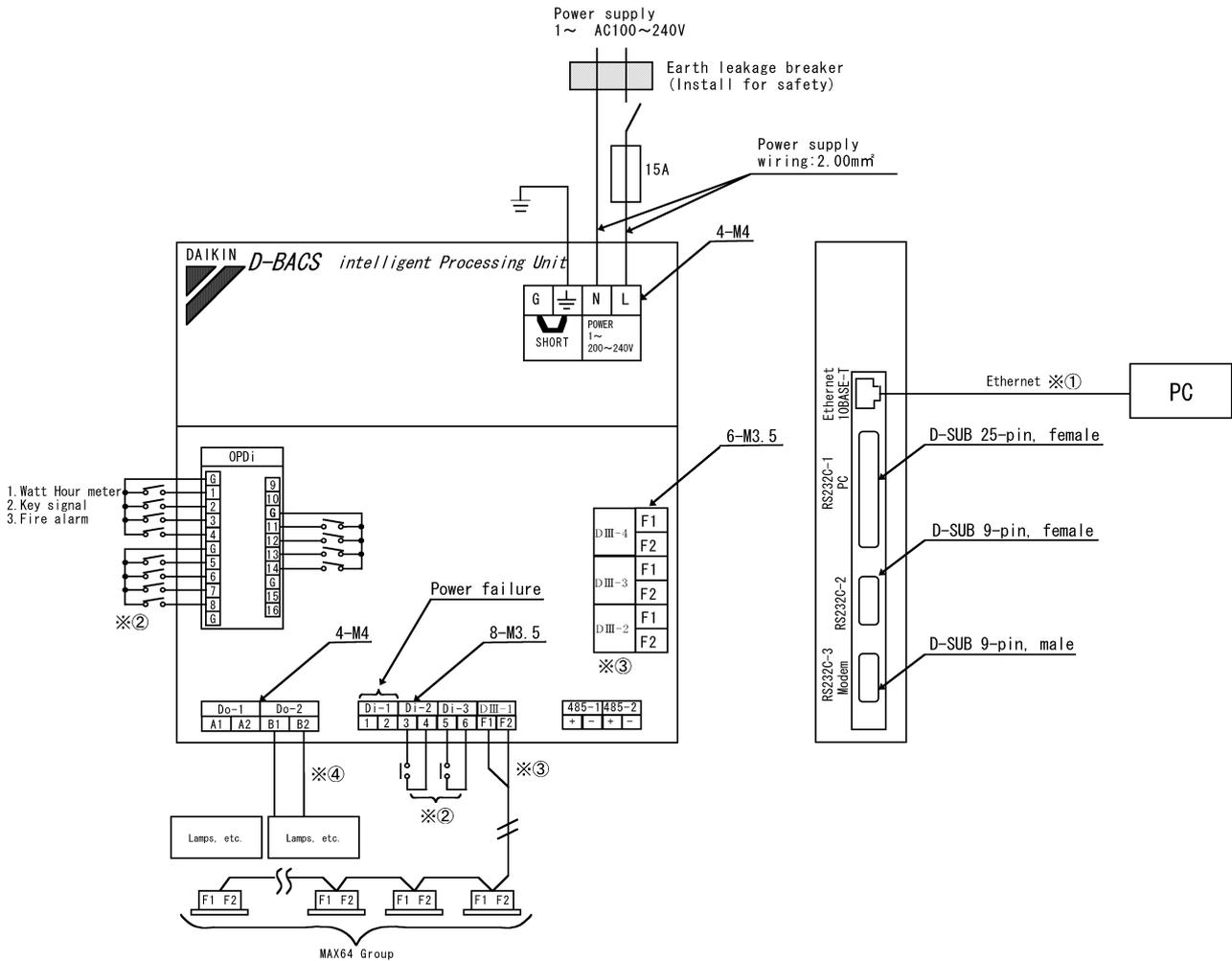


(2) Star Method

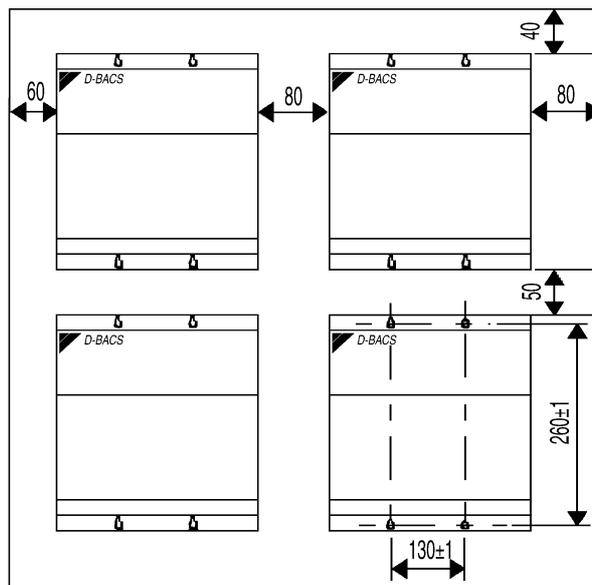


5.2 Wiring Diagram

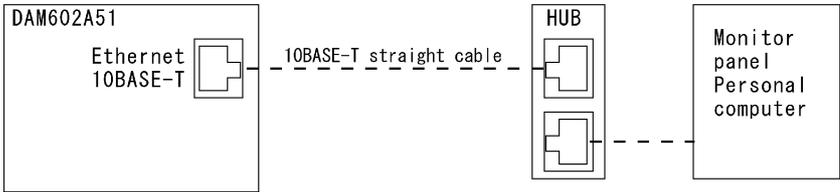
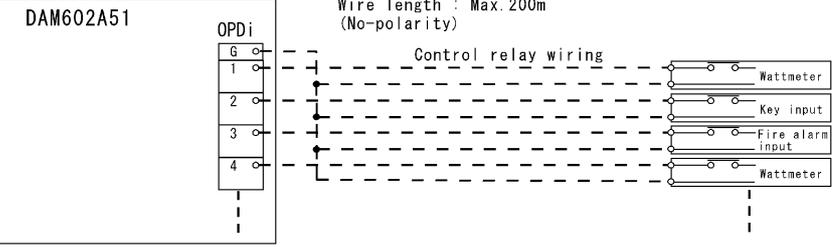
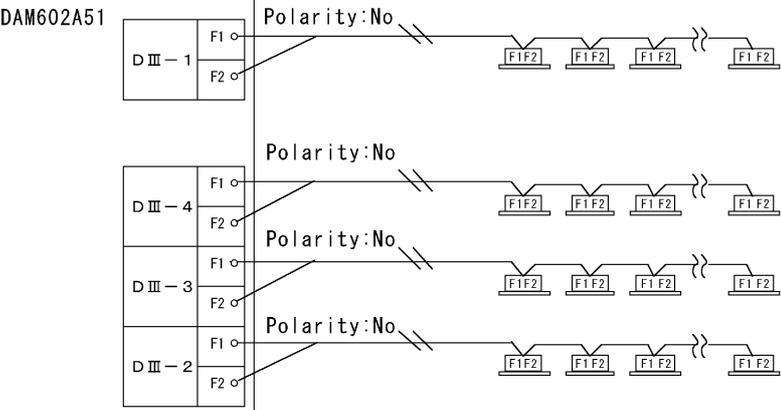
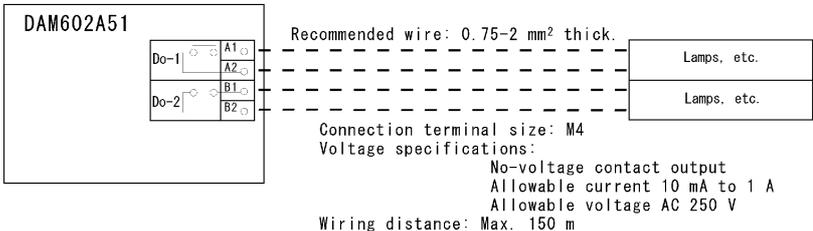
"intelligent Manager Electric Wiring Diagram



Required Installation Space



5.3 Wiring Specifications

No. ※	Wiring specifications
①	<p>● Ethernet communication wiring</p> <p>To be prepared locally</p>  <p>DAM602A51 Ethernet 10BASE-T — 10BASE-T straight cable — HUB — Monitor panel Personal computer</p>
②	<p>Use sheathed vinyl cord (2-wire) or cable (0.75~2mm²) Wire length : Max. 200m (No-polarity)</p>  <p>DAM602A51 OPDi</p> <p>Control relay wiring</p> <p>Wattmeter Key input Fire alarm input Wattmeter</p> <p>Note 1: Up to four input devices can be connected to each G terminal. Do not connect three or more wires together to one terminal.</p> <p>Note 2: Use micro-current contacts for no-voltage input contacts. (Voltage and current to be at DC 16 V and below 10 mA with the contact closed)</p> <p>Note 3: The order of connections may flexibly be modified depending on the test-run settings.</p> <p>With a combination of OPDi, Di-2 and Di-3, total of 18 input devices can be connected.</p>
③	<p>● DIII-NET wiring</p>  <p>DAM602A51</p> <p>DIII-1 F1 F2 Polarity: No</p> <p>DIII-4 F1 F2 Polarity: No</p> <p>DIII-3 F1 F2 Polarity: No</p> <p>DIII-2 F1 F2 Polarity: No</p> <p>F1 F2 F1 F2 F1 F2 F1 F2</p> <ol style="list-style-type: none"> Never use three- and more-core wires. Make sure the wires are 0.75-1.25 mm² thick. Wire length: Max. 1000 m Do not bundle the DIII-NET wires together. Do not lay the DIII-NET wires for a long distance by bundling and securing them with tape, tie-wraps or the like. Lay the DIII-NET wires separately from any power lines to keep off electrical noises.
④	<p>● Do-1 and Do-2 settings</p>  <p>DAM602A51</p> <p>Do-1 A1 A2</p> <p>Do-2 B1 B2</p> <p>Recommended wire: 0.75-2 mm² thick.</p> <p>Lamps, etc.</p> <p>Lamps, etc.</p> <p>Connection terminal size: M4</p> <p>Voltage specifications: No-voltage contact output Allowable current 10 mA to 1 A Allowable voltage AC 250 V</p> <p>Wiring distance: Max. 150 m</p>

External wiring to be all prepared locally.

6. Setting Up

6.1 Precautions for Setup

The intelligent Manager Monitor System PC and printer are used in the same way as general OA equipment.
iPUs are set up within the system.

However, avoid setting up in the following locations.

- Locations that are exposed to direct sunlight, or that are subject to radiation from heat generating equipment such as a boiler.
- Locations with high humidity or where there could be contact with water.
- Locations that are corrosive or where inflammable gas is generated.

Ambient temperature and humidity conditions of location of setup

10 - 35°C 20 - 80% RH (intelligent Manager Monitor System PC, Printer, Display, UPS)

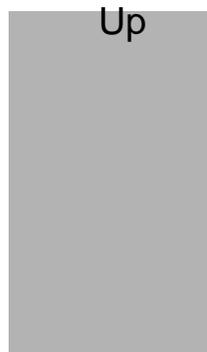
0 - 50°C - 95%RH (iPU)

Separate our air conditioning power (electrical) lines and the communications lines for control a minimum of 50 mm. In other cases, separate from the power lines to meet the following conditions.

Power Line Electrical Capacity		Distance of Separation of Power Lines and Communication Lines for Control	
		Daikin Air Conditioners	Other Equipment
Max. 220 V	Max. 10A	Min. 50 mm	Min. 300 mm
	Max. 50A		Min. 500 mm
	Max. 109A		Min. 1000 mm
	Exceeding 100A		Min. 1500 mm

6.2 Summary of Attachment

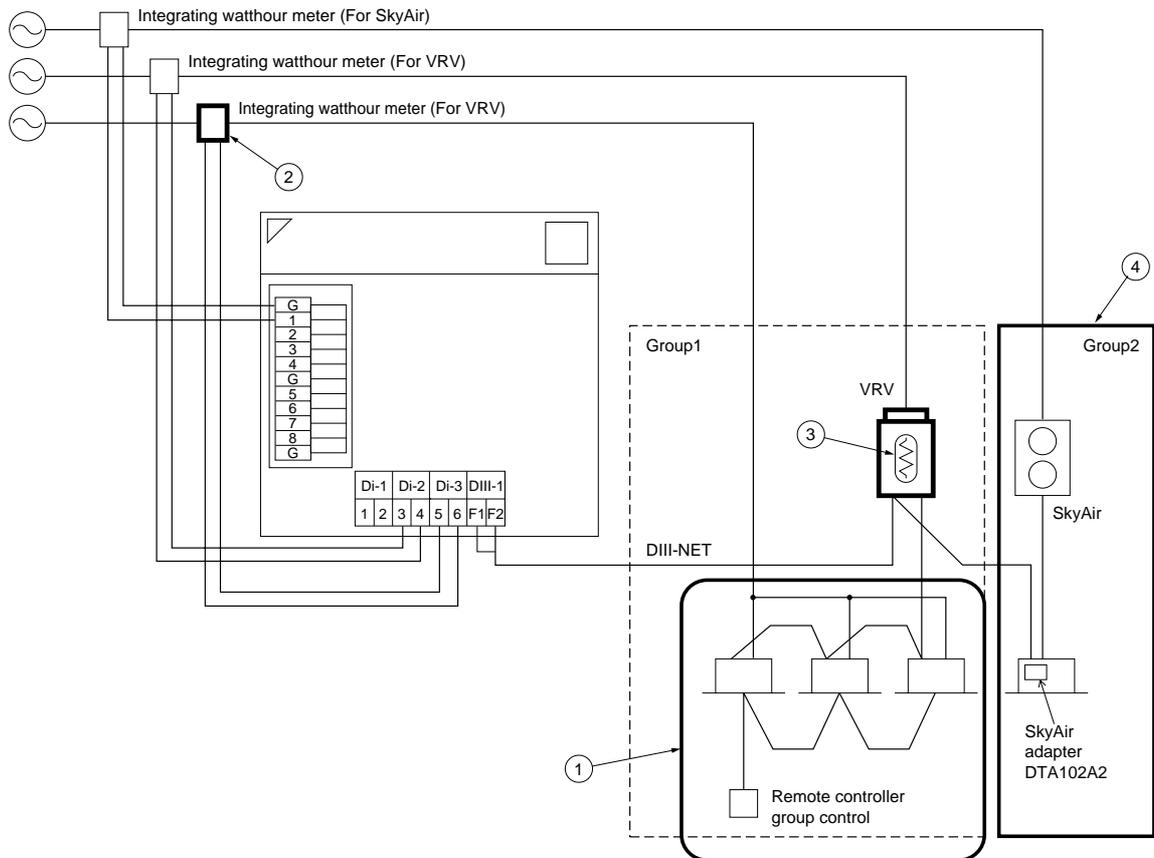
- **Always attach inside a locked electrical equipment box (or somewhere that cannot be opened without the use of a special tool) so that indoor equipment cannot be easily tampered.** The location should not allow the equipment to be subjected to the influence of electromagnetic waves or to be exposed to dust.
Minimum depth dimension necessary for setup is 100 mm.
- The figure at right shows the minimum spacing between equipment when setting up consecutively and the wall.
- Attach as shown in the following figure.



Always attach in the vertical direction. Attaching horizontally will cause failures so do not attach in that direction.

7. Design Precautions

7.1 Rate calculation



7.1.1 Remote controller group control

Also in the indoor unit (sub-unit) with remote controller group control, set the centralized address for correct electric energy distributing.

(The centralized address for sub-unit can be set in the site set mode "30" of the remote controller. However, after setting with "30", if set with "00", the sub-unit address will be deleted.)

→ An imperfection in case collective distribution is done with main-unit running state without setting of centralized address at sub-unit

Even if the remote controller group control is done, each indoor unit has different thermostat state depending on its installation place.

Therefore, the distribution result will differ depending on the decision which indoor unit is to be as main unit.

7.1.2 In case power consumption of indoor unit to be distributed

In distributing the power consumption of the indoor unit, it is necessary to connect the integrating watt-hour meter to the power system of the indoor unit and input its pulse output to intelligent Manager. If such a wiring is connected, in making equipment setting in test run, set at "To make distribution calculation for indoor fan" with intelligent Manager calculation conditions.

7.1.3 Calculation of electric power (Crankcase heater/PC Board power consumption) at stopping

- In the case of calculation for crank case heater and PC Board when not in operation.
 - The electric power consumed by crank case heater of the outdoor unit is divided by the capacity of each indoor unit.
N.B. The calculation also includes the indoor units which are not in operation. (eg.vacant)
- In the case of not calculating for crank case heater and PC Board when not in operation.
 - It is possible to exclude the power consumed by crank case heater and PC Board.
Therefore the power won't be added to each indoor unit.

7.1.4 Electric energy distributing of SkyAir

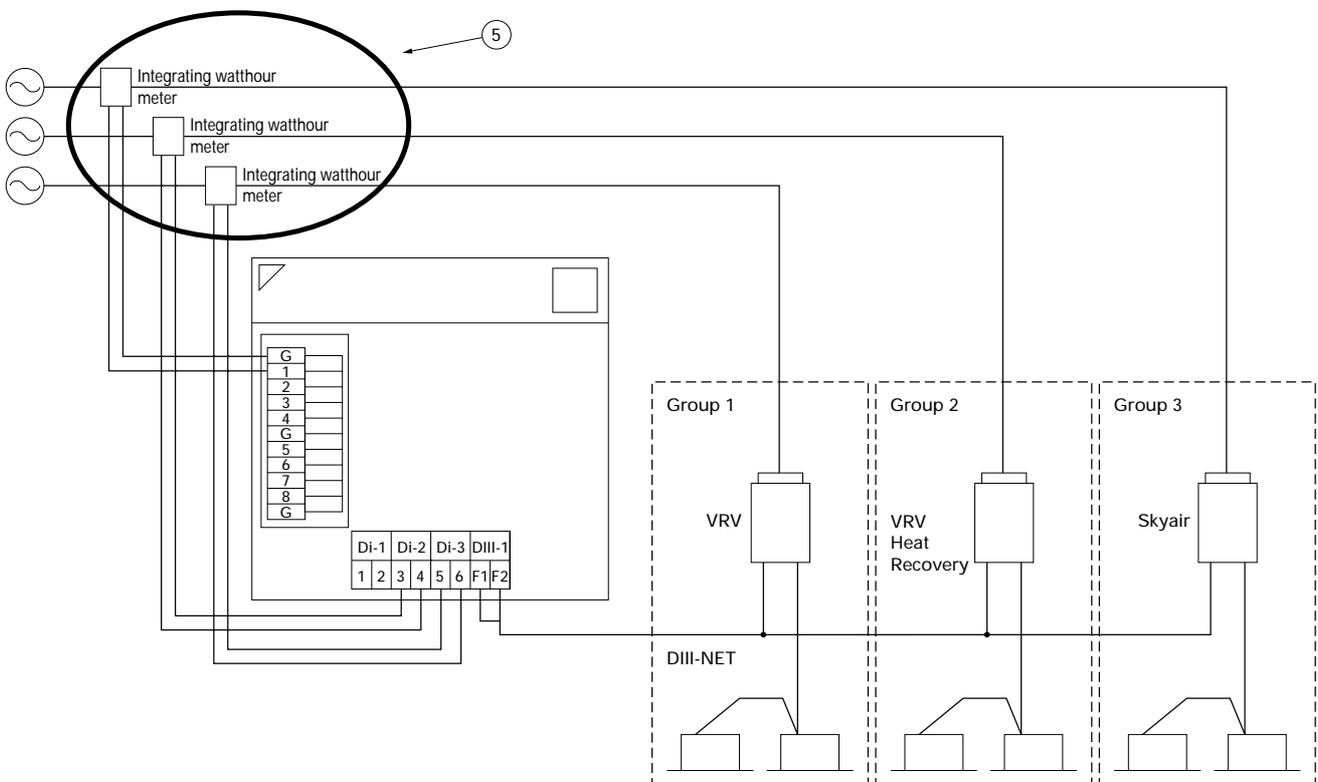
The SkyAir electric energy distributing cannot be included with the group of VRV system. Therefore, it is necessary to separate the group for rate calculation by group setting. Further, the applicable model is also limited. Before applying, refer to “i-Station Test Run Manual: CB94A105A”.

7.1.5 Setting of electric power group

It is possible to distribute the electric energy with one kWh meter if all groups are of the same design and indoor/outdoor units are of the same size as each other group respectively. (different A.C. systems cannot be from the same meter)

7.2 Setting of each electric power group

Although the iPU unit allows electric energy distributing with one integrating watthour meter, if some/many integrating watthour meters are connected as shown below, the electric energy distributing accuracy can be improved.



7.3 The reason why VRV Heat Recovery must not be included

For Heat Recovery outdoor units, the wathour meter must be independently installed.

- (1) For heat recovery, there is a case that the power consumption is less than VRV and VRV Plus.
- (2) However, if different systems are put on the one meter, the electric power distribution would be calculated by constant counting, and the calculation result would then more than the actual value on all indoor units.

There fore, it is necessary to install the wathour meter independently as shown in Fig. 2.
 In addition, the power port No. in Address Table must be different from others. (To be set at test run)

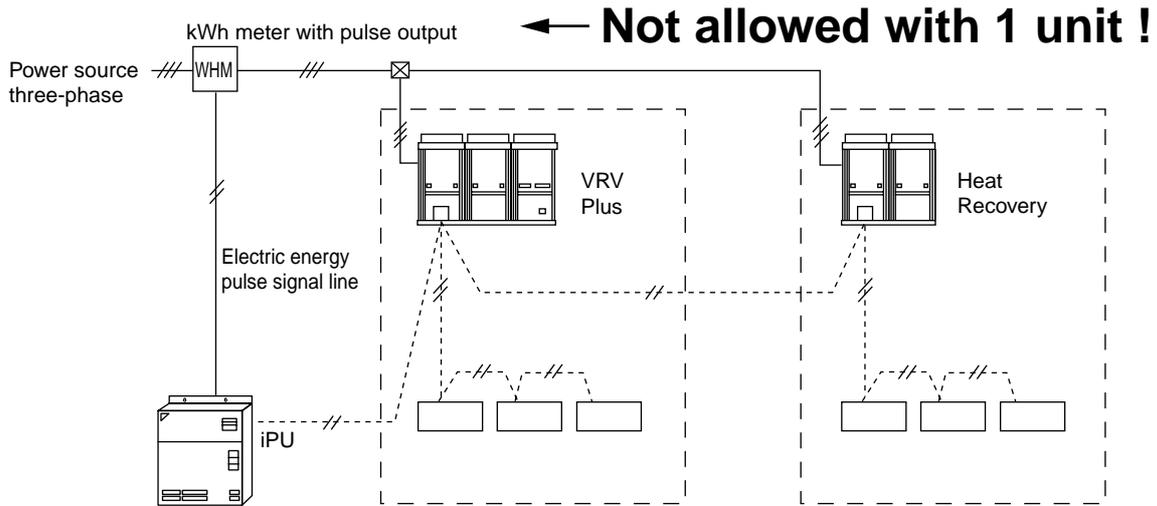


Fig.1 Not Recommended : Wathour meter is shared.

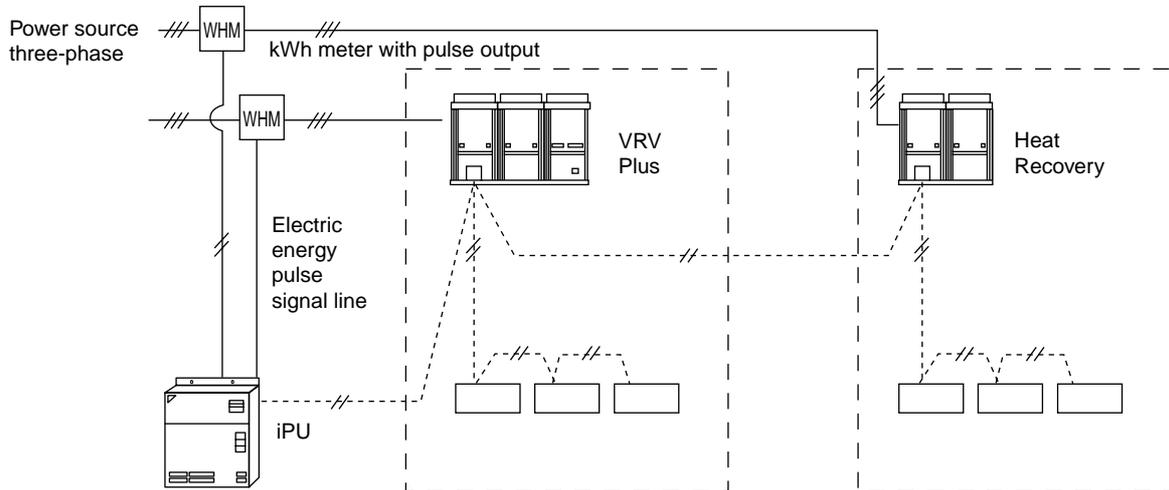
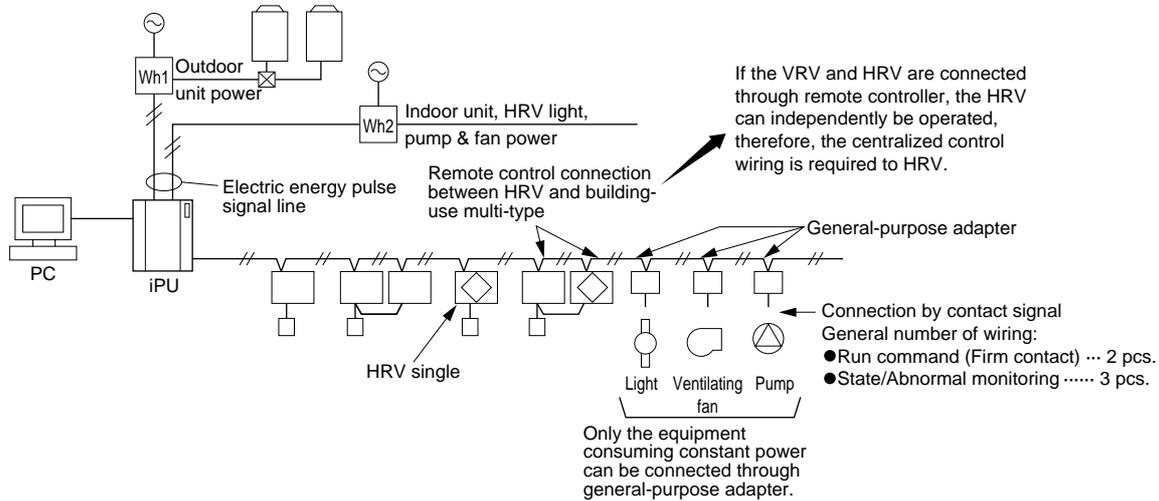


Fig.2 Recommended : Heat Recovery and other system wathour meter are separated.

8. Connection other than VRV

Though the models other than VRV are included in “Rate calculation applicable models”, the following system shows the example of connection of HRV Type FJ and general-purpose adapter.

8.1 System example



8.2 Requirements

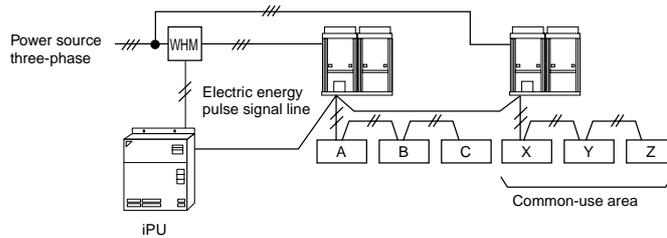
- If HRV and general-purpose adapter are used, the power consumption of the indoor unit is to be distributed. Therefore, it is necessary to input the power consumption of the VRV, HRV, general-purpose adapter and constant power-consumption equipment (units) to be connected to the dues control unit. Concretely, using the watt-hour meter (with pulse output), the pulse signal is to be connected to the iPU.
- For HRV, the centralized control wiring is required without fail.
- Only the type consuming constant power (light, etc.) can be connected to the general-purpose adapter. If the power consumption varies depending on the inverter, etc., such an equipment cannot be connected.
 (Distribution calculating error is increased.)

9. Conditions and Method to Exclude Calculation for Specified Indoor Unit

There is a case that a part of indoor units is desired to be excluded from calculation, such as corridor, hall, etc.

Typically, there are two ways as below.

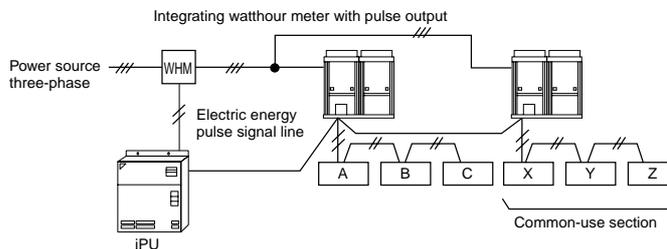
9.1 The power consumption of common-use area can be separated from other areas



- Separating the system is required among the common-use area, outdoor units for office, etc. and the power source.
- Enter "No" in the column of electric energy distributing in Address Table.
- *In calculating the common-use power independently, it is also possible to mount the watt-hour meter (with pulse output) for common-use area.

9.2 The power consumption of common-use area is distributed to other area

(In this case, it cannot uniformly be distributed to other indoor units. The power consumption of the common-use section may be added to the specific indoor unit.)



- The power consumption of the common-use area is distributed to the indoor unit in the office, etc. The calculated value in the office, etc. is increased by the value distributed from the common-use area.
- The wiring work method for the common-use area is quite the same as that of the indoor unit in other offices, etc.
- Enter "No" in the column of electric energy distributing in Address Table.

Example: When the power consumption is A=B=C=10kW and X=Y=Z=5kW, the calculation result total is 45kW, and the calculated value of A, B and C is as follows:

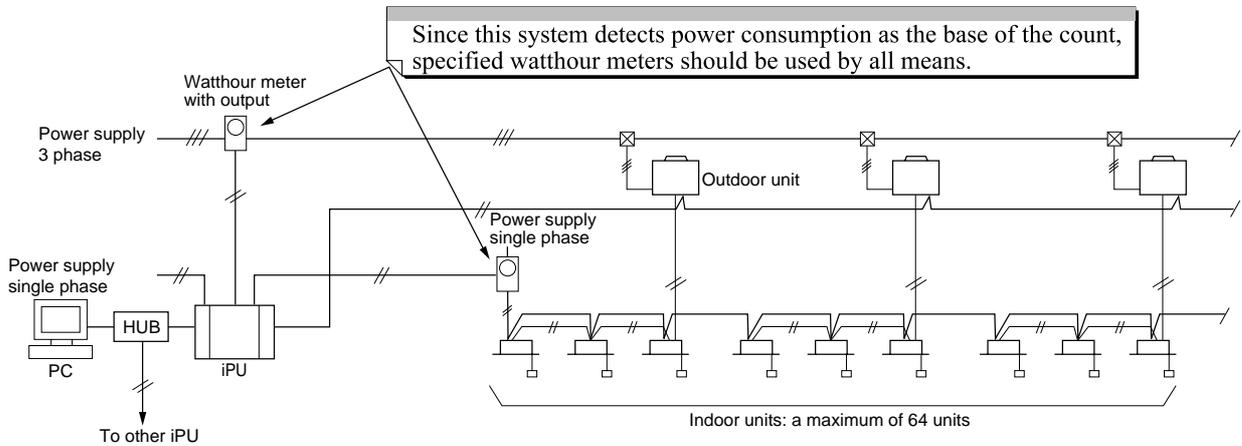
$$A=B=C= \frac{10}{10+10+10} \times 45=15kW$$

The common-use section is distributed and power consumption is more than the actual one.

10. Explanations of Power Proportional Distribution

10.1 What is the Power Proportional Distribution (PPD)

(System Ex. : Normal VRV)



- Previously the general way for requesting the electricity charge at rental buildings was that a management staff read a watt-hour meter and billed the tenants by manual-account based on the operation time which were counted through time-counters. However, this method takes a lot of time for the management staff. In addition, as airconditioning consumes much different electricity for either the operation of airconditioning (thermostat-on) or the operation of fan only (thermostat-off), it might cause to give unfair sense to the tenants inhabited in the spaces with different heat load, though “operation-time” itself is the same. For instance, even if a certain higher preset temperature is applied in summer for energy saving, fee for airconditioning may equal to the fee without preset temperature so far as it is counted based on the operation time.
- Electric energy distributing function of intelligent Manager carries out the proportional division computation in consideration of those thermostat-on and thermostat-off operations and saves time for building management staffs to read watt-hour meters, and also supplies tenants printed data useful for making the bills. Namely, intelligent Processing Unit (iPU) is the product created by the concept to help the assignment of bill-issuing and offers users the reasonable price of the products.
- Yet, since the iPU is constantly assuming each indoor unit's power consumption based on the data which is transferred from indoor units, it should be noticed that the iPU is not which complies with the Weight and Measure Act as shown in the catalogue. The details of the cause to count error is described at chapter 2.

10.1.1 Count method (for a conventional VRV system)

- 1) The following proportional division calculation is carried out every one hour and assigns the power consumption of airconditioning system to each indoor unit.

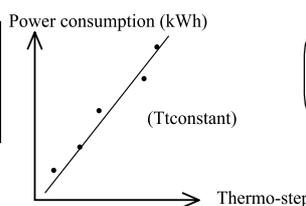
Heat load depending on the operation conditions of airconditioner = power consumption of indoor unit's fan
 + power consumption of optional heater
 + the rated power consumption in cooling (*1) x a
 + the rated power consumption in heating (*1) x b

$$a = (a1+a2xT) \times \frac{\text{Thermo-step}^{(*2)}}{10}$$

$$b = (b1-b2xT) \times \frac{\text{Thermo-step}^{(*2)}}{10}$$

a1, a2: correction factor for cooling
 b1, b2: correction factor for heating
 T: indoor unit's suction air temperature

Indoor units N's power consumption (kWh) = total pulse input from wattmeters x



*1: The value which is registered at the test run, adapting the indoor unit's capacity

As shown in the left, heat load is calculated from an equation of the first degree which approximates the correlation, among thermo-step, indoor unit's suction air temperature and power consumption, into the linear line under the standard conditions of the unit.

*2: "Thermo-step" signifies that an airconditioning capacity is expressed in a range of the values 0-5 mainly based on the opening grade of an electronic expansion valve in an indoor unit. Heat load by one hour calculated through the operating of airconditioner N

total heat load by one hour calculated through the operating conditions of all the airconditioners

- 2) Calculation of the proportional division value for a dairy power consumption

The proportional division value for a dairy power consumption is stored with factors of each indoor unit's number and a calendar date as a table shown below after adding the count result of hourly power consumption from 00:00 through 23:59. (with a graduation of 10 W)

Indoor unit No. Date	001	002	003	004
April 1st	000150	000211	000741	004402
April 2nd	002004	005202	009205	005902
April 3rd	000313	001103	000086	008173

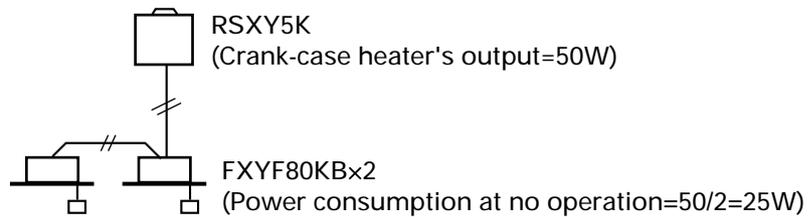
The set data in the dues control unit is not deleted even if the electric power is turned off, because the data is stored in the non-volatile (flash) memory.

3) Counting the electricity at the ceased condition of the unit

Even if an airconditioner is stopped or in the condition of thermostat -off (the condition that the compressors are stopped as the temperature in the space where all the indoor units are installed falls down to the preset temperature), the airconditioner consumes energy due to the energy consumption mainly by the crank-case heater in the outdoor unit.

When the iPU is used, the rated power consumption of the crank-case heater is divided by the number of indoor units in usual connection(for instance , two indoor units of 2.5 HP are connected to an outdoor unit of 5 HP etc.) and the value is registered at the test run ,adapting each indoor unit's capacity.

(Example)



The iPU counts the indoor unit's operating conditions every 20 seconds.

Since the indoor units send ON/OFF data of the crank-case heater the to iPU, it adds one(+1) to the power counter inside iPU at no operation of the airconditioner when the crank-case heater is ON.

When this counter reaches 180, it judges that the crank-case heater was on for one hour, and in case of the above mentioned indoor unit, the counter goes back to zero after 25 Wh is added to the counting result .

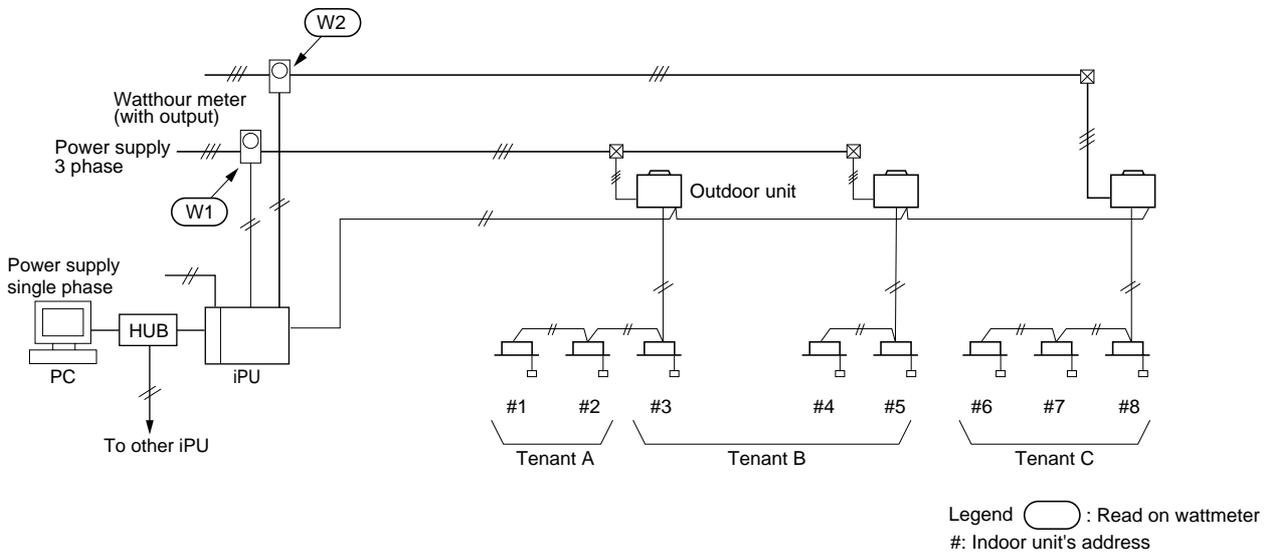
This calculation process is conducted separately from the proportional division computation mentioned on the section 10.1.1 of this document, and this input is got rid of from the pulse input of the watt-hour meter. Because of this procedure, the power consumption in the space where the airconditioner is not used at all is counted constantly every month.

(However, as this airconditioning system is a multi-system, in case that one outdoor unit is shared to another tenant, the count output can be seen in lower value rather than the crank-case heater's power consumption registered, because the crank-case heater doesn't actuate when another tenant operates the airconditioner.)

10.2 Count Accuracy

10.2.1 Cause of error

(System example)



<Case of arising error>

- 1) $W1 + W2 \neq$ Count conclusive total for indoor unit #1~#8 \implies Refer to the next page
- 2) $W1 \neq$ Count conclusive total for indoor unit #1~#5
 $W2 \neq$ Count conclusive total for indoor unit #6~#8 \implies Refer to the next page
- 1) $W1 \neq W2 \neq$ Count conclusive total for indoor unit #1~#8* : The reason to get and the error size

■ REASON 1

iPU counts every one hour's power consumption. Though fraction in case of computation occurs at this time, it is computed after leaving off a 1-W figure to avoid the risk for the owners. As a result, the error by the leaving-off occurs by 0.5W/ hour in average value of all indoor units.

(Calculation example)

(1) Count for errors in 8-day

Tenant A + B: $0.5 (Wh) \times 24 \text{ hours} \times 8 \text{ days} \times 5 \text{ units} = + 0.480 \text{ kWh}$

Tenant C: $0.5 (Wh) \times 24 \text{ hours} \times 8 \text{ days} \times 3 \text{ units} = + 0.288 \text{ kWh}$

total = + 0.768 kWh

(2) Assuming that the reads on watt-hour meters are as follows:

W1: read on watt-hour meter = 490 kWh

W2: read on watt-hour meter = 200 kWh

total = 690 kWh

(3) Finally it is concluded as total error = $0.768/690 \times 100 = 0.11\%$

■ REASON 2

When airconditioners of all the tenants cease operation, the power consumption which were preliminarily registered to all the airconditioners are being added as described on the section 10.1.1,3).

(Example)

In case of 2 HP indoor unit (FXYC50K), it brings the watts for one month during the ceased operation = 20 Wh × 24 hours × 30 days = 14.4 kWh. But for the different case that 10 HP outdoor unit (RXY10K) is connected to three indoor units with 100 % combination rate, it will show as follows;

Outdoor unit RSXY10Kx one unit	Crankcase heater's power consumption : 66 W	Monthly actual power consumption of outdoor unit 47.52 kWh (66×24×30 = 47520 Wh)
Indoor unit FXYC50K	The watts at the ceased operation (registered data) 20 W	Monthly count value 43.2 kWh (14.4×3 = 43.2 kWh)

② (W1) ≠ Count conclusive total for indoor unit #1~#5 :

(W2) ≠ Count conclusive total for indoor unit #6~#8 :

iPU counts the power consumption as the following conditions (1)~(6) for the standards. So, the gap to be raised from these conditions may cause the error. Since these errors vary depending on the surrounded situations, the worst error value can't be drawn out from the computing.

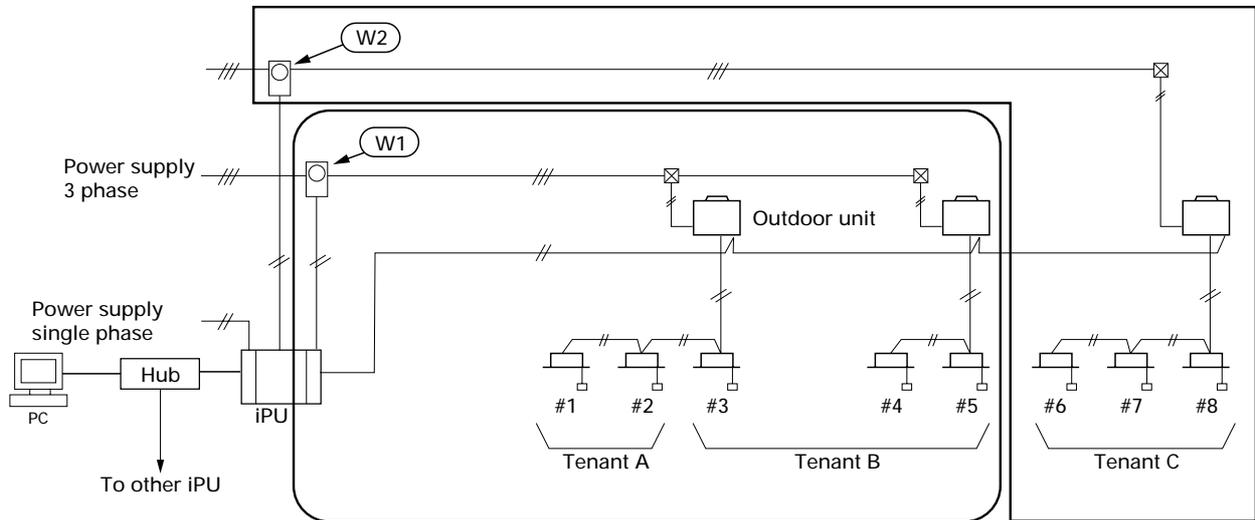
- (1) Combination rate of indoor units connected to an outdoor unit (100%)
- (2) Outdoor temperature (35°C)
- (3) Indoor unit's suction air temperature (19°C)
- (4) Piping length (5m)
- (5) Level difference (0m)
- (6) Pipe diameter (φ22.2)

10.2.2 The way to reduce errors

The error [1] can't be reduced, however this error is small and negligible, therefore so it can generally clear troubles if excusing the reason caused to tenants.

The way to reduce the error [2] will be described as follows.

As shown in the drawing below, when the relation between a wattmeter and indoor units are clear, "the setting to make grouping for power ports" should be carried out at the test run of intelligent Manager. (The actual site job will be conducted by persons of service dept responsible for the test run.)



The power input to iPU can be counted with the proportional division system based on every input of the wattmeter. On the above example, watts at W1 and watts at W2 are shared by indoor units #1~#5 and indoor units #6~#8, respectively. (Before the test run, it is necessary to enter the exact power port No. on the address table.)

The above setting results in the followings:

(W1) = Count conclusive total for indoor unit #1~#5

(W2) = Count conclusive total for indoor unit #6~#8

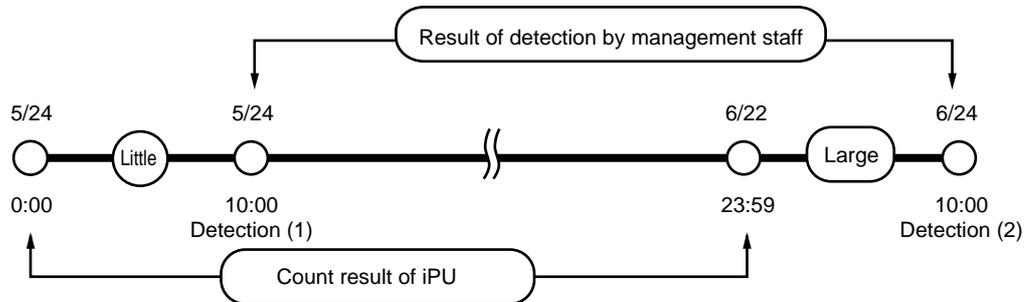
(Except for the error at [1]). However, since iPU watt input has just 18 ports, additional divisional counting is not possible.

CAUTION

If management staff checks the watts in the procedure mentioned below, they would find the calculation to be incorrect due to an uncomplete cycle.

(Example)

- (1) May/24th, read wattmeter and records the watts at 10:00 am
- (2) June/24th, read wattmeter and records the watts at 10:00 am
- (3) When the count in a period of may/24th to June/23rd is printed out, the total value doesn't meet the value detected mentioned above on (2) - (1).



iPU stores the information collected in a period of 0:00 am through 23:59 pm as one day information as shown above.

It results in the fact that there are ten hours gaps between on the first day of the counting and on the last day of the count in the above mentioned column of "Result of detection by management staff" and "Count result".

As shown in the figure above, this error increases in the season from the intermediate forwarding to the season in which airconditioning is highly required.

For more accuracy, it is necessary to compare with the value detected at 0:00 am.

11. Questions & Answers

- Q1. If the number of iPU exceeds four units (indoor unit exceeding 1024 units), what is a suitable solution?
- A. At present a maximum of 4 iPU's can only be connected.
- Q2. If only the iPU has a power interruption, what is the out come?
- A. During the power interruption, the pulse signal cannot be counted, therefore, the calculation result is reduced. (However, the 60-day calculation result is not deleted semi-permanently.)
- Q3. When is the replacement time of the back-up battery in iPU?
- A. In this model, the battery needs no replacement.
- Q4. How is the setting of centralized control address when the indoor unit is group-controlled?
- A. In case of group, call the site set mode "30" of the remote controller, and set every each indoor unit. (The same way of setting is applied in case the rate calculation for indoor unit is made and also HRV is group-controlled.)
- Q5. Is it possible to use the watthour meter with pulse output other than that specified by Daikin?
- A. No, it is not. Other than the watthour meter with conformed specifications cannot be used.
- Q6. If the watthour meter with 1 pulse/10kWh (pulse unit mistaken) is connected, is the calculated value right by allowing 10 times the distribution calculated value?
- A. No, it is not right. (Though the total of distribution calculated value is 1/10 (one tenth), the distribution calculation, when the air-conditioner is stopped, is not 1/10, therefore, there is no coincidence.)
- Q7. If the watthour meter for indoor unit is installed every each tenant, how is the indoor unit distribution specified?
- A. If the electric power of the indoor unit is to be distributed, it is required to input the pulse to the iPU through the watthour meter with pulse output and specify the distribution "Yes".
If the indication is only desired with the watthour meter (every tenant), the watthour meter with pulse output as above is not needed, and the indoor unit distribution should be specified "No".
The ordinary iPU is to distribute the power consumption of the outdoor unit and optionally function for the power consumption of the indoor unit.
- Q8. Is it possible to make a remote indication of Abnormal of iPU and air-conditioner?
- A. Yes, it is. There is each independent no-voltage contact output terminal in iPU. Use this signal.
- Q9. Is it possible to output the distribution calculated value to BMS?
- A. No. These are two different protocol systems.
- Q10. Is it possible to specify no distribution of the common-use section such as elevator, corridor, etc.?
- A. Yes, it is. However, the power source of the outdoor unit should be divided.
It is necessary to write "No" electric energy distributing in Address Table (To be registered at test run based on this table).
If the outdoor unit of the common-use section is independent from the tenant, it is necessary to connect its power source without via the watthour meter.
If the outdoor unit power is common, the power consumption of the common-use section is distributed to all the tenants, and the tenant calculation result is higher than the actual.
- Q11. What is "Electric power port"?
- A. "Electric power port" means the connection terminal of the watthour meter. Normally, "port" means the inlet/outlet for signal, etc.

Q12. How do they compare (A) Central Remote Controller + ON/OFF controller + Schedule timer, (B) intelligent Manager and (C) BACnet gateway?

A. Difference among Centralized Controllers

		Central Remote Controller +ON/OFF controller +Schedule timer	intelligent Manager	BACnet Gateway
Command, State Monitoring	Start/Stop	Yes	Yes	Yes
	Operation Mode	Yes	Yes	Yes
	Set Point	Yes	Yes	Yes
	Rem. Ctr Authority	Yes	Yes	Yes
	Room Temp. (suction)	No	Yes	Yes
	Equip Malfuncion Monitoring	Yes	Yes	Yes
Nb. of Mgt Groups		64	256-1024	256 per Gateway
Schedule Control		Weekly schedule only	Yes Annual schedule	Based on BMS
Power Proportional Division function		No	Yes	Only on RS 232C
Failure prediction (Airmet functions)		No	Yes	Yes
Connect to A/C Management Center		No	Yes	Yes
Purpose, Characteristics		A/C management of one DIII-NET line	A/Ccontrol & monitoring board for up to 4 DIII-net line	Idem (support for RS232C & BACnet)

Q13. Can iManager be connected to the BACnet?

A. No. BACnet is limited to the object list with is not enough for the mass data for the full control of VRV therefore iManager was developed.

Q14. Does iManager software have an expiry date?

A. No.

Q15. Can the history file be saved as a file?

A. Yes, but the data can only be viewed by iManager.

Q16. Can iManager be connected iController?

A. Yes, it is techically possible. However, due to cost issues this is not feasible.

Q17. What is the maximum distance for the cable between the HUB and the iPU?

A. 150 meters.

Q18. Can the iPU be directly connected to the PC?

A. Yes (with the use of a crossover connector), however we strongly recommend the use of a HUB for in the case of testing with a separate computer.

Q19. Is iManager compatible with a central controller?

A. Yes.

Q20. Does the iManager master computer need to be dedicated computer?

A. Yes.

Q21. What is the maximum distance for the cable between the iPU and the kWh meter?

A. 200 meters.

Q22. Can we connect a second HUB to the iManager system for a longer connection?

A. Yes, but the power of HUB must be supplied by a UPS.

Q23. Do I need to connect kWh meter to every outdoor unit?

A. No, although this will depend on the system design.

Q24. What is the accuracy of the Power Proportional Division?

A. That will depend on the system configuration, although you should be able to be close to 97%.

Q25. Can I connect one kWh meter to the whole installation?

A. Yes, provided that all the groups are of identical size and configuration.

Q26. Is iManager display operation real time?

A. Yes.

Q27. What is the maximum length of cable from the iPU and the modem?

A. Serial connection (a few meters). It is recommended to use the serial cable provided with the Modem.

Q28. If the D-III expander card is used, can this data still be monitored by AIRNET?

A. No. The Units under control on the D-III expander card cannot be monitored by AIRNET as this same data line is used for AIRNET.

Part 2 intelligent Manager ECO21

System name	iPU	Number of units to be connected	Remark
iM128	DAM602A52×1	128	Part 2
iM192	DAM602A53×1	192	
iM256	DAM602A51×1	256	Part 1
iM512	DAM602A51×2	512	
iM768	DAM602A51×3	768	
iM1024	DAM602A51×4	1024	

Intelligent Manager

ECO21



The increased efficiency in the operation of your air conditioning system gives you huge energy savings.

Even if an air conditioning system possesses an excellent energy efficient profile, this is meaningless unless its operation is appropriately managed. Precise operation management is the key to getting the most out of an energy efficient system. The intelligent Manager ECO21 is Daikin's energy-efficient air conditioning management system. It maximizes the performance and characteristics of air conditioning systems and further improves upon existing energy efficiency. What we have prepared for you is a highly sophisticated that only Daikin, the air conditioning specialist, could have made possible.

Saving Energy

Intelligent Manager ECO21

- Various energy efficient functions
- Refined control and optimized functions
- Expanded network functions

Highly Energy Efficiency Can ...

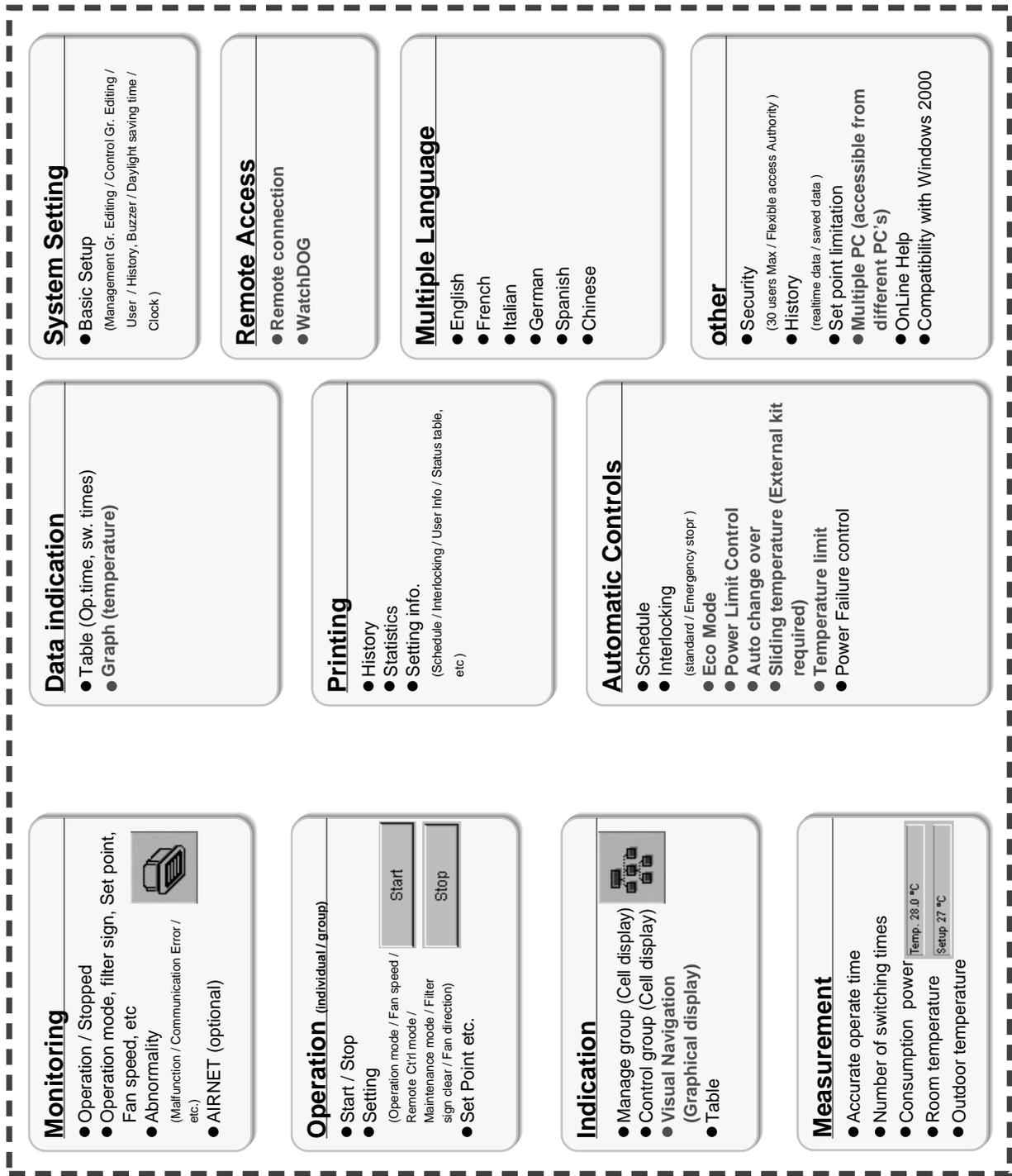
- Reduce costs on energy consumption.
- Save energy resources.
- Contribute to the conservation of global environment.

Energy efficiency Efficient control Reduced costs

%...

*this figure varies upon the size of the project and how the power saving functions have been set.

Functions and System



Monitoring

- Operation / Stopped
- Operation mode, filter sign, Set point, Fan speed, etc
- Abnormality
(Malfunction / Communication Error / etc.)
- AIRNET (optional)



Operation (individual/group)

- Start / Stop
- Setting
(Operation mode / Fan speed / Remote Ctrl mode / Maintenance mode / Filter sign clear / Fan direction)
- Set Point etc.



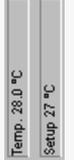
Indication

- Manage group (Cell display)
- Control group (Cell display)
- Visual Navigation
(Graphical display)
- Table



Measurement

- Accurate operate time
- Number of switching times
- Consumption power
- Room temperature
- Outdoor temperature



Data indication

- Table (Op.time, sw. times)
- Graph (temperature)

Printing

- History
- Statistics
- Setting info.
(Schedule / Interlocking / User info / Status table, etc)

Automatic Controls

- Schedule
- Interlocking
(standard / Emergency stop)
- Eco Mode
- Power Limit Control
- Auto change over
- Sliding temperature (External kit required)
- Temperature limit
- Power Failure control

System Setting

- Basic Setup
(Management Gr. Editing / Control Gr. Editing / User / History, Buzzer / Daylight saving time / Clock)

Remote Access

- Remote connection
- WatchDOG

Multiple Language

- English
- French
- Italian
- German
- Spanish
- Chinese

other

- Security
(30 users Max / Flexible access Authority)
- History
(realtime data / saved data)
- Set point limitation
- Multiple PC (accessible from different PC's)
- OnLine Help
- Compatibility with Windows 2000

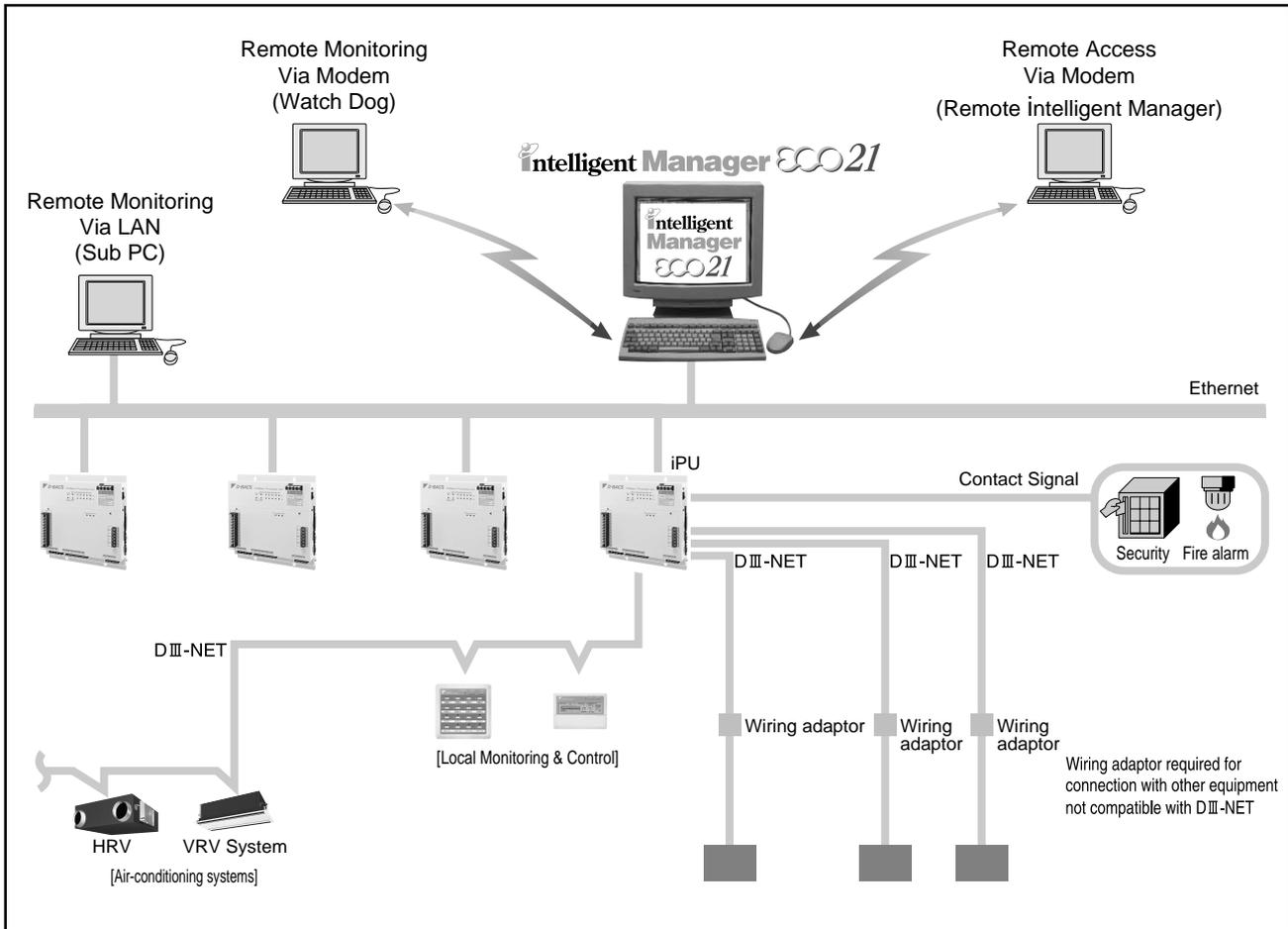
Comparison of Functions

No.	Functions	i Manager (Ver1.0)	i Manager ECO 21 (Ver. 2.0)	Remarks	
1	Monitoring	Operation/Standstill	○	○	Monitoring of operating status
		Operation mode, filter sign Set point, Fan speed, etc	○	○	Monitoring of set status such as operation mode
		Abnormality - Malfunction - Communication Error - Operation failure - Disagreement error	○	○	Monitoring of abnormality · Malfunction of equipment (Malfunction detected by air conditioner itself: Indication of abnormality code) · Communication error (Error of communication such as the communication between D3Net and iPU) · On/ Off failure (The equipment failed to follow the On/ Off command) · Disagreement error (Disagreement between the equipment operation and the iManager command)
		Defrost status	×	○	
		AIRNET Function	○	○	In addition to a separate agreement, it is necessary to be in the AIRNET applicable area.
2	Operation	On/Off	○	○	On/Off operation
		Setting - Operation mode - Fan speed - Remote Ctrl mode - Maintenance mode - Filter sign clear	○	○	Setting operation · Operation mode · Fan speed · Setting of remote controller operation prohibited/permitted · Under inspection mode (Monitored/controlled items are temporarily cancelled) · Filter sign clear · Discharge air direction
		- Air discharge direction	×	○	
3	Indication	Manage group (Cell display)	○	○	Control by multiple floor group
		Control group (Cell display)	○	○	Group control for blanket operation
		Graphical Screen (Layout display)	×	○	Graphical user interface Indication of such as floor plan on iManager display
		Table	×	○	Indication of monitoring status by table
4	other	Security - 30 users Max - flexible Authority	○	○	Setting of operation authority Registration of up to 30 persons is possible Various of operation of Operable/ Not operable can be set to each user
		History - real-time data / saved data	○	○	History function Cumulative data of such as On/Off status change and detected abnormality over a year
		Set point limitation	○	○	It is possible to designate the upper and the lower limit of remote controller temperature setting * Forced energy saving operation is possible by narrowing the range of temperature setting
		Multiple PC (accessible from different PC's)	×	○	It is possible to install the 2nd PC as PC for Monitoring/Operation
		OnLine Help	×	○	
		Compatibility with Windows2000	○ (ver1.4)	○ (ver1.4)	In addition to WindowsNT, Windows2000 is compatible
5	Measurement	Accurate operating hours Number of switching times	○	○	Measuring function · Operating hours, Number of times of On/ Off
		Consumption power	○	○	· Power consumption (function of proportionally dividing power) WHM (1pulse/1kWh) is necessary Design and commissioning are required for the sake of proportional division of power
		Room temperature	○	○	· Measurement of inlet air temperature as room temperature
		Outdoor temperature	×	○	· Measurement of sensor temperature of outdoor unit as outdoor temperature Use of OMRON sensor
6	Data indication	- Table (Op.time, sw. times)	○	○	· Indication of measured results (operating hours, number of On/ Off times, power consumption) by list (Excel is required)
		- Graph	×	○	· Graphical indication of measured results (room temperature, outdoor temperature)
7	Printing	- History - statistics	○	○	
		- Setting info. Schedule, Interlocking , User Info Status table, etc	×	○	
8	Automatic Controls	Schedule	○	○	Automatic control function · Operation according to the schedule Setting according to the weekly and yearly calendar In addition to On/ Off operation, setting of temperature, setting of operation mode, setting of remote controller Permitted/ Prohibited are possible

No.	Functions	i Manager (Ver1.0)	i Manager ECO 21 (Ver. 2.0)	Remarks	
8	Automatic Controls	Interlocking - standard - emergency stop	○	○	· Linked control Linked control for general purpose:On/Off of equipment and such are possible by using the operation status change and the abnormality occurrence as triggers Emergency stop control:Contact input such as fire signal can bring the designated air conditioners to forced stop.
		Energy saving (ECO MODE) (Power limit control)	×	○	· Energy saving control Intermittent operation control:Realization of energy saving by repetition of On/Off Target power consumption control:(Set temperature control by priority order control) · Design/ Installation of electric power system are necessary · WHM is required (If the size of a building is something that consumes 400kWh, 20pulse/1kWh is required)
		Auto changeover for Heat recovery VRV (DIL spec.)	○	○	· Automatic Cool/ Heat changeover - For the Heat Recovery type VRV, changeover of Cool/Heat by room temperature measured results (current iManager) - For non-Heat Recovery type VRV, changeover of Heat/Cool by room temperature measured results and simulation of BS unit
		Auto changeover for non-Heat recovery VRV (DENV spec.)	×	○	
		Sliding temperature	×	○	· Room temperature setting function linked with the outdoor temperature - Outdoor temperature measuring method External kit required For accurate measurement, use the OMRON sequencer and sensor terminal The cost of a sequencer and such are required (See http://www.omron.com) Installation of a sequencer is required
		Temperature limit (Automatic start)	×	○	· Automatic operation linked with the room temperature
		Power Failure control	○	○	· Power Failure/Recovery control - UPS is required - Contact signal to notify the power failure occurrence is required Globally available APC SU-1000/700 + Relay I/O are recommended (There is a power failure signal)
9	System Setting	Basic Setup - Management Gr. Editing - Control Gr. Editing - User - History, Buzzer - Daylight saving time - Clock	○	○	System setting Registering/ Editing of management group, control group Registration of the users and setting of the user's operation authority Setting of history function Setting of daylight saving time Setting of clock
		Remote control for service work	○	○	Remote control · It can be used for the purpose of maintenance
10	Remote control	Watchdog	○	○	The basic policy is applied by AIRNET mounted with predictive function * As a special case, it supports the Watch Dog which only alarms the detected abnormality of equipment
		Software (Main part)	English only	○	
11	(Multiple Language) - English - French - Italian - German - Spanish - Chinese	Peripheral Engineering tool (English only)	○	○	
		Document (Eng,Fr,Ge,It, Sp) - Operation manual - Engineering manual - Online help	English only	○	
		- Management Point tool - PC setting tool - iPU setting tool - Eng. Tool for proportional division of power - Eng. Tool for AIRNET	○	○	Engineering tools · Tools for creation of customized data - PC setting function - iPU setting function - Management point registering function · Commissioning tool for proportional division of power · Commissioning tool for AIRNET
12	Engineering tools	- Graphical Screen creating tool	×	○	· Tool for creation of graphical display (Tool for allocation of monitoring points of such as air conditioners) - VISIO and PowerPoint are required as a drawing tool for creation of floor plans
		- Demonstration version (simulation version) for off-line engineering	○	○	Demonstration-version and the environment of engineering in advance (simulation environment) under the state of iPUless

1. System Image

■ An Overview of the intelligent Manager ECO21 System



2. Series and Components

■ The Intelligent Manager ECO21 Series and its Components

Products name *1	IM-128	IM-192	IM-256	IM-512	IM-768	IM-1024
Max number indoor units	128	192	256	512	768	1024
Max number outdoor units	20	30	40	80	120	160
PC,UPS,etc.	Local Procurement					
Hardware model name *2	DAM602A52	DAM602A53	DAM602A51x1	DAM602A51x2	DAM602A51x3	DAM602A51x4
PPD (Power Proportional Distribution)	Yes *2					

*1 Products name is recognized as an order number. This includes hardware, software and field engineering work as a package.
 *2 kWh meters to be locally supplied.

3. Specification

■ Main specification

Item		Requirement Specification
PC	Performance	CPU:Pentium300MHz,Memory:64MHz,HDD:4G
	Network	10Base/T Ethernet
	Operation	Keyboard/Mouse,Sound and Speaker
	Software	Windows NT (Ver4.0(SP4 or later)) Windows 2000
CRT	SVGA	800x600, 1024x768
Printer		A4 Page Printer
Network Equipment		Multi Port HUB (4 or more parts)
iPU intelligent Processing Unit	Backup for power failure	Data are filed into nonvolatile memory
	Transmission	DIII-NET std:1 line, Max 4 lines/1 iPU
	Power supply	AC100~240V±10%, 50/60Hz, Max 20W
	Ambient temperature	-10~+50°C
	Ambient humidity	0~98% (condensation is not acceptable)
	Dimension,mass	260(W)x281(H)x58.5(D)mm, 4kg

■ UPS(e.g. APC SU700, 1000 series)

Item		Requirement Specification
UPS	Capacity	200~250W/20min
	Voltage	As required
	Control signals	Power failure signal (from UPS) UPS shut down signal (to UPS)
	Relay	I/O module (AP9610)

■ WHM

Item		Requirement Specification
kWh meter	Pulse transmitter	<ul style="list-style-type: none"> ● 1 pulse to 1kW or 10kW pulse width must be within 40-400m/sec. ● Output relay must be mercury or electronic type only. ● No voltage output.

4. Functions

4.1 Local Functions

■ Local Function

Item	Description
Monitoring	Operation status monitoring for 64 indoor units (10 outdoor units)~ a maximum of 1024 indoor units(160 outdoor units),when 4 iPUs are connected;* AIRNET:Air conditioner failure prediction (optional); Continuous operation time monitoring (per management point); Power failure monitoring
Control, Operation, and Settings	Login setting; Individual control; group switching/ setting of control group (100 groups); Schedule control (128 programs); Fire emergency stop control (32 programs); Power failure/ release control (selected from 5 power restoration modes); Air conditioner centralized control
Display	Management point name/icon/list display; Control group list display; Screen scroll function; Operation time display; Integrated switching number display; History display (malfunctions, alarms, control)
Measurements	Operation time integration; Switching number integration; Meter reading (through Pi port on iPU); Power proportional reading (optional: 256 units)
Management	Operational history management; Generation of daily, monthly and yearly reports; VRV power proportional distribution (optional: 256 units)
Data Storage/ Report	Print output; Data storage
Warning	Emergency signal input

* If exceeding the stated number of outdoor units, DIII-NET Expander Adapter <DTA109A51> allows easy system connection as long as restrictions are observed.

5. Functions of intelligent Manager ECO21

5.1 Maximizing energy efficiency, while maintaining room comfort

■ Power Limit Control

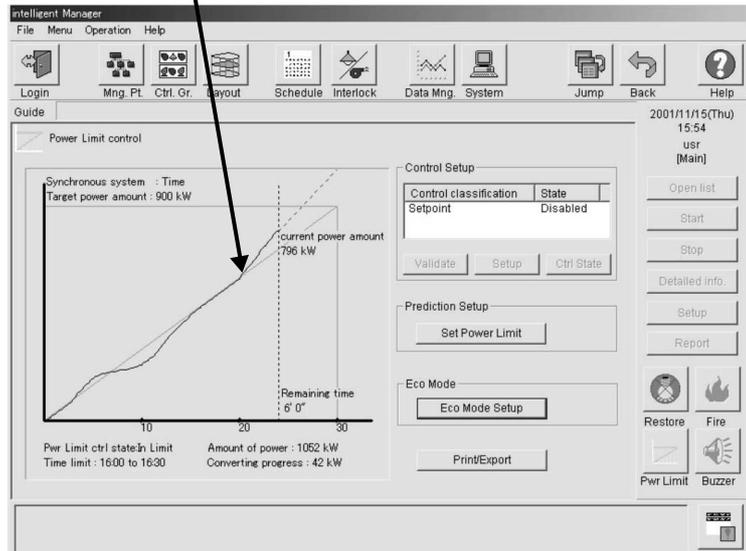
Enables systematic management of A/C power consumption.

Providing control via prediction of A/C operation in order to limit power consumption to the set targets.

Accordingly, this enables users to systematically manage A/C consumption of electrical power, which until now has been an uncertain.

- Flexible group configuration
- Set Point,
- real time control
- 30 minutes prediction time

• Power consumption prediction based control.
Provide more comfortable environment

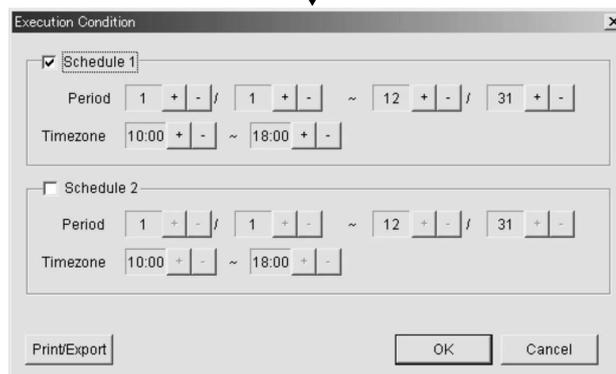
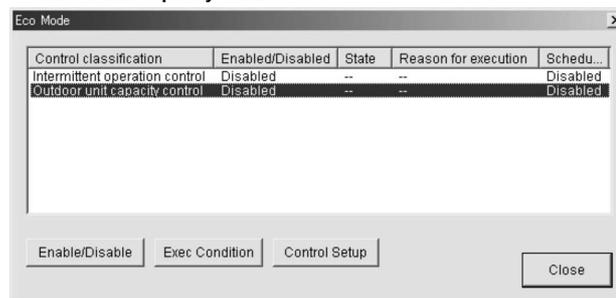


■ ECO Mode

Reduces power consumption by 10 to 20%, while maintaining room comfort.

Based on a predetermined schedule, the intelligent Manager ECO21 executes capacity control and intermittent operation of A/Cs so as not to increase the discomfort index.

- Flexible group configuration
- 2 control types:
- Alternative stop control
- Outdoor unit capacity control

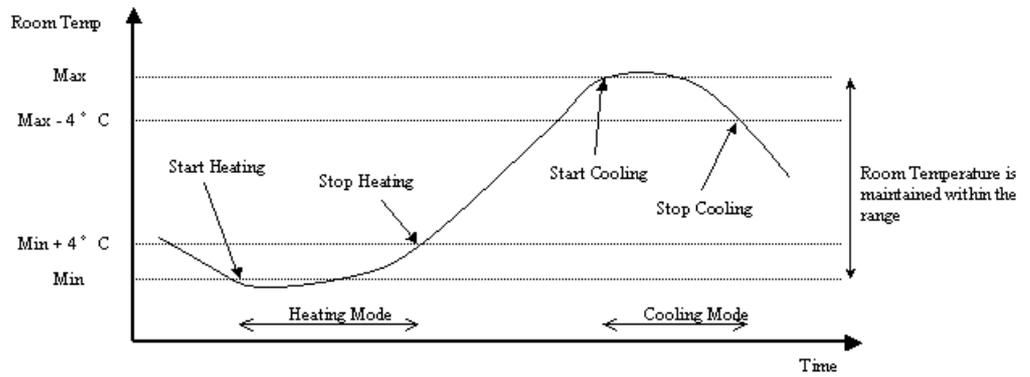
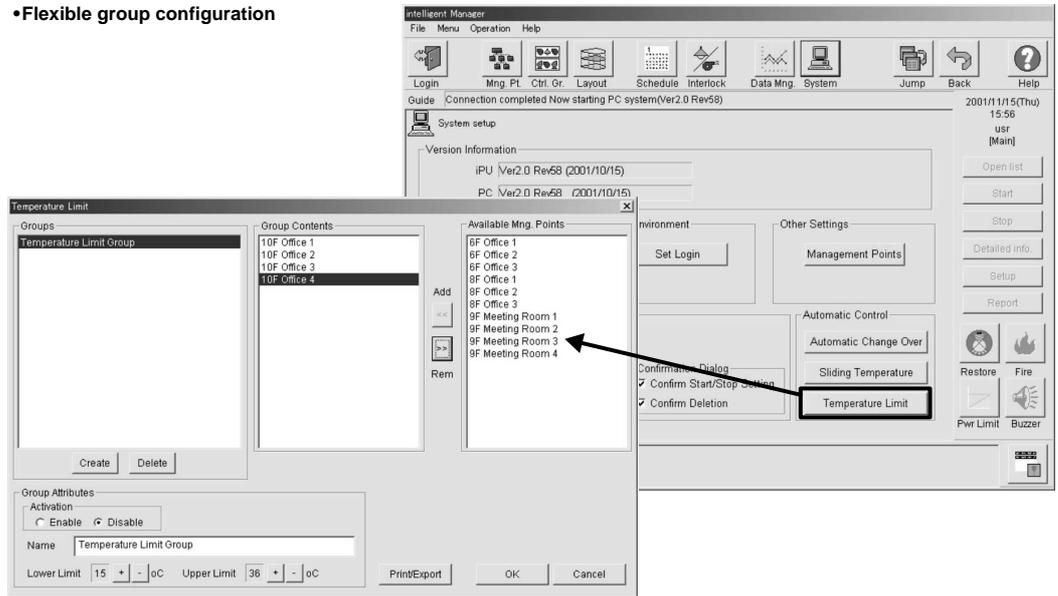


■ Temperature Limit

Provides the appropriate operation management by limiting the maximum and minimum temperatures.

intelligent Manager allows users to put limitations on the maximum and minimum room temperatures and ensures an appropriate room temperature via automatic control.

•Flexible group configuration



Room Temperature and Operation Mode

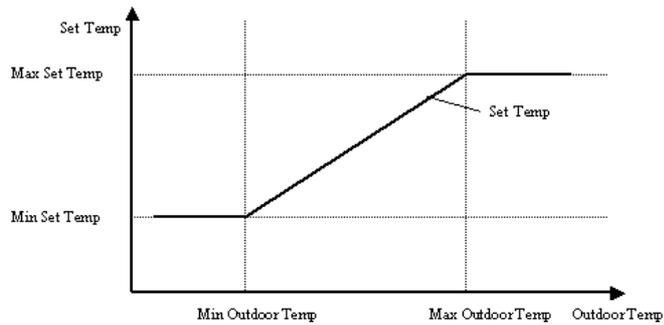
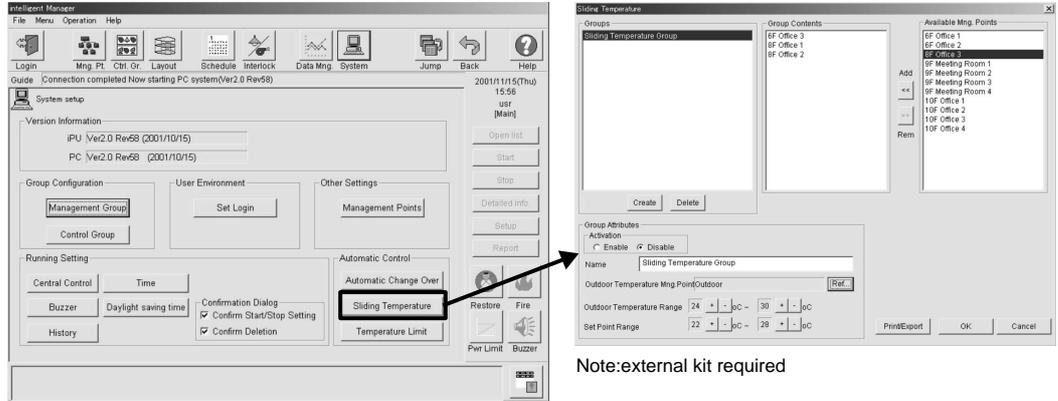
■ Sliding Temperature

The intelligent Manager ECO 21 eliminates overcooling via sensory comfort control.

intelligent Manager outdoor temperature and automatically controls room temperature settings all in order to minimize drastic temperature differences with the outdoors.

Along with energy efficiency, intelligent Manager also can eliminate any uncomfortable cold shock around building entrances and the like.

•Flexible group configuration



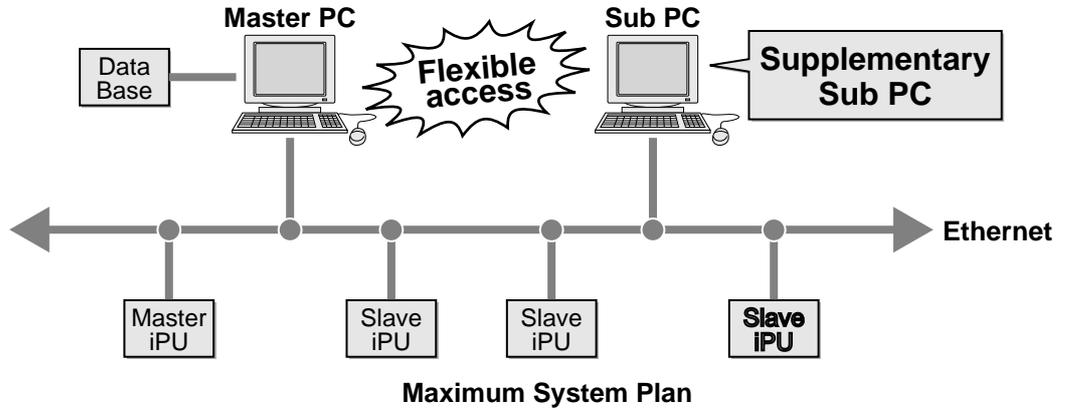
Relation between Outdoor Temperature and Set Temperature

5.2 Allowing flexible network configurations in response to specific needs

■ Multi-PC

The intelligent Manager can be connected to existing LANs, contributing to a reduction in costs.

Because air conditioners equipment and the Intelligent Manager ECO 21 can be easily connected to existing LAN networks, users can reduce installation costs.



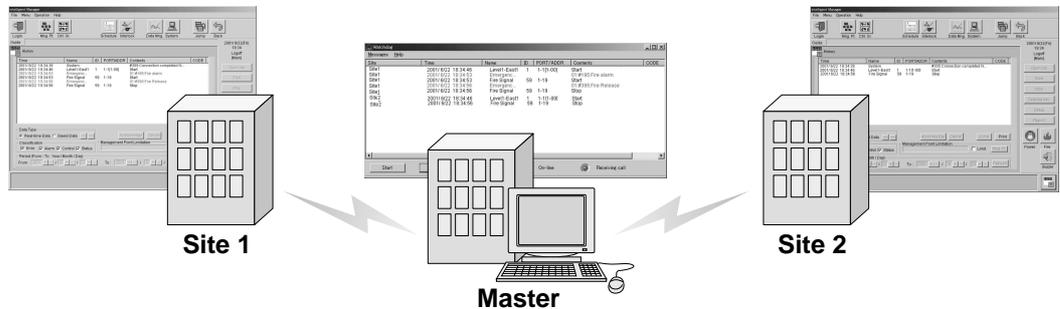
■ WatchDOG

Large-scale maintenance systems can be run at low costs.

The system can receive error messages from air conditioners in more than one building or structure via public phone lines. This allows the user to configure an appropriate maintenance system over a broad area at the lowest of costs.

Watchdog (telephone remote monitoring):

- Transmit Malfunctions, etc
- Configurable retry
- Alternative phone Nr
- Remote monitoring :
- Printer
- File backup
- Multi sites

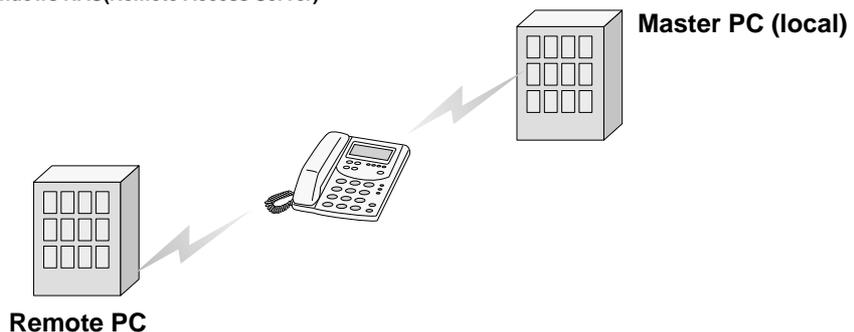


■ Remote intelligent Manager

Flexible management of air conditioners equipment from a multiple number of buildings.

It enables flexible monitoring and control of remote air conditioners equipment via public phone lines. air conditioners equipment in more than one building can be managed from one location, making it easy to reduce system management costs and bring consistency to the system environment.

- Remote Control & Monitoring, Data Management, etc
- Based on Windows RAS(Remote Access Server)



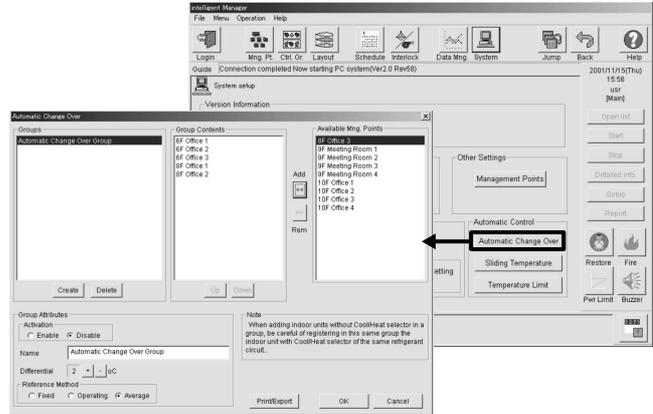
5.3 In addition, various functions provide the user with comfort and enhanced laborsaving management

■ Automatic Changeover

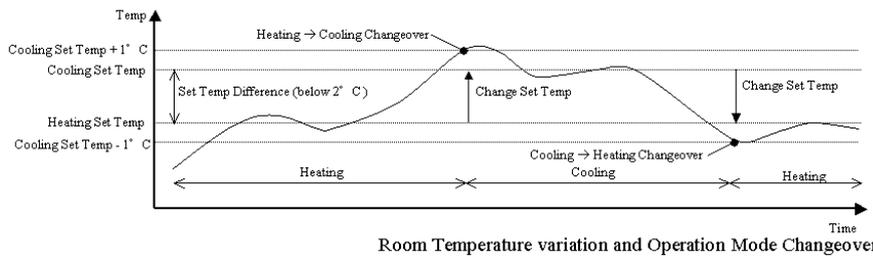
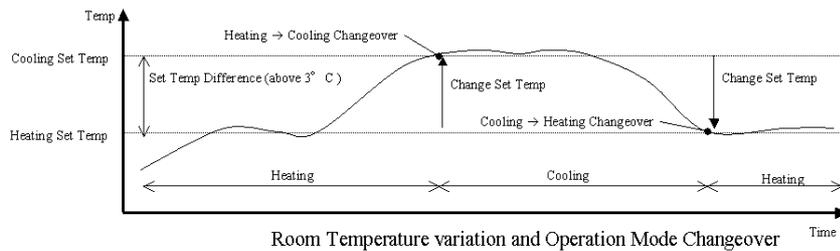
Increases comfort and saves on labor required in managing system operation.

The intelligent Manager ECO 21 measures room temperature and automatically changes over between cooling and heating modes depending on the set temperature. This provides comfort by enabling selection of the appropriate mode and takes the human factor out of changeovers.

- Flexible group configuration
- 3 selection methods



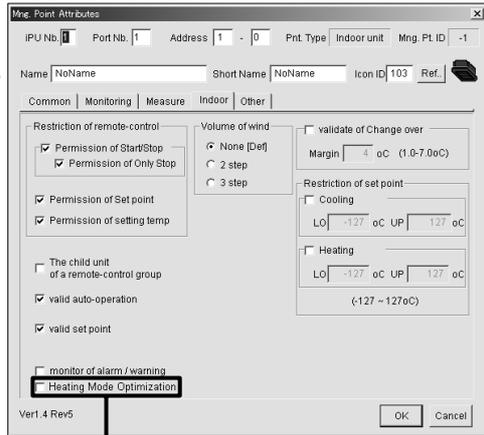
● Fine grained temperature control



■ Heating Optimization

This eliminates the uncomfortable feeling when the room temperature is too high and increases overall system efficiency. The intelligent Manager ECO21 completely stops the operation of room units to effectively eliminate the uncomfortable, continued rise in room temperature that occurs even when room temperature has reached the set temperature, which is a characteristics of heating operation in VRV systems.

•Flexible point configuration

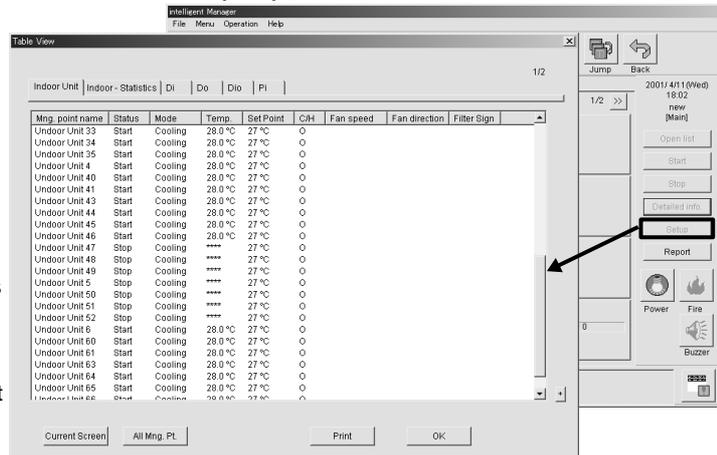


Check box to enable Heating Mode Optimization

■ Table Report

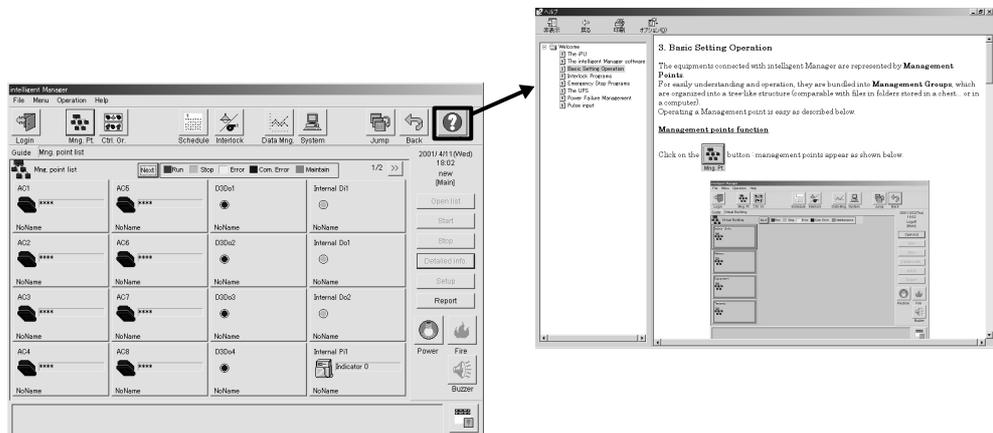
The operational status of a multiple number of air conditioners can be ascertained with just one look. Users are able to ascertain any abnormalities or malfunctions pertaining to the operation status or setting of a multiple number of air conditioners via list displays. This enables the user to manage the system in an appropriate and expedient manner.

•Complete points information



■ Online Help

No need for manuals. Through the intelligent Manager ECO21 system you'll receive attentive support for all your needs. The onboard help function provides aid when users do not understand operation procedures and when trouble shooting. It provides support for even beginners.



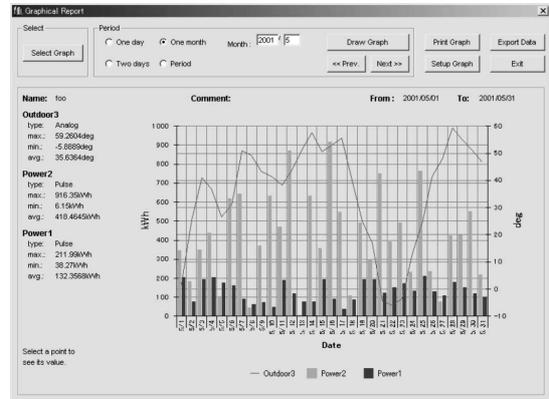
■ Graphical Report

Displays minute changes in easily understood terms via graphical expression.

The intelligent Manager ECO21 can provide graphical displays of all the operational and measurement data and coherently express changes and comparisons that would otherwise be difficult to grasp with mere tables. Depending on the particular purpose at hand, the Graphical Report can be switched back and forth between the Table Report.

- Flexible configuration to display:
- Temperature
- Analog Input
- Power Consumption
- Pulse Meter
- Operation Time
- Indoor units,
- Digital Input,
- Digital Output

• Temperature and Power consumption can be shown in same graph

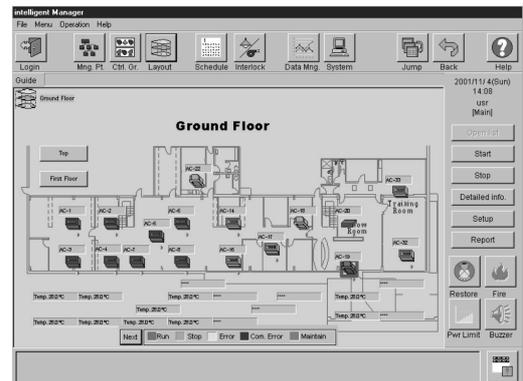


■ Visual Navigation

Facilitated management through displays of the layout (Optional)

One of the possible options is a flexible screen configuration system that increases the freedom users have by allowing to perform various tasks such as decisions concerning the location of individual air conditioners units with respect to the actual layout of the building.

- Flexible components configuration (background & links)
- 3 active types:
 - Icons
 - Buttons
 - Real time info

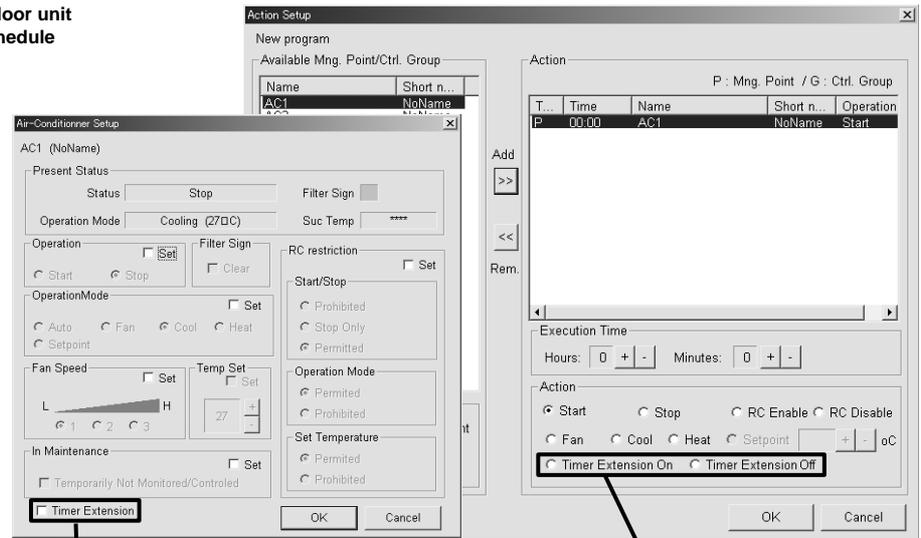


The system components (management points or control groups) are displayed (and dynamically refreshed) on a background image (plain or elevation view) That appear as:

- Attributes same information as cells of a management point (operation state, room temperature, etc)
- Icons:same icon as in a cell of a management point control group;in this case the same color states and actions as corresponding cell are supported (start, stop, detailed information, such as setup, etc)
- Buttons:Navigation links to other free layout screens

■ Timer extension (action off after 2 hours)

- By indoor unit
- By schedule



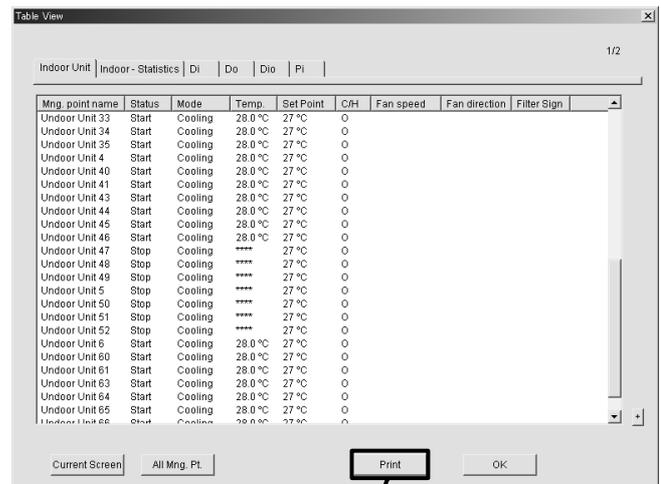
Check box to enable the Timer Extension

Action to enable the Timer Extension

This function is beneficial for example in the event of forgetting to switch off the building A.C. when leaving in the evening. This has the potential to save energy.

■ Printout displays of main functions (printer & csv file)

- For all main function
- Printer
- File (csv)

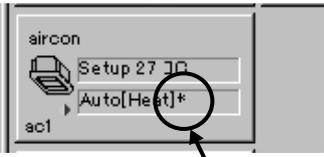


Print

■ Defrost status (display)

•Indication for each indoor unit

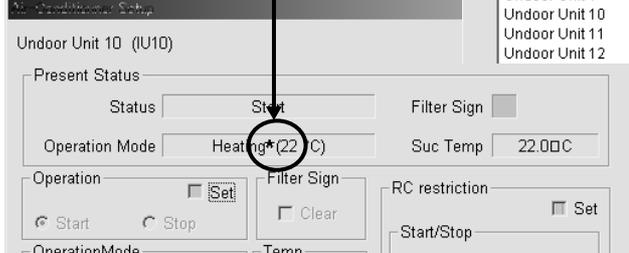
Cell



Defrost status is shown by "*"

Table View

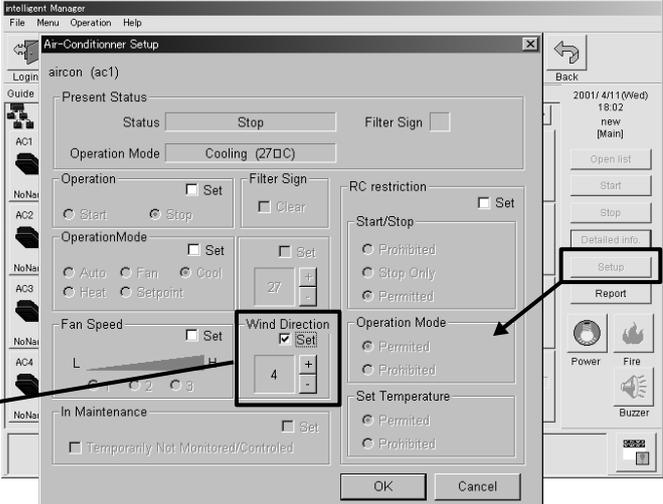
Mng. point name	Status	Mode	Temp.	Set Point	C/H
Indoor Unit 22	Start	Heating*	22.0 °C	22 °C	0
Indoor Unit 3	Start	Heating*	22.0 °C	22 °C	0
Indoor Unit 42	Start	Heating*	22.0 °C	22 °C	0
Indoor Unit 62	Start	Heating*	22.0 °C	22 °C	0
Indoor Unit 1	Start	Heating*	22.0 °C	22 °C	0
Indoor Unit 10	Start	Heating*	22.0 °C	22 °C	0
Indoor Unit 11	Start	Heating	22.0 °C	22 °C	0
Indoor Unit 12	Start	Cooling	22.0 °C	22 °C	0



■ Fan speed/direction monitor & control

•Setup for each indoor unit,
•Status in Table Report

New Control
(directions & Swing)





The air conditioners manufactured by Daikin Industries have received **ISO 9000 series** certification for quality assurance.

Certificate Number.
(ISO9001) JQA-0486 (ISO9002) JQA-1452
JMI-0107
JQA-0495



The airconditioning factories of Daikin Industries have received environmental management system standard **ISO 14001** certification.

Shiga Plant
Certificate Number. EC99J2044
Sakai Plant
Certificate Number. JQA-E80009
Yodogawa Plant
Certificate Number. EC99J2057

Dealer

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